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Table of Contents

FOREWORD

Prof. Kaminishi
Chair ICIM2016 ,Yamaguchi Univ.

On behalf of the organizing committee of ICIM, I am pleased to welcome you to the 13th meeting held at Malaysia-Japan International Institute of Technology (MJIIT), Universiti Teknologi Malaysia in Kuala Lumpur, Malaysia from November 28 to 30, 2016. We hope that you benefit from the program content as well as guests you will meet during the conference activities.

'Management of Technology (MOT),' 'Innovation Management' or whatever it might be called, just as its name says, the underlying theme of ICIM, has rapidly achieved its popularity across the globe since ICIM gave its first cry. While we are grateful to witness the rise of societal cognition on the research field, we are somewhat embarrassed to see the diminishing opportunities of meeting researchers who don't research management of technology as it affirms its own identity. The ICIM of this year is therefore jointly held with the International Symposium on Asia MOT Education (ISAME). The hot topic of the ISAME 2016 focuses on the education and application of Intellectual Property (IP) because we would like the ICIM to be a 'field' providing a good chance to run into cutting-edge research in other field and inducing 'chemical reaction' as well as marking the frontier of MOT research, particularly the intellectual property awareness in this Asian region is yet at early stage and not all of researchers, students or practitioners have a clear understanding of IP in research, education and application.

I hope that your participation in ICIM2016 and ISAME2016 will be enjoyable and memorable one.

FOREWORD

Dr. Mohammad Ali Tareq
Co-Chair ICIM 2016, MJIIT UTMKL

On behalf of the organizing committee, I welcome you to the 13th International Conference on Innovation and Management (ICIM) 2016 and International Symposium for Asian MOT Education (ISAME) 2016, co-hosted by Malaysia Japan International Institute of Technology (MJIIT), UTM and Yamaguchi University (YU), Japan at UTM, Kuala Lumpur.
To promote the research on innovation management and to establish an international annual academic conference for facilitating researchers and experts in applied research on Innovation and Technology Management, top universities in this field from 6 countries have been organizing this international conference from the year of 2004. The International Conference on Innovation and Management has proven to be a high-profile event for leading international scholars in the area of management and innovation and has become a premier conference among researchers, academician and practitioners. This conference is of special significance to the academics and the professionals.

The theme of this year's conference is "***Global Collaboration for Sustainable Innovation***".

The aim of ICIM 2016 is to provide opportunity for researchers to present their findings on innovation and management as well as to create opportunity for the exchange and synthesis of new knowledge on innovation and technology management and Intellectual property. This conference will provide opportunities to interact with researchers from around the world and will provide the platform to share the contemporary research trends and experiences towards sustainable innovation. I am happy to note that participants from various disciplines are contributing to this conference. More than 85 papers will be presented from 12 countries.
Selected papers from the conference will be included in the special issue of the Malaysian Construction Research Journal (MCRJ), a Scopus indexed multidisciplinary journal as well as in RISUS- Journal on Innovation and Sustainability**, published under the consortium.**

I hope that participants will obtain useful feedback on their current research work and will gain insight and idea on potential future research and collaboration with other researchers.
I wish all the participants of ICIM2016 a meaningful and interesting event.

FOREWORD

Prof. Datin Dr. Rubiyah bt. Yusof
Dean MJIIT, UTMKL

It is my pleasure to welcome the participants of the 13th International Conference on Innovation and Management (ICIM) 2016 and International Symposium for Asian MOT Education (ISAME) 2016, co-hosted by Malaysia Japan International Institute of Technology (MJIIT), UTM and Yamaguchi University (YU), Japan at UTM, Kuala Lumpur.

MJIIT, established in 2010 as a result of cooperation between the government of Malaysia and Japan, intended to be the engineering education hub for ASEAN region. It has three engineering departments- Mechanical Precision Engineering (MPE), Electronic Systems Engineering (ESE) and Environmental Engineering and Green Technology (EGT), and the department of Management of Technology (MOT) with a blend of Malaysian, Japanese and International staff. 'iKohza', the unique research laboratory system which is set up with the collaboration among Japanese University Consortium (JUC) members, Japanese industries and the government, initiate the transfer of knowledge and technology among the researchers at MJIIT.

As a part of the international collaboration in research and education, MJIIT and Yamaguchi University have jointly established an international research laboratory at MJIIT. This International Joint Intellectual Property Laboratory (IJIPL) aims to be the center of excellence in Management of Technology research, with special emphasis on intellectual property, in ASEAN region. As the partner of this joint research laboratory, Yamaguchi University will extend their expertise in IP research and education. The aim of the IJIPL will be to share technology transfer resources and expertise to deliver a professional and responsive service to Industry, spin out companies and our academic communities. The joint research laboratory will increase Industry engagement with its members and will provide enhanced support for existing and new companies.

This conference will be the platform to share the contemporary research trends and experiences in regional common issues as well as to explore research work on Innovation and Intellectual Property from Japan and other countries. I hope you will take advantage of this opportunity and contribute, through presentations, discussion and interaction, to the development of new ideas and new directions in innovation management and Intellectual property.

RESEARCH PRESENTATION

Theme 1:

Innovation in Technology, Manufacturing, R&D, Organization, Business and Service Quality Management

Digital Library Access, Requirements and Usability Attributes: A Systematic and Critical Review of Literature

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Abstract In recent years, digital libraries (DLs) have changed the whole process of information handling. DLS is becoming the lifeline for all human activities in terms of collection, organizing, storing, retrieval and dissemination of information. This paper examines the access and usability aspect of DLs by undergraduate students in Nigeria. The paper describes the concept and significance of digital library from the global perspectives down to Nigerian environment. A number of published literatures in the area of DLs were identified and critically evaluated. From the review, the paper reports the basic understanding of the body of knowledge on the access and usability attributes of DLs. The paper emphasizes that easier and wider access to information is often touted as a primary benefit of digital libraries. In addition, a number of basic requirements and rubrics for understanding the access and usability attributes of digital libraries have been extracted and reported. The paper concludes with a cross-examination of the challenges such as erratic power supply, poor network connectivity; indifferent attitude of digital library staff etc. as those major obstacles that affects students when using the DLs. The paper recommends that efforts must be made to ensure wider access to digital collections through the provision of adequate access points, adequate digital facilities; availability of network and alternative power sources.
Key words Digital Libraries, Access, Usability attributes, Nigeria

1 Introduction

Universities are expected to provide theoretical and practical training to their communities for the overall development of the nation as a whole. Universities are generally considered as a system which is made up of people with different backgrounds in terms of needs, skills, talents, status, competencies, knowledge, behavioural styles, interest and perceptions Alakpadia[1]. In this regard, universities are the communities of those who teach and those who learn with the noble vision and mission to generate, expand, and disseminate knowledge in all disciplines for the advancement of human civilization. They also produce highly skilled graduates with a capacity for life-long, critical, conceptual and reflective thinking which is achievable through active involvement and support of university libraries. University library provides information resources and services for teaching, learning, and research consequent upon which become an integral part of any institution. The advent and emergence of ICT has become increasingly popular which brought beneficial developments to higher education particularly in making information resources available in almost all fields of human endeavours. Consequently, many traditional libraries and archives have attempted to revolutionize and keep up with new technologies by developing digital libraries (DLs) Jeng[2].

The emergence of digital libraries has provided more opportunities for users to access and utilize a variety of information resources Bowden & Viler[3]. They further stressed that, in the digital age, the speed of learning and research has become vital differentiator for institutions and individuals in the pursuit of knowledge and in conducting research. Internet which is the backbone of DLs has greatly influenced the way learning and research is taking place quickly. Digital Libraries can be seen as a major hypermedia environment, and possibly the largest information system being used in the world. Digital Libraries have

evolved to become storehouses of information that are available through the Internet. In this regard, Digital Libraries are medium that link students with the acquisition of information and knowledge that influences the learning styles of learners in a multi-dimensional ways. DLs enable users to become independent lifelong learners and use information ethically and legally to solve problems. In this connection, the concept of DL is unlike other traditional libraries; rather it is the metaphor for the entire learning process which is part of the responsibilities of all library stakeholders to have a clear perception and involvement in developing and promotion of digital libraries accessibility and usability. Blandford [4] noted that, ample evidences such as accessing and retrieving very vast information in the world over have shown the relevance and rationale of DLs in the process of learning and research especially in the developing world.

This paper examines the access, requirements and usability attributes of digital libraries and undergraduate students' searching skills and utilization in a Nigerian Federal University; Abubakar Tafawa Balewa University, Bauchi (ATBU) through a critical and systematic literature review. Understanding usability attributes of DLs and searching skills of the undergraduate students will provide the university management in depth understanding of the need, relevance and importance of digital libraries in supporting teaching, learning and research as well as in enriching university students' independent lifelong learning needed for academic and employability standard. In addition, stakeholders of education like the universities, NUC, NRDC, TETFUND, and other regulatory body in planning and policy formulation that will strengthen digital library services in their various institutions.

2 The concept and significance of Digital Libraries (DLs)

The concept of DLs can be seen from the perspective of network of networks connecting millions of computers located throughout the world by different organizations, governments, industries, academic institutions, people etc. In simple term, Omekwu[5] described digital libraries as, a set of electronic resources and associated technical capabilities via internet protocol for creating, searching and using information. The Digital Library Federation (DLF) (2012) defined digital libraries as "organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access, interpret, distribute, preserve the integrity, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities. Similarly, Debel, & Chapman[6] defined a digital library as an organization, which might be virtual, that comprehensively collects, manages and preserves for the long term rich digital content, and offers to its user communities specialized functionality on that content, of measurable quality and according to codified policies.

Therefore, a digital library is not a single entity of itself, rather it requires technology link the resources of many collections. The links between digital libraries and their resources are transparent to users. Digital library collections are not limited to document surrogates (bibliographic records). They are the actual digital objects such as images, texts, etc. It is a network that consists of millions of similar domestic, institutions, business etc. networks which together carry various information and services. Digital libraries through the Internet protocols involve the use of e-mail, telnet, file transfer protocols, web service, the application of search engines such as yahoo, Google, Alta vista, mamma, Infoseek, etc. make things easy in getting information. Through the digital libraries, one can access full text data bases, bibliographies, library catalogues on OPAC, electronic mails, journals etc.

In recent years, digital libraries have changed the whole process of information handling. The information scenario today comprises a whole lot of disjoint sources available around the world. Madu[7] stated that, digital library serves as a backbone and connects to these sources of information irrespective of their location. He further stated that, in present scenario digital library has become the lifeline for all human activities in terms of collection, organizing, storing, retrieval and dissemination of information. Digital library has allowed scientist, researchers, students, doctors, journalists, businessmen,

educationists, politicians and the common man to have access to valuable resources scattered in various forms in different part of the world. Today, information is the most vital resources for any kind of activity, and digital libraries are playing a key role to support teaching, learning and research in the academic environment. DLs are constructed, collected and organized by and for a community of users and their functional capabilities support the information needs and uses of that community Saracevic & Covi[8]. The undergraduate students in universities constitute an important segment of the library user community. Consequent upon the understanding of their information needs and searching mechanism with regards to DLs become imperative for effective service provision.

3 Access and usability attributes of DLs

Access includes a whole process to make information in the document usable to users. The scope of the information access is more closely related to the theory and practice of the digital libraries than information retrieval. Easier and wider access to information is often touted as a primary benefit of digital libraries. Claims such as the world's information at your fingertips" and "desktop access to entire library collections are commonplace. Accessibility of information resources is widely accepted as a primary determinant of extent of its use Dillion,[9]. Chowdhury[10] did a meta-analysis of empirical work on the relationship between accessibility to use. They found that propositions on information use most commonly validated in empirical studies were that information-channel use is a function of channel accessibility, perceived cost and user awareness. Accessibility of information resources is usually assumed to depend on a range of cognitive, social and physical factors such as whether a person is aware of a resource, has the knowledge and skills needed to access it, and has the resources close at hand. Cunan[11] explored dimensions of accessibility and in analysing people's perceptions of physical access to information resources in different venues, equated the ability to enter a library with the ability to gain access to a computer terminal and find the system up. In addition to the availability of a working system, Borgman[12] concludes that online public access information-retrieval system are hard for people to use because they require a combination of basic computing skills and knowledge of how to formulate and execute searches.

DLs have changed the way humans interact with information in terms of its origination or creation, selection, acquisition and delivery as well as its storage. As long as there is an internet connection available within the DL and the user has an appropriate access device, the requested information can be accessed from anywhere at any time. Moreover, in so doing, DLs have introduced learning especially distance learning, to new dimensions. This fact has increased the necessity for learning and in combination with the new technology opportunities, has led to the emergence of e-learning. DLs has been identified as the enabler for individuals and institutions to keep up with changes in the global world of academia that now occur in Internet era and it is one of the most significant recent developments in the Information System (IS) industry Wang[13]. E-learning solutions facilitate the delivery of the right information and skills to the right people at the right time. Similarly, Agbonlahor[14] also stated that, the adoption and use of digital libraries in higher institutions could facilitate access to unlimited and current information for learning and research irrespective of geographical location and time. Therefore, use of digital libraries centres in African schools and especially Nigeria could provide college and university students, lecturers and researchers the opportunity to bridge the knowledge gap between them and their counterparts in developed countries. Buttressing this need, Jeng[2] stressed that, digital libraries have to be designed and developed in such a way that their use and usage would be simple, easy and error free that would yield satisfaction. That mean they have to have usability.

Usability is considered as one of the most important factors of DLs by many writers, Alakpadia[1], Jeng[2] and Nelsen[15]. Jeng[2] viewed usability aspect of DLs as the parameter to concentrate, to measure the extent in which a product can be used by specified users to achieve specified goals with learnability, effectiveness, efficiency, and satisfaction. While, Nelsen[15] outlined five parameters to concentrate as attributes of usability examination of digital libraries as: learnability, efficiency, memorability, low errors

rate and satisfaction. This study emphasized however that the usability aspect of DLs depends to a large extent on user searching power or skills. Commenting on the competencies and searching skills, Alakpadia[1] explained that, competency is a self confidence of individual capability to create, search, use, retrieve, and modify information from the digital library. This means any potential user that is aspiring to use the digital libraries, he or she must possess the necessary skills and capabilities of know how to harness the use of digital library effectively. Furthermore, possession of the competency and searching skills are coined with certain factors that will facilitate the use of digital libraries among the undergraduate students, and as well as negative factors or challenges that will be faced when using digital libraries among the undergraduate students are all going to be examine in the paper.

4 Students' Searching Skills: Requirements and rubric for access and use of DLs in Nigeria

The Nigerian government made some frantic efforts to make digital information available and accessible to students especially at higher institutions of learning. As a result, students are compelled to acquire the necessary skills to operate in the new digital information environment, the internet in particular. Digital information literacy then becomes mandatory for the students to effectively utilize the information available through the internet. Okon[16] equally stated that, access along with study skills, effective information search and utilization become essential for students' success in their overall academic endeavour. He further stressed that finding relevant and appropriate information from digital libraries is a task. Information retrieval skill has been defined by Okon[16] as a set of abilities that enable an individual to recognize when information is needed and to have the capacity to access, evaluate and make effective use of the required information. With this all information users including students need to develop skills for searching, evaluating and managing information if they are to be effective and critical consumers of information particularly in academic institutions. The National Center for Education Statistics (NCES) reported by Debell & Chapman[17] indicated that about 99% of students in United State have access to digital information. This has reaffirmed earlier findings that, in the developed countries just like in the United State, majority of students have access to digital information.

Eyitoro[18] stated that, African countries including Nigeria are trying within their capability in the provision of digital facilities specifically for educational purposes of students. Efforts are being made for the provision of internet access to students especially at higher institutions. Although the studies conducted by (Eyitoro[18]; Tella[19] and Jagboro[20]) fundamentally investigated obstacle to internet access and utilization, aspect of the digital information access and utilization was facially addressed. Making digital access and utilization are two different things, having proficiency in the use of digital information searching is another one that was also not addressed. It is therefore imperative to examine the way and manner in which students' access and utilized digital libraries.

Taking Nigeria for example, few Nigerian universities are now available on the net, one beauty about it is the fact that beside providing access to remote users, they also provide opportunity for libraries to easily and chiefly update and expand their collections as well of information sharing and delivery.
In the developing countries of Africa especially Nigeria, the application of this digital advanced technology in libraries is mostly at the exploration and experimental stages. Okon[16] highlighted that, even though the application of ICT in Nigerian libraries is very recent, its impact in information access, management, processing, storage, retrieval and dissemination is enormous. He further maintained that, by this opportunity, some university libraries in Nigeria have subscribed to books, journals, online databases like AGORA, MEDALINE, HINARI, OCLC, OPAC, RDA etc. in addition to some CD-ROM databases. Talking on the access to digital information in his study on the availability of ICT in some selected libraries in Lagos and Ibadan, Faboyinde[21] reveals that, 58% of the libraries have wireless access to the internet through (VSAT) and 35% already have web sites access. This signifies that Nigerian libraries have joined the trend of world's digital community just like other counterparts in the world.

From the above, it can be understood that globally libraries embraced digital revolution by automating their services in order to enhance their collection size, depth and public access to pave way to the utilization of their resources. There is the outmost need to find out whether university digital libraries in Nigeria are getting satisfactory digital accessibility and guidance on how to retrieve information from digital libraries. Despite all these, there is a gap in gaining access to most of the digital libraries in Nigerian tertiary institution, whereas potential users are required to submit their university network identification number (NetID) for authentication. Sometimes users must then complete a registration questionnaire that collects basic identification, demographic data before having access to utilize digital libraries. That is why Borgman[12] stated that, authentication and registration procedures presented an enormous barrier to access and use, and one that was largely unanticipated. Another gap is that despite having barriers to free access, this barrier has not received much attention in published reports of digital libraries studies. Thus, its importance as a determinant of use should not be under estimated.

5 Challenges Faced in Using Digital Libraries

World wide access to and use of DLs are not without some challenges. Multiple numbers of challenging problems or obstacles are faced by users in using DLs. Some of the problems are in existence for long, while others might come along the way. In most instances, erratic power failure, network problem, lack of basic and adequate essential infrastructures has persistently remained a problem to appropriate access and use of the digital libraries in Nigerian society. Okachi[22] stated that lack of ICT facilities can be a barrier to using digital resources in Nigerian libraries, this couple with the traditional mode of carrying out library services and operations that still prevail in most Nigerian libraries.

There are very limited number and availability of digital facilities compare to the number of students' enrolment, sometimes student has to booked in order to use the digital library or to wait for quite some time for his/her turn with a very limited duration, because the number of students outnumbered the computers by far. Another problem has to do with the low label of self-confidence on the usage of digital libraries. Certainly, those students with low level self-confidence may end up in having problem of searching skills in locating and retrieving desired information. Commenting in the same vain [1]Alakpadia (2000) stated that, internet skills are the basic human tools for operating the computer in the digital set-up. A skilful internet user can be operationally defined as one who is able to search for, locate, retrieved, download, send, reply from the digital library and also participate in the web based conferences, use groups, use nets etc. From another angle, [22]Okachi stated that, digital library staffs are sometimes reluctant in regularly assisting patrons on the use of digital library. That is why Etim[23] stated that, this may not be unconnected to the fact that many personnel including the professionals, para-professional and supporting staffs working in the Nigerian libraries themselves have no basic internet skills and yet professional training in librarianship and information science in Nigeria do not make provision for conducive atmosphere in which librarians can be computer literate. They are lacking in the knowledge of how to use digital libraries or rather to assist users to use. This has implication to search efficacy on users who defend on assistance.

Network service availability and stability is not constant. Most a times either the service is very low or rarely available. [24]Ugwuanyi stated that high cost of internet connectivity and bandwidth as well as low speed connectivity established a treat to African universities in joining digital information world where knowledge and research findings are accessed digitally. There are also problems related to users' attitudes of misuse and mishandling, as well as spoilage of digital facilities that have all become topical issue of concern among educationist and other stakeholders. It is also observed that some users dedicate most of their time on meaningless and social related information at the detriment of meaningful information for their learning and research. Electricity supply also hinders the constant connectivity within digital libraries, which cripple the smooth running of many universities library services, as no library will

survive on generating power from the use of generating machine. While, Ogbomo [25] stated that, irregular and epileptic power supply cripple the Nigerian economy and hundreds of progress research carried out by institute, groups and individuals.

Other related challenges are lack of ICT infrastructure, lack of adequate funding and lack of necessary manpower.

6 Conclusion

Though, libraries have come to exist in response to needs in human communities. Digital libraries are no exception. This paper focused on accessibility and usability of digital library by undergraduate students in ATBU, Bauchi. It dealt extensively with the important themes and variables related to this paper such as accessibility and usability of digital library. It was paramount for this kind of study to be conducted in this institution of learning to determine the extent to which access and services of digital library were available to undergraduate students, to find out whether access influence its usage, determine the factors that facilitated or motivated the use of the digital library and find out the purpose for which digital library was used by students in the university.

The purpose of this research study is to examine access and usability attribute of digital library and undergraduate students to make it more effective and efficient for users. The review gathered from the literature shows that there are in adequate point of access and there are some great access barriers that distract effective and maximum access, there is also under utilization of digital libraries which is very low. The study also revealed that, majority of the undergraduate students relies and depend on receiving assistance on how to use digital libraries. Therefore, this shows that they have low competency and searching skills.

It was deducted from the findings of the study that, digital libraries are important in supporting teaching, learning and research. It is also evident that Abubakar Tafawa Balewa University established such digital libraries to offer this important service to the university community, although the services are generally low because of the encountered problems and constraints ranging from poor network connectivity, inadequate points of access, indifferent staff attitude as well as power outage. There is the need for urgent attention towards improving the services of the digital libraries.

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Innovation Management in Oil Tanker Vessels Safety

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Abstract Oil pollution is caused by the maritime casualty that effecting safety of environment. While lot of research, work and investigation carried out in order to find out the cause of oil spillage attributed during accident in shipping industry, very rare research has been done to determine the aspect of safety in relation with effectiveness of innovation in structure for oil tanker vessel for controlling oil pollution. The International Maritime Organization (IMO) believes that innovation in technology is paralleled with the International Management and Safety Convention somehow reducing the oil spillage. Hence, in this research great emphasis will be made on its effect globally in relation to aspect of management and innovation technology in oil tanker vessel safety, ways to improve safety management, reduce casualty and marine pollution, and review some potential innovations and ideas to achieve the optimal maritime safety for oil tanker vessels.
Key Words innovation management, oil tanker, vessels safety.

1 Introduction

United Nations was the main international body that promotes the maritime safety to be more effective and reducing the accidents involved maritime casualty. After 1948 conference conducted by United Nations, the countries were agreed to form the International Maritime Organization (IMO) as the specialized agency that deal with the international maritime and shipping. The main purpose of this organization is to improve and develop the maritime safety and protection of the environment of the sea [1]. The first convention in safety was "*Safety of Life At Sea*" (SOLAS 1974).

For this purpose, IMO has identified a measurement of technical and operational to improve the maritime safety, particularly in oil tanker in reducing the oil pollution [2]. Total adoption is about 40 conventions and 700 codes and recommendations pertaining to the prevention of pollution and maritime safety [3] . The major convention for oil pollution was "*International Convention for the Prevention of Pollution from Ships*" (MARPOL 73/78). Main disaster to the maritime ecosystems in worldwide is oil pollution [4] .

Pollution can be defined as contaminated [5]. Oil pollution is the main source of marine pollution. Oil pollution can be happened during the shipment of the oils at seas as shown in Figure 1. Despite of fact that the amount of the oil spills might be in small or large portion, but any oil spills may leave the effect of ecological damage to coastline or sea [7].

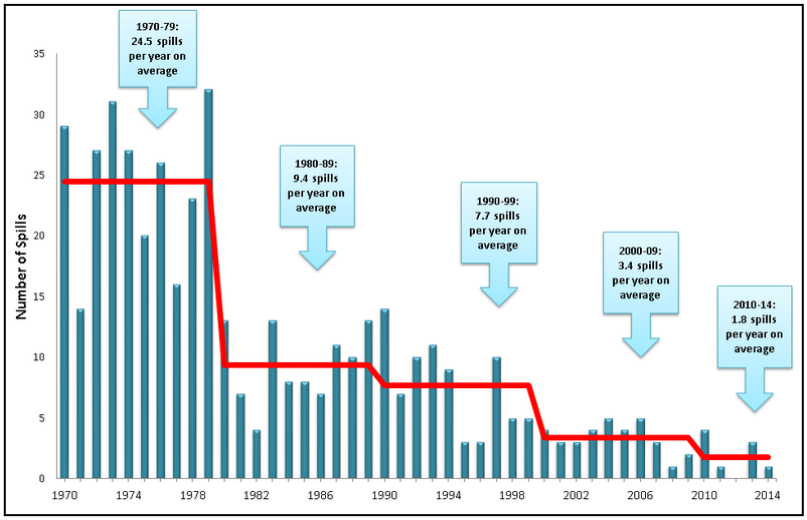

Figure 1: Oil Tanker Spill Statistic 2014 (Original Source taken from ITOPF, January 2015)

In order to comply with safety environment in organization, the IMO has specified the International Safety Management (ISM) code and "*Standard Training for Certificate of Competency of Watch Keeping Seafarers*" (STCW 1995) [8] code which have been endorsed to become compulsory for all shipping owners and operators [9].

For the beginning, there were only single hulled oil tanker vessels for oil transportation as shown in Figure 2. Due to some accident disaster in oil pollution, particularly the Exxon Valdez tanker vessel in 1989, the technology has been changed from single hulled tankers to double hulled tankers for best solution in preventing oil pollution [10].

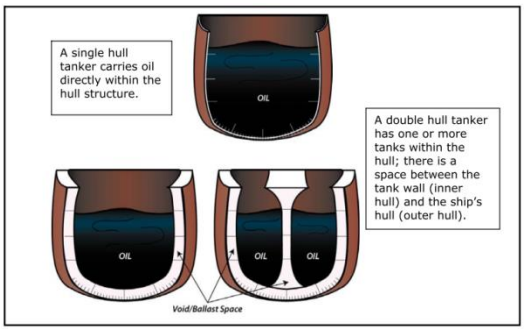

Figure 2: Typical Single and Double Hull Configurations (Original source taken from Prince William, 2009).

The rapid changes of shipping industry led to the increasing of operational cost, commercial legislation and challenging new technology and innovation in order to achieve and maintain the optimal maritime safety and to add value to the ship owner [11].

2 The Role of the IMO in Maritime Safety

The IMO is the specialized agency that deals with the international maritime and shipping affairs [12]. The participation members of IMO are 170 endorser States, including the UK and other major

marine countries. Hence, IMO has the command ability to control more than 96% of world ship owner and operators [13].

3 Legal Aspect of IMO in Maritime Safety in the Oil Tankers Vessels Particularly In Major Casualty Cases

The major convention for oil pollution was "*International Convention for the Prevention of Pollution from Ships*" (MARPOL 73/78) [14].

In 1971, the IMO has adopted another important legal measurement in maritime safety, particularly in oil pollution which was the "*International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage*" [15]. The aims of this convention were to establish the providing of repayment for pollution damages and also to contribute results for the intention that has been set out from this convention [16].

Also, IMO has supported compensation as Civil Liability Convention (CLC) for oil pollution. It is stated that any ship owners, from time and position of accident which happened, were going to be responsible for any pollution damage affected by oil spillage or oil discharged out of the vessels as an effect from the accident [17].

Another important tool to control and assist the vessel in distress in oil tanker accident was "*Port of Refuge*". Port of Refuge is any port that can provide shelter for damaged of any type vessels that can endanger life, health and surrounding or port who can assist any vessel so that the vessel can stabilizing their position, reducing the danger in navigation and also protection for seafarers and surrounding [18].

After the oil disaster by the Exxon Valdez (1989), the Oil Pollution Act in USA has been imposed in adapting the new technology in oil tanker vessel (Double Hull Steel Structure) and also the standard in constructing vessels for carrying oil in bulk [19].

IMO also has invented the idea of double hulled oil tankers in 1992. The convention was determined to request that oil tankers constructed after 1993 must be appropriated with double hulled tankers [20]. When Erika tanker (1999) and Prestige tanker (2002) broke and spilling the oil into the sea, the IMO agreed to revise the phase out of single hulled tankers in earlier. The final revision declared that the legal phase out for existing single hull tankers will be changed on 2010 [21].

3.1 Flag state and coastal state control

Any state that giving the authority by registering any ships in using their state flag are responsible in handling all the matters of controlling the administrative for the ships. [22]. In the other hands, Coastal State Control is to monitor the usage of the ships in the foreign coastline.

In controlling the registration of the flag, it can be categorized in to two section; National Flag and Flag of Convenience [23].

3.1.1 National flag

National Flag registration is the record with genuine connection between the ships flags and the holder (enforced by UNCLOS), also acknowledged as closed registers and first registers of the vessels. [24].

3.1.2 Flag of convenience

Flag of Convenience is the record of the ship flags is created deceit in another place other than the ship flag is displayed, whether it is the flag for other record country [25].

Flag of Convenience also known as "open register" parallel with the national register. Ships that register under this flag of convenience can gain some advantages whereby they can reduce the operating and technical cost such as lower taxation and lower payroll costs [26].

However, there are measure disadvantages in the safety regulation and controlling of the vessels in proper manners of safety with international convention which directly affected to the maritime safety [27].

3.2 Port state control

In usual procedure, many vessels are not commonly calling for Flag State and Coastal State which can reduce the authority for effectiveness of the Flag State to monitor and administer the standard aspect of the vessels [28].

However, with Port State Control, the movement of all vessels can be monitored accordingly. Port State Control (PSC) may consider as a third regime of authority that focus on the validity, quality and activity control of the vessels in respect of safety [29].

3.2.1 Regional port state control

A "Port State Control regime" has been set up under "memorandum of understanding" (MoU) or very much alike within the same neighboring port state [30]. Its practice the harmony investigation process that has been designed to aim the inferior vessels with the major objective relates to the IMO industrial convention such as SOLAS and MARPOL. Some of regional port state controls are Paris Memorandum, Tokyo memorandum and etc. [31].

3.2.2 International Association of Classification Society (IACS)

IACS can be defined as a non-government society that endorsed and approved for maritime safety particularly in technical support, construction design, and conformity of certification and also the study of improvement [32]. This endorsement is aligned with the guideline and standard setup by the IMO [33].

In other words, Any vessel that gotten the endorsed and approved certificate by IACS, are entitled to get the international insurance that can protect the vessel while on board in international waters and coastline.

Even though IACS have a crucial character and carry out their role in the shipping industry, but still the liability of the vessels will be borne by the ship owners, operators and also by marine insurance providers [34]. As such, IACS main responsibility is to inspect and investigate the compliance of the ship with the appropriate standard by issuing the related certificate, without any guarantee and liability of the wellness of the vessel.

4 The Role of Voluntarily Organizations in Oil Tanker's Safety

When it comes to the safety on the vessel, there are lots of aspects that need to be considered from the condition of technical and up to the operation performance of the vessel. The responsibility in maintaining this up-to-date condition of the vessel is lies under the jurisdiction of ship-owners and operators [35].

As a result from the high-risk responsibility of the ship-owners, they agreed to form non-legal pressure organization to manage the transportation and maritime safety risk of their vessel [36]. Which are including of International Chamber of Shipping (ICS), International Association of Independent Tanker Owner (INTERTANKO), Oil Company International Marine Forum (OCIMF), International Association of Port and Harbor (IAPH), Committee Maritime International (CMI) & EQUASIS.

5 Aspects of Implemention of Double Hull Tanker

The main idea for this evolution is preventing oil pollution and controlling the safety aspect of marine industry. Holding to this idea, The IMO and its organizations believed it can stop the level of oil pollution by double hull tankers. But as reported and analyzed the changing in technology to double hulled tankers the oil pollution not stopped, later it demonstrates that other ideas of innovation in technology also need to be considered in preventing oil pollutions as well as improving the safety level of marine industry [37] (as shown in Figure 3).

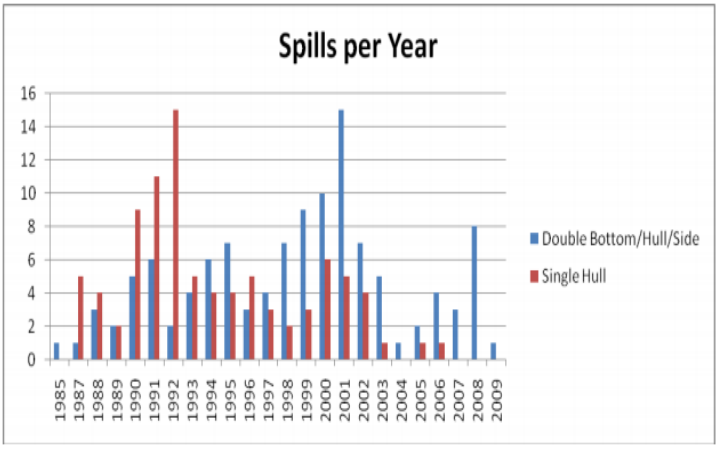

Figure 3: Comparison of Oil Spill by Double Hulled and Single Hulled Tanker (Original Source taken from the Review of Double Hulled Tanker, 2009)

Despite of the accidents happened in double hulled tanker, there are some other advantages and disadvantages for double hulled oil vessels [38]. The invention in technology of double hulled tankers show that the operation of loading clearance become faster and produce good rate of loading. In fact, the cleaning process of double hulled tanker become easy and faster [39]. However, there some increasing in the cost whereby the manufacturing cost of the vessel under double hulled became high due to usage of more steel, required more construction time as well as in maintenance aspect of the vessel [40]. On the operation issue, double hulled tankers are easily leaking caused by the crack in bulkhead between cargo and the ballast tank.

6 Implemention of Open Innovation in Oil Tanker Vessel

In 2004, the IMO and its organization have amended Chapter 11-1 in SOLAS 74 (new Reg. 3-10) [41]. The Marine Safety Committee under IMO has endorsed a decision MSC.290 (87) which enclosed with a new SOLAS arrangement that requires new single side skin carrier vessel for oil tankers and bulk vessels of 150m in length, and above to be formed and manufactured according to the class society's guidelines that have been approved and confirmed by the IMO to fit the new Goal Based Standard (GBS) creation specification, which were also being endorsed by MSC 87 [42]. For strategic plan, the IMO should authorize the GBS for the design and construction of new ships [43].
Followed by the Bahamas, Greece and IACS, they agreed to use the 5-tiers framework of GBS (as shown in Figure 4) [44]. The first 3-tiers are comprised by the development of the IMO standards and the last 2-tiers are comprised of other organization i.e. classification society' standards [45].

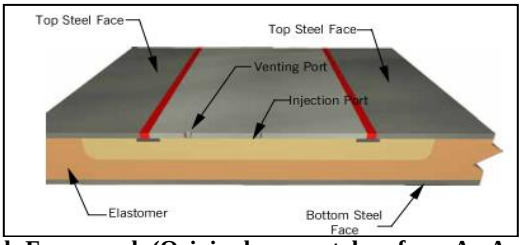

Figure 4: Goal-Base Standards Framework (Original source taken from An Analysis of the Implementation of Future GBS, 2011).

This new open innovation is developed to increase the possibility of reducing in oil pollutions and also at the same time, promoting the new innovation with the lower cost. These standards approved and endorsed by the IMO and the design is confirmed by the IACS are to create the goal-based standards that being adopted by all ship builders, ship owners and also marine industry [46]. Goal-Based Standards (GBS) are the standards set up by the IACS for the structure and design of the new vessels for single side skin to be implemented to the oil tankers and bulk vessel in increasing the safety and reducing the percentage of oil pollution [47]. The advantages of the standards are low in the construction cost, maintenance cost and ease of access for inspection, as well as more eco-friendly. The implementation of the new standards is scheduled on the 1st July 2016. Any ships manufactured before July 2017 is not comply with the standards. The standards are complying only for the ships that manufactured after July [48].

Addition to this and on base of these rules, some researchers has invented the idea for new technology as added value to the current technology. One of the new ideas of technology invention is Sandwich Plate System (SPS) as shown in Figure 5. SPS is a lightweight material that separated two metal plates with elastomer core to make it stable and solid [49].

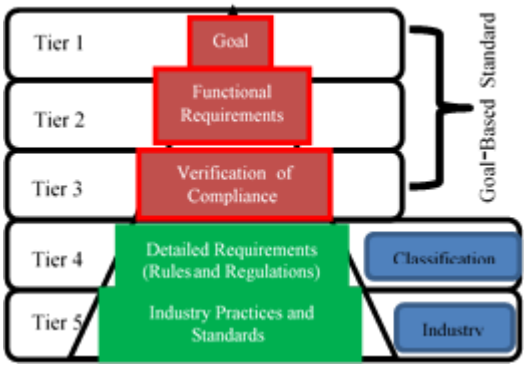

Figure 5: Conventional Structure and SPS Structure (Original Source taken from The Performance, Safety and Production Benefits of SPS Structures for Double Hull Tankers, 2004)

Longitudinal Profile Plate a.k.a. LP also one of the innovation in technology for oil tankers. As shown in Figure 6, LP can be defined as the continuous changes of the thickness of the plate in longitudinal way to cut down the construction cost and lighten the steel in many grades with the wide range of plate dimension for shipping manufacturing [50].

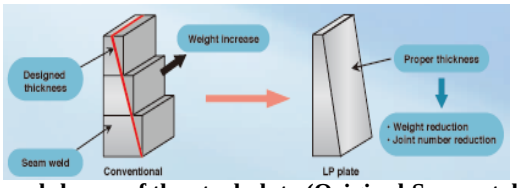

Figure 6: Various thickness and shapes of the steel plate (Original Source taken from the JFE Technical Report)

7 The Role of ISM and STCW in Human Factor in Maritime Safety

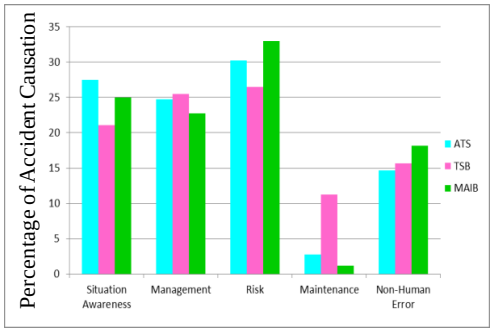

Figure 7: Percentage of Oil Tanker Accident Causation by Human Error from ATSB, TSB and MAIB database. (Original Source taken from ABS Review and Analysis of Accident Database in Oil Tanker Disaster)

As stated in Figure 7, it shows that 80% of accidents in shipping industry particularly in oil tanker vessels are caused by human error.

Some researchers also believed that dispute in human error leads to the catastrophic of oil pollutions and tankers accidents [51]. When accidents happened to oil tankers, a pilot study particularly in human factors is conducted to measure the percentage defect caused by human error. They believed that tiredness, careless and misunderstandings are the main focus in human factor that leads to the safety environment in marine industry [52]. Aware of the effect of human error in safety of marine industry, the IMO engage development in advancing the arrangement in human factors by ISM code and regulation [53].

On top of that, the IMO also improvising the Standard Training for Certificate of Competency of Watch Keeping Seafarers (STCW) focusing on implementation of minimal standards of marine training and control of seafarer's capability [54].

7.1 The relationship of technology with other safety factors in oil tankers vessel

Beside the changes in innovation of technology for oil tankers, some of the researches believe that advancement in navigation system may help in reducing the percentage of sea accidents and at the same time can act as the tool in increasing the safety in maritime industry. While ENC is an electronic navigation control which has been created to be used along with ECDIS. The information gathered from the system covered i.e. position, heading, speed for every vessel in the system [55]. Additional system to this sensor is Automatic Identification Systems (AIS) that have been invented in Navy ships then to be adapted for security as well as safety while on the sea or in the port [56]..

Maintaining the safety assessment in oil tanker also can be highlighted as the factor in increasing the safety level of the vessel. Formal Safety Assessment (FSA) can be defined as a form and

standard procedure in improving the safety levels involving life preserving, health, maritime environment and ship in accordance with the IMO approval by evaluating the risk and assessing the benefit [57]. Despite of the allowable unidentified and challenging to accuse in civil and criminal actions, the vessels that registered under flag of convenience are recorded to have high percentage of detention level which can jeopardized the safety of the vessel (as shown in Figure 8), if compared with the vessels registered under national flag [58]

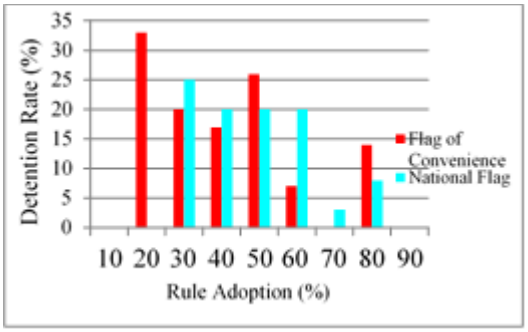

Figure 8: Detention Rate for Flag of Convenience and National Flag Countries (Original Source taken from the Bulletin of Berlin, 2009)

Therefore, in reducing the percentage of detention ships under the Flag of Convenience, some European country i.e. France, Norway and Germany, came out with the idea of quasi open register whereby the cost affected as the open register but at the same time the enforcement of marine regulation for the vessel administration and safety environment of the vessel are highly defined, accountable for liability and worldwide implemented [59] as shown in Table 1.

Table 1: Example of Quasi Open Register Country (Original Source taken from the Thesis of Flag Choice Behaviour in the World Merchant Fleet, 2011).

No	Countries	National Flag	Quasi FOC	Cumulative (%)
1	Singapore	808	924	80.4
2	Hong Kong	585	1091	76.4
3	Cambodia	15	665	87.3
4	Bahamas	28	1276	71.7

However, the reinventing idea of using quasi open register still has the breach. Numbers of Vessels registered under quasi open registered are recorded with inspection detention for Germany International Ship Register and French International Ship Register [60].

8 Conclusion

Many parties in the marine industry are depended to the role of IACS. Any type of flag states either National, FOC or quasi open, also need to admit liability in the wellness of the vessels and must avoid to give legislative immunity to IACS for negligent of surveys during inspection in order to make guarantee for safety in vessels and crews on the sea. As well as port state control play measure roles in this respect for safety of the vessels.

To reach to the optimal maritime safety, all elements in the industry themselves need to be integrated. It could start from first step in structure and design of the vessels, legal authorities for the rules

and regulations and liability, and other safety factors need to be paralleling with the Administration and Authorities to contribute with the voluntarily association.

Also, the added value for open new innovation in design and advancement of innovation in technology along with the human is the main factors in succeeding this objective and reaching to the optimal marine safety with excellent management team.

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Do Social Media Enhance Students Performance? An Essential Insight from Bayero University Kano, Nigeria

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Abstract The uses of social media have already changed the way people communicate with each other. There is an ongoing debate regarding the integration of social media in education. Advocates of social media usage point to the benefits of using social media for academic practice while critics are calling for regulations and/or the removal of such online technologies in the classroom. Hence, this study examine the relative importance of social media on academic performance and identify which, among the social media has significant influence on students' performance of Bayero University Kano and form a model describing students' performance. The study employed some hypotheses, in which the hypotheses were tested using Structural Equation Modelling (SEM). "Facebook, YouTube, and WhatsApp" were the main concerns reported by the respondents which influence students' performance.
Key words: Facebook, WhatsApp, YouTube, education, students' performance

1 Introduction

Providing education and training to the masses on gigantic scale, for economic survival and to meet the ever-changing requirements of the society and also to meet the individual's special requirements and tastes, is not possible through the conventional system of education based on brick-and-mortar schools, colleges and universities. The social media is being used to improve communication, collaboration, sharing of resources, promoting active learning, and delivery of education in different framework. Social media, which is a latest trend in knowledge creation, may be taken as a form of instrument that will mediate the relations of students and lectures. In recent years, many of the universities and educational institutions use Facebook, YouTube, and WhatsApp etc. for facilitating the lifelong learning and to make this compatible with other educational management activities (Rana, & Lal, 2014, Hauge, 2016).

2 Literature Review

2.1 Social media

Social media, derived from the social software movement, are a collection of Internet websites, services, and practices that support collaboration, community building, participation, and sharing. As defined by (Guy, 2012, Castells, 2015), "Social media are technologies that facilitate social interaction, make possible collaboration, and enable deliberation across stakeholders. Social media can be generally understood as Internet-based applications that carry consumer-generated content which encompasses "media impressions created by consumers, typically informed by relevant experience, and archived or shared online for easy access by other impressionable consumers". Social media can be classified according to two key dimensions: social presence / media richness and self-presentation / self-disclosure. According to another classification social media can be grouped in two broad categories depending on their main purpose, as a plat form where users express themselves by sharing text, video, picture, music,

or a means of collaboration where users share knowledge and content, in general, and work together for a common goal (Guy, 2012, Imran, *et al.*, 2015).

The use of social media has surged globally in recent years. A recent report from the Statista (2016), as of the second quarter of 2016, Facebook had over 1.71 billion monthly active users, YouTube have a total number of 3.25 billion hours watched each month and as of February 2016 WhatsApp announced more than 1 billion monthly active users. Despite the popularity social media for personal use, however, a low number of students in BUK use them for academic practice. As educators look for ways to engage and motivate students, social media technologies are becoming a viable supplement to the traditional learning environment (Olajide & Alao, 2015).

Hence, the purpose of this study is to examine the use of social media in BUK students. Specifically, identify which, among the social media has significant influence on students' performance of Bayero University Kano and form a model describing students' performance. Although, previous studies have suggested that access to technology is inequitable and that students of developing countries are less likely to use technology, and therefore, have fewer opportunities to use social media tools than those in the develop countries. There is an ongoing debate regarding the integration of social media in education. Advocates of social media usage point to the benefits of using social media for academic practice while critics are calling for regulations and/or the removal of such online technologies in the classroom (Guy, 2012, ACUTA, 2010).

2.2 Social Media Use by Students

Today's college students are exposed to all types of technologies in many aspects of their lives (Morreale *et al.*, 2015). On a daily basis students used internet to actively engage in social networking, text messaging, blogging, content sharing, online learning, and much more. Contemporary college students have become habituated to a world where social media is the norm; thereby, as an educational tool, social media enriches the learning experience by allowing students and instructors to exchange ideas, foster collaboration and discussion, and engage and interact using such emerging social platforms outlines several benefits to using social media in education (Mr, Rodney & Wakeham 2016). For example, social media is an effective way to increase student engagement and build communication skills by allowing students to feel more comfortable expressing themselves in a less intimidating environment. Social media can also be used to improve communication between students and instructors, while the latter can answer students' questions, post homework assignments and lesson plans, send messages and updates, schedule or announce upcoming events, and share Web sites and multimedia content (ACUTA, 2010).

Despite the aforementioned benefits of social media, some critics' where of the view that there are serious risks for using social media in the classroom, because social media technologies are neither appropriate nor successful vehicles for teaching and learning activities. For example, Facebook and Twitter divert students' attention from classroom participation and ultimately are disruptive to the learning process. Also, social networking sites provide ways for students and lectures to connect; there is a concern that students are missing valuable lessons in real-life social skills (Guy, 2012).

While the debate continues regarding the pros and cons of using social media for academic practice, no one can argue the influence that social networking has on today's students (Jeske & Shultz, 2016). Meaning that, finding a middle ground has become a challenge. Thus, social media is consider as a plat form that will offer a unique opportunity to reform the relationship between students and lectures, from the conventional way of knowledge sharing to the advance way of knowledge dissemination. As documented in recent research, students are using these emerging technologies and platforms in all facets of their daily lives, specifically social media (Dabbagh *et al.*, 2015); yet, a low number of Bayero University Kano (BUK) students' users are engaging in such for academic practice (Olajide & Alao, 2015). Hence, the following hypotheses are developed based on the literature review discussed:

Ho1: There is a significant relationship between WhatsApp and social media in BUK.

Ho2: There is a significant relationship between Facebook and social media in BUK.

Ho3: There is a significant relationship between YouTube and social media in BUK.
Ho4: There is a significant relationship between social media and students' performance in BUK.

3 Methodologies and Data Collection:

The survey instrument was developed based on literature review, while the variables included in the study have been adapted from the existing literature. Data were collected through an online questionnaire from Bayero University Kano (BUK). Respondents were randomly chosen from the list of students. The students' sample was chosen because they are heavy users of social media in the campus (Westerman *et al*., 2016).

Interestingly, 280 students filled up the questionnaires online, in which they were asked to state their level of agreement with the series of statements, stated using a five-point Likert scale ranging from "strongly disagree" to "strongly agree."

4 Data Analysis and Results:

Confirmatory factor analysis was conducted in the entire construct to determine the remaining measures which indicated the validity, unidimensionality and reliability of the measurement model prior to modelling the structural equation model. The measurement of correlation indicates the strength of the relationship between the exogenous construct, mediating construct and endogenous construct. Furthermore, the CFA's of constructs produced a relatively good fit as indicated by the goodness of fit indices as indicated in Figure 1. According to Zainudin (2012), the discriminate validity failed if the correlations are above 0.85, while in this case all the correlations are below 0.85 as it can be seen from Figure 1, meaning that discriminate validity is achieved. This means that the measuring items provide a reliable measure of internal consistency. Since, factor loading are newly developed scales, the 0.5 or higher is considered in this study.

Therefore, after removing the items with factor loading less than 0.5, there are four (4) items usable to measure the significance of WhatsApp (WHATAPP) on social media, five (5) items to measure the significance of YouTube (YOUTB) on social media and five (5) items to measure the significance of social media (SCMD) on students performance, while items like Facebook (FCBOK), and students performance (STPF) remains on change because the factor loadings are above 0.5 as it can be seen from Figure 1.

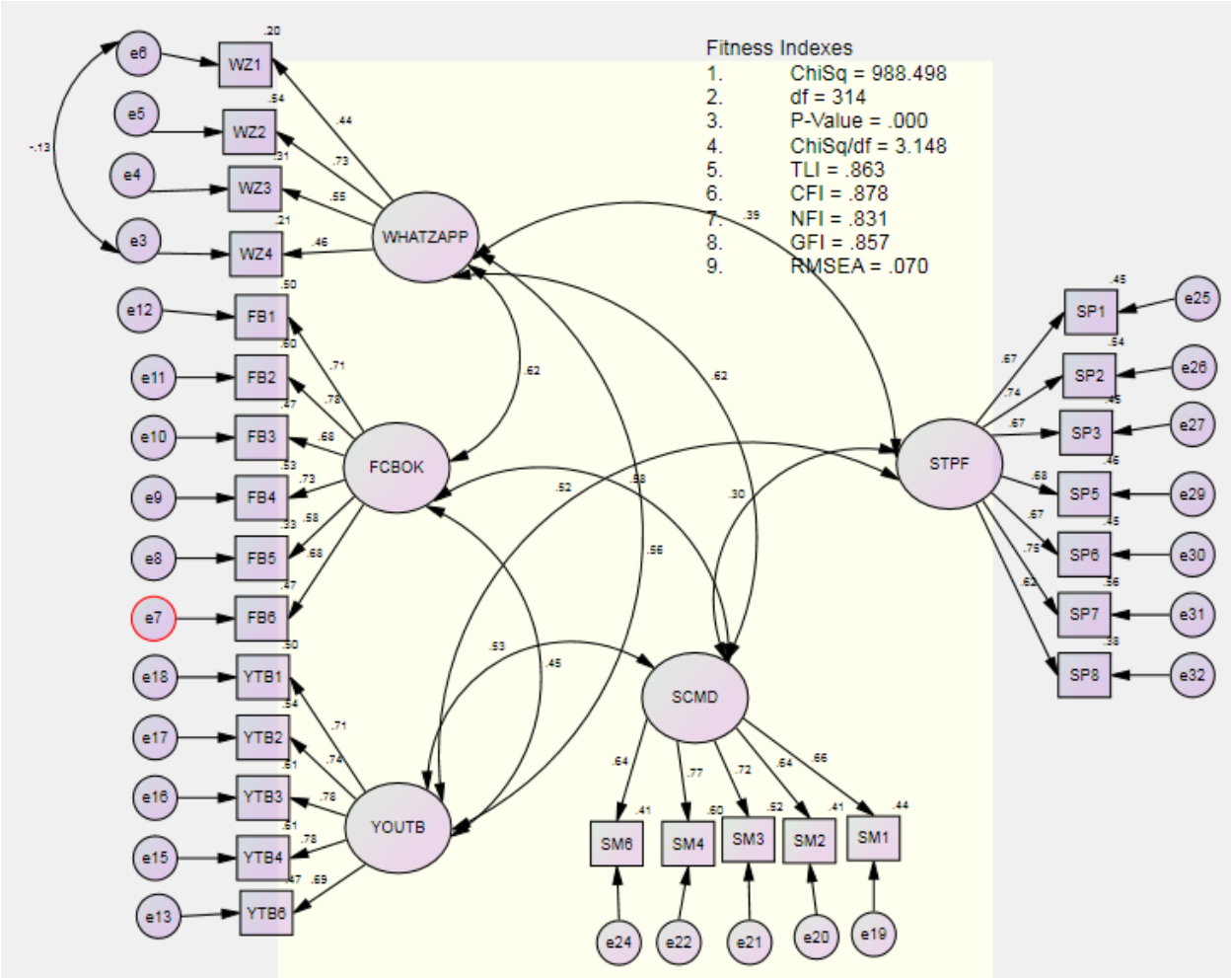

Fig. 1: Factor loading and Correlations for all Items of the Respective Construct.

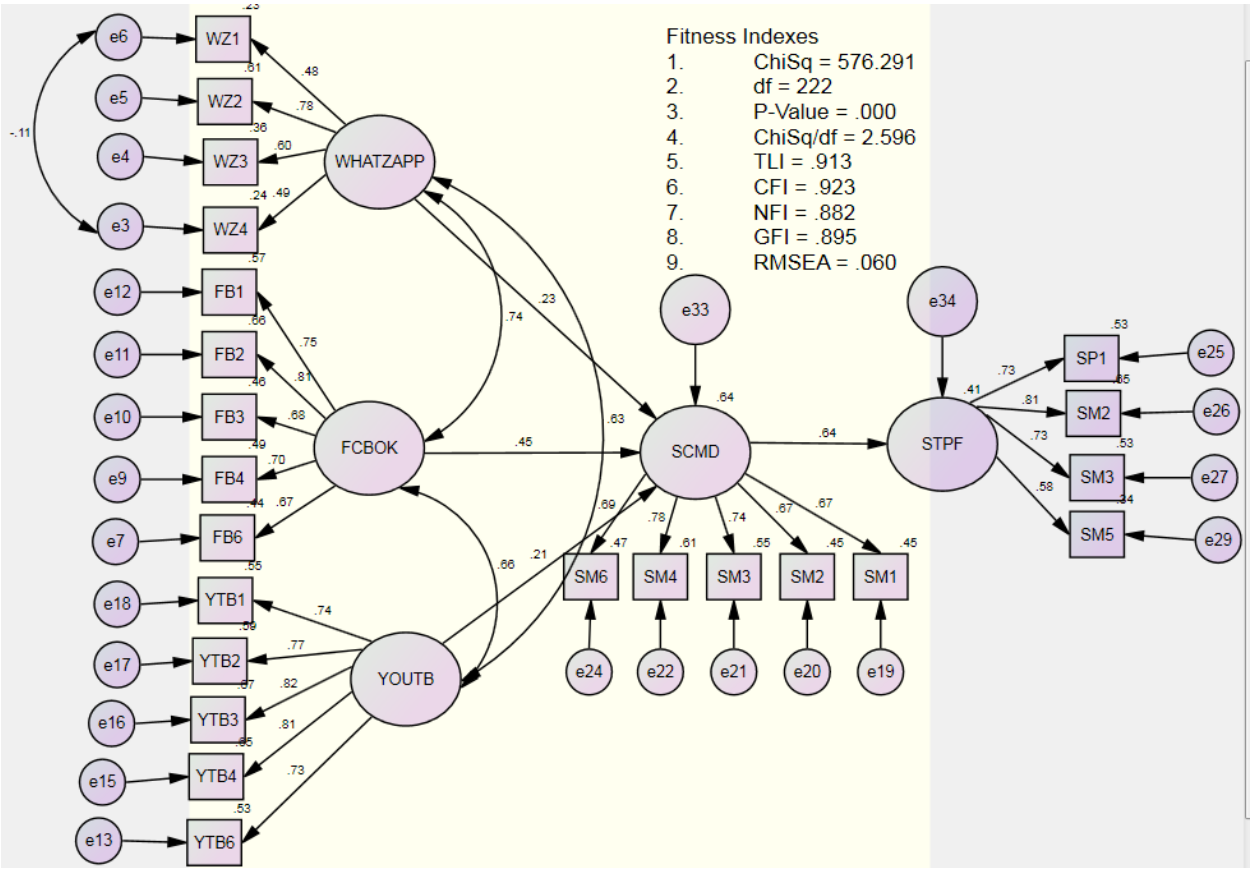

Fig. 2: Standardized Factor Loading for Each Component of the conceptual Model

The values for the level of acceptance of fitness indexes assessment in Figure 2 shows that CMIN/DF < 3, GFI is approaching < .89, CFI is approaching < .92, and RMSEA < 0.60, which are all under the acceptable level (Zainudin, 2012). Therefore, the conceptual standardized model (Figure 2) is considered as appropriate and has a good fit. The path analysis summary shows that the regression coefficient of WhatsApp, Facebook and YouTube values on social media are significant for the sample, where the p- value of social media is 0.00. Meaning that, WhatsApp, Facebook and YouTube factors are significant predictors for students performance vie social media as the mediator of customer service delivery.

Table 1 show the goodness of fit of generated or re-specified structural model and it is better compared to the hypothesized model.

Table 1: Hypothesis testing for the Casual Effect of the entire construct

Hypothesis			Estimate	S.E.	C.R.	P	Label
WHATZAPP	<---	SCMD	.313	.117	2.687	.007	Supported
FCBOK	<---	SCMD	.531	.099	5.380	***	Supported
YOUTB	<---	SCMD	.217	.063	3.462	***	Supported
SCMD	<---	STPF	.641	.066	9.765	***	Supported

All the hypotheses are supported, meaning that WhatsApp, Facebook and YouTube have a direct influence on social media and by extension social media has an overall influence on students' performance in BUK. Thus, from the result of the hypothesis testing, the study has proven that all the hypothesis have strong evidence of students' performance vie social media as the mediator linking the relationship between social media and students' performance.

5 Conclusion

The growing interest in social media has led educators to examine its use for academic practice. As institutions of higher learning are challenged to enhance collaborative learning and community building amongst students, the findings reveals that social media holds promise for academia. The study reveals that BUK students have diverse perceptions and experiences with regard to social media technologies. However, as new model is proposed, questions of who is accessing and using such technologies will remain paramount if we are to be successful in utilizing social media for academic practice in BUK. Therefore, specific indicators have emerged with respect to student use of social media technologies. In addition, this study has revealed the use of social media by students for academic practice is surpassed by its use for social engagement, direct communications, and relationship building.

As suggested by Rana, & Lal, (2014), providing education and training to the masses on gigantic scale, for economic survival and to meet the ever-changing requirements of the society and also to meet the individual's special requirements and tastes, is not possible through the conventional system of education based on brick-and-mortar schools, colleges and universities. Social media is apparently a plat form that institutions can use to improve communication, collaboration, sharing of resources, promoting active learning, and delivery of education in different framework.

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The Nature of Innovation Support in Emerging Economies: Implementation of a Technology Driven Policy Initiative in Malaysia

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Abstract Emerging economies have introduced a portfolio of policies to propel economic development. Policies are acknowledged as powerful tools to promote industrialisation and economic diversification. The feature of these policies are not only confined to established emerging economies but also mid-ranking emerging economies like Malaysia. As the country moves towards a knowledge-based economy, this study provides insight into how a policy comprising a financial initiative introduced by Malaysian Government has been used to enhance capabilities of indigenous small and medium enterprises particularly for innovation. This study is exploratory since it seeks to find out how firms developed and enhanced their innovation capabilities in the presence of government policy. It identifies the implementation of the financial initiative in particular is in line with the specific objectives of the policy which is intended to support commercialisation of research outputs among indigenous small firms. This study also found that this policy initiative tends to affect the latter end of the innovation process (i.e. in particular in the exploitation phase) rather to the innovation process in general. This study contributes to closing some of the gaps in research into public support for innovation and development of knowledge-based economy within emerging economies. In particular it identifies the target group and impact of such policy initiative, particularly in the context of policies designed to upgrade firm's capacity to carry out new product development process for high-technology products.
Key words Emerging economies, innovation, dynamic capabilities, case study.

1 Introduction

The rapid economic growth achieved by emerging economies generated a huge amount of research interest into the mechanism behind the economic take-off. The main contrast in the literature has been the role of the government vs markets in catching-up development [6]. Scholars also provide technology-based view that focuses on explaining how emerging economies have tried to catch up technologically with developed economies [12]. Industries in advanced economies are at the frontier of technological advancement. In this view, catching-up is considered as a question of relative speed in a race involving a fixed multi-directional process [18]. Scholars also highlight that emerging economies do not simply follow the technological development of advanced countries. They may create their own individual path which is different from the developed economies.

While many appreciate the rapid economic growth achieved by emerging economies [37], there has recently been concern that some countries have been more able than others to catch up technologically. Scholars suggest that the success factor of these emerging economies is based on their ability to build and develop their national innovative capacity. National innovative capacity refers to a country's prospective to produce a stream of commercially relevant innovations [25]. This capacity is not only confined to production of new products or services, but also echoes the fundamental conditions, investments and policy choices which create an environment for innovation.

In building up national innovative capacity, governments in emerging economies have implemented a portfolio of strategies [15]. These strategies have produced different impacts and outcomes within which strategies that include policy initiatives are also subject to divergence. However, the implementation of technology-driven policy initiatives in emerging economies is often associated with failure to achieve their objectives in terms of uplifting national innovative capacity. However, little is

known about what factors contribute to that failure [23]. This is an important insight which could be brought to studies on implementation of policy initiatives, especially in regard to their screening and monitoring process.

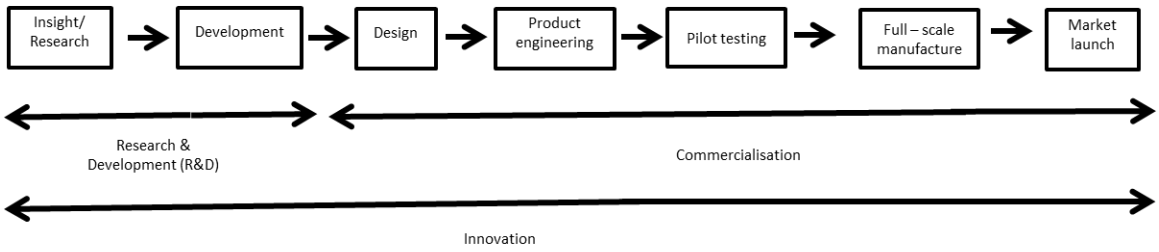
2 Literature review

2.1 Emerging economies and high-technology industrialisation

Research on economic development pays particular attention to regions or countries that were able to position themselves as contributors to global wealth. It has been acknowledged that Western economies[1] are the frontiers of the world economy [29]. However, recent evidence suggests that the global economy started to consider progress beyond the Western economies [29]. Countries from different continents have emerged as new blocks of economies that have managed to achieve remarkable progress in economic development. Hoskisson et al. [14] suggest that these economies could be known as emerging economies.One explanation for the remarkable economic growth within the emerging economies is their ability to make changes in the economic structure [21]. This was also the same successful recipe for developed economies' transition in the eighteenth and nineteenth centuries. However, the changes in economic structure took place at a faster place within emerging economies out of necessity in order to catch-up with more advanced economies of the West [8]. Amsden [3] argues one of the major reasons for emerging economies to embark on manufacturing-led industrialisation is because the states' intention to catch-up with advanced economies by emulating their industrial composition through establishing manufacturing activities that produce high-technology products such as electric and electronic goods. Szirmai [29] supports Amsden's proposition by affirming arguments on why manufacturing is essential for economic development. Pisano and Shih [24] refine this argument based on the experience of the American manufacturing sectors. They propose that the high-technology sectors is essential in innovation process because it entails the importance of generating and utilisation of technology in the industry. This strengthens Szirmai's argument that high-technology industries is important for technology catching up especially among emerging economies.

According to Atkinson and Ezell [4], emerging economies face a great challenge to promote high-technology industrialisation. The aims of this type of industrialisation is different from ordinary industrialisation that tries to introduce and promote manufacturing activities into emerging economies [2]. High technology industrialisation is a transition process from assembly-type manufacturing to high technology manufacturing [2]. Nelson and Romer [22] describes this process as a transition from simple, labour-intensive and low value-added industrial activities to those embodying more intensive use of human capital and technology. In the context of emerging economies, policies for high-technology industrialisation are targeting local firms to venture into high-technology sectors. Above all, high-technology industrialisation does not only require governments' commitment to encourage local firms to utilise technology but also to support them to develop new technology into finished products or processes [5]. For Smith [28], the process of developing new technologies and utilising them into products can be regarded as an innovation process. Figure 1 illustrates the innovation process.

[1] Szirmai (2012) describes the Western economies as countries in Europe and North America that have been promoted manufacturing sectors as the main engine of accelerating economic growth since nineteen century such as Great Britain, Germany, Russia and the United States.



Source: Adapted from Smith [28]

Figure 1: A generic model of innovation process

Scholars agree that innovation is a complex process [26]. In this process, Lee and Gaertner [19] suggest there are two components involved: 1) technology development and 2) technology dissemination. The former component focuses on discovery of new material, technique or solution. Meanwhile, technology dissemination involves a process of bringing the output from the technology development into usage that is embedded in finished products [19]. The two processes need to co-exist in order to maximise the technology utilities.

2.2 Firms competiveness in high-technology sectors

This study investigates the influence of a technology driven policy initiative on a firm's competitiveness in the high-technology sectors in an effort to understand the policy's application. By empirically studying interaction between policy and firm behaviour, it is possible to identify areas for improving policy design and implementation. Particular attention is paid to evidencing the existence of effective business activities within firms in high-technology sectors that can plausibly be linked to the presence of government support. This study also considers a theory in strategic management literature that explain how firms can develop business programmes and sustain competitiveness: the Dynamic Capabilities [33].

The Dynamic Capabilities (DC) framework stems from the Resource Based View (RBV) [10]. The DC draw heavily on how a firm absorbs and applies knowledge. In doing so, it emphasises routines [10] and the importance of the individual on organisational routines [31]. The DC was first defined as the 'ability' firms use to 'integrate, build and reconfigure' other assets, capabilities and competences to address a changing environment [33] and create market change [10]. The idea that firms possessed the ability to modify their resource base meant that they could now keep up with industry dynamics. The term 'dynamic' refers to changes in capabilities to achieve congruence with the changing business environment. Certain innovative responses are required when time-to-market and timing are critical, the rate of technological change is rapid, and the nature of future competition and markets is difficult to determine. Within the DC concept, 'capabilities' refers to, routines, norms, values or learning ability that come into existence when individuals or firms possess tacit knowledge. The capabilities component of the definition therefore emphasises the capacity of firms to appropriately adapt, integrate and reconfigure internal and external firm skills, resources and functional capabilities. Therefore, DCs are the ability or capacity of a firm to change their static capabilities to match the requirements of both internal and external changing environments.

The DC suggests that the concept of firms needs to be understood from a wider perspective. Prior to the DC concept, firms were often understood as organisations that try to gain competitiveness by acquiring unique and strategic resources. This understanding was built on the assumption that firms will maintain a certain structure and that the market remains stagnant [31]. However, the DC concept suggests that firms need to make changes in order to address a dynamic market [30]. The change can be incurred in resources configuration, organisation structure and competencies in a process to identify and shape opportunities [31].

A major argument underlines by DC theory concerns the importance of recognising firms' ability to execute activities as evidence that they have been utilising resources. This view is applicable to government initiatives to develop new industries because most external interventions, such as government support programs exist as resources for the firms. It becomes more prevalent when the support program is meant for a specific purpose and has been implemented in a common mechanism such as financial assistance. The interaction between the supplied resources through that programme demands that firms execute an array of activities. For some scholars, most activities carried out by firms can be categorised as DC. However, Easterby-Smith et al. [9] argue against this idea by suggesting that only specific activities to accommodate opportunities can be considered relevant to the DC framework. Teece [32] addresses the discussion of the sort of activities that should appear in the DC theory by suggesting that firms' activities can be divided into three elements: 1) identification and assessment of opportunities (sensing); 2) mobilisation of resources to address an opportunity and capture value from doing so (seizing); and 3) continued renewal (transforming). Each of the clusters has been embodied by a portfolio of sub-processes that essentially try to create and capture value from opportunities.

The elements include manufacturing activities that are crucial for production of tangible products. The manufacturing activities allow firms to address their external environment such as products regulation through safety testing and customer demand by getting the customers' feedback. The main principle is to highlight the importance of transforming static organisational capabilities or creating new ones to meet changes in the environment. In fact, both areas of DC and industrial economics try to study ways firms can be more competitive by promoting innovation in the economy. Apart from this, the DC framework tries to study innovation in a context of strategic management by connecting innovation with competitive advantage. In strategic management, innovation is considered as a multifaceted capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting and reconfiguring firms' resources [31]. It may involve probing and re-probing customer needs and technological possibilities. Each activity demands that firms have the ability to understand latent demand, industry structure and market. Indeed, innovation itself is a dynamic process because being able to bring invention to the markets requires a different configuration in each activities, in research, manufacturing and marketing activities. In other words, each activity need to be progressive which requires a combination of resources and capabilities to respond to changes in external environments.

This study adapts the DC and at the same time modifies the RBV. The main rationale because in emerging economies context, Government perceive in order to improve firms' innovation performance, they need to invest more in R&D activities. The Malaysian Government has been dependent on industrial policies to promote innovation but often policy makers do not have a clear idea how these policies work within firms. Therefore, investment in R&D is very blunt instrument and probably not effective. In fact, this investigation needs some sort of concept or construct to explain this phenomenon. The RBV provides internal perspective of innovating firms where they try to consider internal and external factors of innovating firms. In that case, DC is a much better way of looking at how to improve innovation. The main argument of DC is firms can spend a lot money (especially in emerging economies) but if they do not have capabilities to actually use what R&D is producing, there will be no innovation. Therefore, DC is relevant in this particular context because it promotes the understanding of firms' capabilities to execute tasks within innovation process. Besides that, DC also is a concept that just not only focus on one capability but a number of capabilities. Some of these capabilities are in R&D and some are related to other activities such as manufacturing and marketing. This means that it is just not R&D capabilities needed to improve innovation but there are other capabilities (i.e. production and selling capabilities) that play a crucial part. These capabilities interact and work together. In short, DC has the underpinnings of a strong theory. First it can show causality as several studies show how dynamic capabilities can cause a firm to have more innovative capacity [34]. Second, it is measureable because it can be measured through

learning outcomes and technological innovation performances such as new products, sales performance, market share and employment. Indeed, some of the understanding on how capabilities have changed could be obtained from econometric analysis. It means that most of the understanding could be gained once researchers get inside firms. This perspective leads to case study approach.

3 Methodology

The focus of this research is an in-depth study of a biotechnology firm. The firm is known as Bio 1, is one of the recipients of financial assistance from Malaysian Government. Using a single but in-depth case study provides a scope for investigation, which Yin [38] notes is one of the benefits of using case studies as a research design. Case studies are especially appropriate in research in which the objective is to examine social phenomena that are complex [38]. Innovation and the process of developing firms innovativeness are interrelated fields that are individually complex. Innovation process is often evolved and case studies are seen as a way to capture it. Case study approach also offer opportunities to look inside the firms and at their practices in particular. It is hard to pick this up from using surveys (questionnaires). Case study design also enables the researcher to look at the bigger picture. Besides that, case study also favours for the researcher to have a bit of contact with firms over a period of time which facilities multiple data collection techniques (i.e. interviews, archival data and observation). These techniques will give and in-depth and detailed picture of firms' practices and what they do for innovation. From here, the researcher could interpret why the firm operates in these ways.

This study employs triangulation technique which involves the application of several methods to collect data from different sources. Saunders et al. [27] suggest the use of two or more independent sources of data or data-collection methods within one study is useful to ensure that the data could produce a more complete portrait of the situation. The primary data source is interview transcriptions and it is triangulated by the use of documentary and observation narrative. This technique provides a better representation and consistent insight of what actually happened in the firms as the data sources corroborated with each other. It also enables the strengths and weaknesses of the various methods to be counterbalanced and a more holistic picture of organisational environment to be developed.

4 Case study

Bio 1 was originally incorporated as a start-up firm in 1996 by a scientist, Miss Ht. The firm has been operating in a promoted industry: biotechnology. The Malaysian Government has identified biotechnology as one of the core technologies to accelerate the transformation of Malaysia into a knowledge-based economy and an industrialised nation by 2020. The firm sought to become a product development company that is capable of manufacturing products for sustainable plantation (mainly oil palm and paddy plantations) and other agriculture activities. The firm's products have been developed based on applications of microbes as fertilisation and decomposition agent aimed at improving crop productivity, land rehabilitation and soil fertility. Bio 1 has been dependent on R&D capabilities in its products' development. In fact, its first product (a bio-fertiliser marketed as MYCOgold) was developed from research on *Mycrorrhizae*[2]. The fungus' applications remain the firm's core source of technology and have provided the central path for the firm's research and development (R&D) and all its strategic direction. To date, almost all of Bio 1's products have been dedicated to these applications.

The firm's route in innovation has been dependent on its amplification of scientific discovery and technological breakthrough. This recruitment practice has been continuing in the expansion stage. It has allowed the firm to have a pool of qualified personnel in interrelated disciplines. The firm's executive personnel comprise of universities graduates. They hold Bachelor of Science and qualified as biologist,

[2] *Mycrorrhizae* refers to a group of fungus which forms a mutually beneficial relationship with plants. These fungi grow either inside of a plant's roots or attach to the surface of roots.

microbiologists or agriculturists. Based on their education background, the executives are researchers by training. They are deemed to have understanding how a research based firm should work and the importance of technological breakthroughs.

The firm's capacity in innovation could be witnessed in terms of introduction of new products and financial attainments. Since 1999, Bio 1 has produced eight products. The firm's products focus on niche a market for sustainable plantation (mainly oil palm and paddy plantations) and other agriculture activities. The main reason for this move because the oil palm industry forms the economic backbone of Malaysia. Malaysia a main producer of palm oil for the global market.

Financially, Bio 1 has experienced significant growth in term of turnover and profitability from 2005 to 2010. In that period, the firm was able to achieve average turnover growth of 44.41 per cent. The highest sales growth was incurred in between 2008 and 2009 with 115.72 per cent growth, meanwhile the lowest sales growth was in 2006 with 0.58 per cent. Bio 1 has experienced more substantial growth in profitability with an average of 93.75 per cent in the same period. The most substantial growth was in 2007 with 377.01 percent hike. Table 1 summarises Bio 1's turnover and profitability.

Table 1: Bio 1's financial performance

Year Ended	Revenue (MYR)	Direct Cost (MYR)	Profit (MYR)	Fixed Asset (MYR)	Current Asset (MYR)
2005 (USD1= MYR3.80)	3.09	1.07	0.33	7.43	1.27
2006 (USD1= MY3.70)	3.11	1.20	0.41	7.87	1.81
2007 (USD1= MYR3.47)	4.55	0.91	1.96	8.53	3.16
2008 (USD1= MYR3.37)	5.08	1.97	1.09	10.8	12.99
2009 (USD1= MYR3.56)	10.92	5.65	2.02	16.51	15.81
2010 (USD1= MYR3.25)	13.13	6.95	3.59	22.01	22.81

Source: Extracted from Bio 1's financial statements retrieved from Companies Commission of Malaysia
Note: Financial figures are in millions

4.1 Context of the financial grant from Malaysian Government and the product

Bio 1 has been awarded with a financial grant by the Malaysian Government in 2007. Bio 1 applied for MYR5,000,000 and was approved for MYR3,200,000 because the grant is limited to providing 70 per cent of the total project cost. The grant was approved for commercialisation of a microbial based insecticide which is marketed as Metaxorb. The bio-insecticide was a new product' category besides bio-fertilizer and bio-remediation.The Metaxorb is a bio control insecticide which applies the *Metarhizium anisoplie* to control a rhinoceros beetle (Oryctes rhinoceros) problem in oil palm plantations. *Metarhizium anisoplie* is a soil-inhabiting fungus well known as a microbial agent against insects and a host-specific for the rhinoceros beetle. This product is essential in Bio 1's initiatives to establishing a niche market demands in the oil palm sector that is now ready to adopt more sustainable methods of agricultural productions driven by increasing environment awareness. The Metaxorb is packed in 1-litre bottle and this product has been expected to fulfil big plantation companies' demand. The plan under the grant's project was to produce and market 5,000 litres of Metaxorb. This plan was viable because before receiving the grant, the production of Metaxorb had been carried out using small scale machines.

4.2 The firm product development capabilities

Metaxorb is an outcome of Bio 1's product innovation. The firm has been dependent on discovery of microbes that could be commercialised as fertilization and decomposition agents. The discoveries are the result of the firm's research and market penetration activities. Indeed, the processes are challenging

and time-consuming. Although the development of Metaxorb started in 2004, the firm's capabilities in products development have been building up since 1998. At that time, the firm was starting to develop its first product by making improvement to technology acquired from a university. In that stage, the academic research was enhanced based on the executives' basic research that *Myhorrhiza* has been tested empirically on vegetable plants. There was no research guidance except the fundamental technology from a local university.

The experience with their first product has convinced Bio 1 to amplify scientific discovery and technological breakthrough. This process is segregated into two sections: 1) discovery of new microbes and 2) finding quadrupling techniques for microbes' enrichment. However, developing a new bio-based agriculture products proved difficult. The firm has been dependent on processes related to identifying and integrating innovations. This process meant exploration phase of the innovation process. The executives initiated this process by scouring journals to look for scientific opportunities in term of new potential microbes. Their qualification proved applicable in this process. However, the empirical works within the academic literature are limited to certain plants only. This restricts the application of the scientific discoveries (i.e. potentially beneficial microbes). In Bio 1's case, the firm is interested in commercialisation of *Mycorrhiza*. However, the empirical works in universities does not firmly discuss which plants are suitable for *Mycorrhiza*. Bio 1 perceives this as more general application of the fungus. Therefore, the firm decided to expand their research work into field testing to determine the *Mychorrhiza*'s applicability.

In the initial stage, field testing was carried out based on the executives' basic research knowledge that *Myhorrhiza* has been tested on vegetable plants. There was no research guidance except the fundamental technology from a university. The first field testing was carried out on oil palm and rubber seedlings. The seedlings are owned by Bio 1's prospective customers. The result from the field testing suggested that oil palm and rubber plants are compatible with *Myhorrhiza*.

The firm is also deemed to have significant experience and proper facilities for manufacturing. From its inception, the firm has carried out the manufacturing activities on its own. There were no outsourced activities. This arrangement has facilitated production of eight products within ten years of operation. On average, Bio 1 spent between two to four years before a product could be sold on the market. For example, the development of Metaxorb was started in 2004 and was officially launched in 2008. The development of Metaxorb was expected to have taken a longer period because it is a totally new products.

The firm's research capabilities are essential in the product formulation. The main outcome was the product sample (i.e. prototype). At that time the firm did not have any production facilities except to run the production activities at laboratory scale. Indeed, the production scale in one of the obstacles for Bio 1 in the product development. It became more apparent when the firm did not have an allocated budget for designated production line. Still, the firm perceived the needs to upgrade the production capacity from laboratory scale to industrial scale.

The fund from the grant has been used to acquire new machines that lead to the firm's capacity upgrading. Before that, for example, the old autoclave for grooming the fungus (i.e. the *Metarhizium anisoplie*) could only cater for 50 samples. Certain processes were even performed manually. The firm has recognised this as its weakness because the production line generated limited output, hence limiting the firm's production capacity. The newly acquired autoclave can accommodate 200 samples. In this case, the grant has increased Bio 1's investment capacity and manufacturing capability. However, under the grant's arrangement, a recipient needs to have incurred expenses before the remaining 70 per cent will be disbursed on a claimed basis. However, Bio 1 did not have any allocated budget. As an option, Bio 1 decided to approach SME Bank[3] for a loan to cover 90 per cent initial outlay to acquire that machine. Bio 1 also made an initiative to renegotiate the terms of grant with the Government pays upfront 10 per cent

[3] SME Bank is a full-fledged financial institution for nurturing SMEs excellence in Malaysia.

outlay. Then after Bio 1 took the delivery of that machines, the firm made the reimbursement application and used that money to pay out the loan from SME Bank. This occurrence is illustrated by Figure 2.

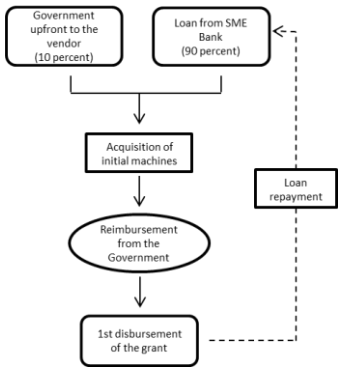


Figure 2: Grant's application in Bio 1

The grant had facilitated the initial outlay of Metaxorb's production capital expenditure. From this initial process, Bio 1 was able to acquire additional machines via reimbursements until the grant has been fully reimbursed in 2011. However, the partial grant term required Bio 1 needed to be creative in administering the grant and production. This induced a notion that the grant is working but not as positively as expected. Firstly, the work of grant through the evaluative session helped Bio 1 in the production planning. Secondly, the firm needed to list machines needed for production of Metaxorb.

The comment explains that the firm needed to prioritise because the grants disbursements were by each machine. Secondly, the machines reduce Bio 1 dependency on manual worker as the production technique became more automated. Each stage of production activities has taken less time. However, Bio 1 needed to face a bigger challenge in terms of manufacturing. The automated system required each machines to be working well. However, this has been not always the case. In order to avoid this, the machines need to meet a costly maintenance schedule. The maintenance is not only costly but also increases the production idle time thereby increasing the overhead cost.

By focusing on big plantation companies, Bio 1 needed to adopt different approaches especially in getting in touch with customer for sales purposes. Sales were initiated by directly approaching plantations and estates. However, this sales approach was less effective because any decision is subject to plantation managers' discretion. The managers converged in a special group known as planters. Based on these circumstances, Bio 1's personnel needed to join the planters group. During their monthly events, planters discuss their plantation problem and Bio 1 has benefited from this in terms of recognising unmet needs of their customer. Bio 1 also tries to maintain good relationships with planters by sponsoring souvenirs. However, the main challenge is about overcoming competition from chemical products. Bio 1's approach is about not directly rejecting chemical product, but instead introducing gradually substitution technique to customers. This sales technique requires Bio 1 to convince the customer to use their existing chemical up to certain threshold level and then start to use Bio 1's product. Most of the advice is derived from Bio 1 laboratory and field works.

In this regard, the big plantations' demands have a large bearing on the firm's strategic path in term of demand for its products' innovation. However, this perceived demand did not guarantee market acceptance. Bio 1 needed to dedicate substantial resources to gaining access and acceptance among plantation companies. Based on their operation scale, the big plantation companies might have demanded large quantities of bio-based products. It means that, Bio 1 could have received large orders from their customers. However, this move created challenges for Bio 1. The plantation companies required product

quality control and requested reliable data on product application. The main reason was that Bio 1 did not have experience in plantation and its products were new to the market.

5 Case Analysis and Discussion

5.1 Policy implementation

There was a lot of speculation about whether policies could be used to enhance local firms' technological capacity [17]. This assertion is also applicable to the grant because it is a major policy initiative to facilitate innovation by ensuring research and discovery will reach the market. In Weiss's work [36], he suggests that governments have to put significant efforts into the refinement of policies to make them more rigorous. This means policy documents need to explain clearly the objectives, aims and implementation mechanisms. This improvement is essential to minimising risk of a policy failure [36]. The case studies presented here establish that the grant has been well managed by the Government. The evidence shows that the firm was convinced that grant's funding is meant for upgrading their ability to proceed with a new product development (NPD) process although the firms anticipated other challenges in innovation projects.

Prior studies also highlight that undertaking innovation projects is challenging and thus often associated with firms' failure to complete that projects [23]. For some researchers, failure to complete innovation projects is influenced by factors that are linked to products and markets [11]. These general findings were adopted by other scholars as the basis of an argument for government support for innovation projects. In this sense, past evidence seems to suggest that within government policy initiatives in particular fiscal initiatives (i.e. where money goes to firms), there is a tendency for innovation projects to never be completed. This study shows more positive outcome for fiscal policy in terms of project completion. The firm was able to complete the innovation projects under the grant. This suggests that the grant has been implemented in an effective and prudent manner. Firstly, the grant is a partial grant; firms was only being approved for 70 per cent of the total the project cost although the maximum funding is MYR4 million (USD1=MYR3.30). Therefore, the firms needed to come up with the remaining 30 percent of the project cost in form of cash. This is the grant's major requirement. This finding implicitly concurs with a study by Hobday and Rush [13] that looks into initiatives by another government (i.e. Government of Thailand) in emerging economies to uplift local firms' technological capabilities. Hobday and Rush's work shows that government policies show best results when directed towards firms that have a positive attitude and commitment towards self-funding aspect of a designated innovation project. Otherwise the risk of failure will be relatively high. Furthermore, a study by Cooper [7] showed that the matching grant structure can be considered as fund improvement. This is because programmes to support innovation projects are typically seen too generous and carry a bad reputation of being non-selective. This might expose firms for not being accountable for their designated projects.

The above finding also corroborates the views of Hsu and Chiang [15] whose study looks into government efforts in another emerging economy (i.e. Taiwan) to support R&D activities for the advancement of domestic industrial technology. An element shared by the context of both studies is that firms participating in sponsored innovation projects are expected to contribute required resources, such as manpower. Unlike the present study, Hsu and Chiang's study appears not to have explored the issue of financial commitment in terms of cash required from participating firms in sponsored innovation projects. Conversely, the findings of this study shows that the Malaysian Government establishes clear guidelines for 30 per cent financial commitment from the firms.

5.2 Target firm

Studies have established that innovation projects are best carried out by an appropriate group of firms [26, 35]. For Rasmussen [26] who looks at the Canadian Government's support for universities to commercialise research outputs found that the most suitable candidate is spin-off firms. This is relevant for initiatives involving direct financial support like the grant due to the possibility of miss-targeting [16].

In this sense, the findings of this study support an argument in previous studies that suggests innovation support programmes should target specific groups. Indeed, evidence from the case study established that the grant has targeted and reached a specific firm: small, indigenous and high-technology firms. The firm is also still in operation with some of them becoming fairly profitable.

The findings of this study also suggest that selecting the appropriate target group might be the decisive element (i.e. small high technology firms) in innovation projects. In reflecting upon the importance of small high technology firms, this finding lends some support to the study by Hobday and Rush [13] that suggests only a small fraction of small firms innovate although in a general sense small firms are more receptive to change compared to large firms. This means that there is certainly a type of small and medium sized firms but does not necessarily mean all small firms are high-technology firms. At this point, one primary reason that small firms were seen as the main beneficiaries of this policy initiative because they appear to be underdeveloped in the context of emerging economies like Malaysia [2]. Besides that, small firms made up the majority of local firms in high technology sectors and this factor motivates Malaysian Government to support them. In addition, due to their flat organisational structure small high technology firms have the required flexibility to deal with technological changes while fulfilling customer needs.

The case study suggests that the grant has targeted the exploitation phase of the innovation process as it emphasises manufacturing activities because for the firm, manufacturing is the bottleneck in commercialisation of research. This is the direct impact of the grant and this study trying to show that the programme is doing what it supposed to do. In this sense, the programme seems to be efficient. However, this study also highlights that firms also encounter needs other than those addressed by the grant. This condition could be explained by the provision in which grant is not targeting at the most serious problems constraining firms that try to carry out innovation activities.

5.3 Impact

In government efforts to support innovation, the target group (i.e. local firms) are expected to experience improvement in their resources and also their ability to carry out a NPD process. More importantly this process entails the firm's ability to utilise resources and translate them into a set of capabilities. This study shows evidence that the firm's has experienced improvement in capabilities that are closely related to the innovation process. It means that the firm is better at doing innovation and these capabilities are being part of the organisation. Most of the improved capabilities are not in research development (i.e. exploration phase of innovation process) but in capabilities applicable to the exploitation phase of innovation process. This finding implicitly concurs with a study by McKelvie and Davidsson [20] which has also established the same relationship. However, McKelvie and Davidsson propose a relationship based on discrete capabilities that could be considered independently. Instead, this study identifies the influence of resources to interrelated capabilities to bring high technology products into market. This means, capabilities in the exploitation phase are made up of reciprocal activities such as production, selling and NPD activities.

This is consistent with a study by Aldridge and Audretsch [1] that looks at applicability of a R&D fund to innovation projects. However, their findings were rather focused on measuring innovation in terms of spending on research activities that eventually produce intellectual properties such as patents. Thus, the findings of this study complement Aldridge and Audretch's work by highlighting that the key innovation capabilities reside in manufacturing activities, as this seems to be critical for exploitation of the innovation potential. The main rationale for this occasion is that the firm is a high-technology SME. The firm is deemed to have significant research capacities because it is being being managed by technical personnel (i.e. scientist). Yet, the firm is lacking of production facilities, which influences their manufacturing capacities in terms of scale and scope. Now, the firm is able to manufacture products at industrial scale and differentiate them as well.

The impact of the grant funding on firms' innovation process reflects the desirable outcomes of the programme despite government support initiatives have been extensively scrutinised by researchers [16]. The main argument of Kaufman and Todtling [16] is on inability for that type of support to reach its target; in this case producing innovation. The findings of this study suggest that the grant has been targeting at innovation projects and it has been contributing to firms essentially producing innovation. Therefore, the firm is able to upgrade their innovation capabilities because it has used the grant funding to improve, enhance and upgrade their innovation capabilities. It means that firms are more capable of commercialising research as the result of direct usage of the grant's funding. Innovation within the firms produced new high technology products. The impacts also explicate the context of the grant within firms' innovation process as the grant has been involved in the later part of innovation process. This possibility reflects the purpose of Malaysian Government policies to facilitate innovation amongst local firms.

6 Conclusion

This study highlights the application of technology driven growth strategies and thus contributes to knowledge about the effectiveness of this policy (i.e. technological upgrading type of policy). In most of strategic management literature, inward looking aspects such as firm strategies, firm activities, managerial competencies and possession of strategic assets have emerged as common competitiveness factors [32]. This study suggests in the context of policies for technological upgrading, firms are recommended to develop capabilities that allow them to utilise resources in order to address changing environment [9]. The main argument of dynamic capabilities is firms in emerging economies can spend a lot of resources but if they do not have capabilities to utilise the R&D outputs, there will be limited innovation. This means, firms should have capabilities execute tasks within innovation process.

From the larger context of Malaysia's innovation policy, this study highlights the challenges of commercialisation of research in emerging economies. A particular innovation support programme like the grant gives priority to certain stages of commercialisation process, which in this case, is the exploitation phase of the innovation process (i.e. targeted for full scale manufacturing and product market launching). Those activities in the exploitation phase, particularly at the latter part of it, received a lot of emphasis since firms are inclined to buy equipment and machines. However, the firm also need to give considerable attention to marketing and other elements of NPD [28]. In summary, the evidence from the case study, confirms that the Malaysian Government's grant programme is effective in enabling small and indigenous technology-based firms to modify and extend their resources. This has extended firms' ability to successfully undertake activities within the innovation process. The firms' ability to undertake innovation projects is more applicable in the exploitation phase of the innovation process rather than earlier phase of exploration (i.e. R&D related activities). This programme has enabled the firm to undertake commercialisation activities relevant to the market that it is trying to address more effectively compared to the absence of the grant. As a result, there is compelling evidence to suggest the grant scheme has contributed significantly to raising the innovation capacity of small indigenous and start-up technology based firms. In this process, it has met the aims of technology-driven growth strategies of an emerging economy like Malaysia.

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Investigating Antecedent of Knowledge Sharing among DBA Students

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Abstract This conceptual paper proposes a new framework based on a modified Unified Theory of Acceptance and Use of Technology (UTAUT) model that look at knowledge sharing behaviour through two antecedents namely Norm of Reciprocity and Learning Self Efficacy and how these influence knowledge sharing behaviours. Using the modified UTAUT model, we propose that performance expectancy effort expectancy, and social influence mediate the relationship between Learning Self-Efficacy and the Norm of Reciprocity and knowledge sharing behaviour.
Keywords UTAUT Model, Knowledge Sharing Behaviour, Knowledge Management

1 Introduction

Mobile technology is frequently used in communicating knowledge, and is especially useful in the education setting. It offers students and academicians increased choices and opportunities in the context of information dissemination. The advent of information and communication technologies has enabled the easy sharing of knowledge and information between people through social interactions using mobile applications that promote opportunities for knowledge sharing [1]. Milrad had identified some characteristics of mobile technologies that can be beneficial for education: Portability, Social Interactivity, Individuality, and Sensitivity to context, Connectivity and Fusion of digital and physical worlds [2].
According to Nonaka and Takeuchi [3], knowledge is born of an interaction between explicit knowledge and tacit knowledge. Tacit knowledge includes innate or acquired skills, know-how and experience. It is a form of hard knowledge to translate in the speech and to communicate through language. On the other hand, explicit knowledge is transferable on a support, formalised and transferable through an intermediary medium such as a document. By validating the individual knowledge through community consultation mechanisms, it is possible to reach a consensus on a shared vision of what is true in the professional community.

Knowledge sharing is the behaviour that is to make knowledge available in an organisation. Knowledge sharing is the dissemination of a person's acquired knowledge with other people within an organisation, through identifying existing and accessible knowledge from others and using this knowledge to solve specific problems better and more efficiently than through other methods [4]. In other words, knowledge sharing between individuals is the process by which knowledge held by an individual, is converted into a form that can be understood, absorbed and used by other individuals [5]. There are two main processes in knowledge sharing, i.e. knowledge donating (communicating existing knowledge to others) and knowledge collecting (consulting other people to learn what they know) [6].
Knowledge sharing plays an important role in Knowledge Management, but there is a marked distinction between knowledge contribution and knowledge seeking behaviours in knowledge sharing. It's been found that users' intentions and facilitating organisational conditions predicted knowledge sharing behaviour; but continuance intention was determined by users' beliefs and attitudes [7]. It is an assumption that when a knowledge sharing technology is in place, such as mobile applications, people will automatically use the technology. Unfortunately, this is not the case, as knowledge sharing is a voluntary and intangible activity and is not forcible or be mandated by other people [8]. It This is because knowledge is perceived as valuable and vital resources or assets, thus many people were reluctant to share their knowledge or expertise [9]. Therefore, there are many factors to consider when implementing a knowledge

sharing technology. Thus, it is important to acknowledge any external moderating variables regarding technology acceptance if we are to fully see the overall issue.

2 Methodology

This study will utilise a modified Unified Theory of Acceptance and Use of Technology (UTAUT) model to explain to what extent and under what conditions DBA students accept and use mobile technology to share knowledge, specifically addressing the questions about what makes it easier for the DBA students to collaborate and share knowledge and how mobile technology can be accepted successfully and used in the course.

This study proposes to look at knowledge sharing behaviour through two antecedents namely Norm of Reciprocity and Learning Self Efficacy and how these influence knowledge sharing behaviours. Using the modified UTAUT model, we propose that performance expectancy effort expectancy, and social influence mediate the relationship between Learning Self-Efficacy and the Norm of Reciprocity and knowledge sharing behaviour.

Self-efficacy refers to a person's inner conviction that they could arrange and accomplish their actions to attain the desired goals [10]. Based on social capital theory Reciprocity refers to people's beliefs that active contributions would be reciprocated [11]. Fulfilling the norm of reciprocity gave people a sense of mutual interpersonal benefit [12]. As such people frequently reciprocate actions when they have benefits. Thus, knowledge sharing behaviour occurred when people participate in knowledge exchanges whereby they share knowledge with the hope of developing favourable relationships with other people or expect to obtain knowledge from others in the future [13]. People will be more likely to share knowledge when they perceived that knowledge sharing behaviour strengthened self-efficacy and personal abilities [14]. An organisation having reciprocal relationship amongst its members will exhibit stronger advantage because the members will then have the capacity to influence each other [15].

3 Proposed Framework

UTAUT was proposed by Venkatesh et al. [16] and is a model that attempts to integrate and empirically compare elements from different technology acceptance models in technology acceptance, as per figure 1.

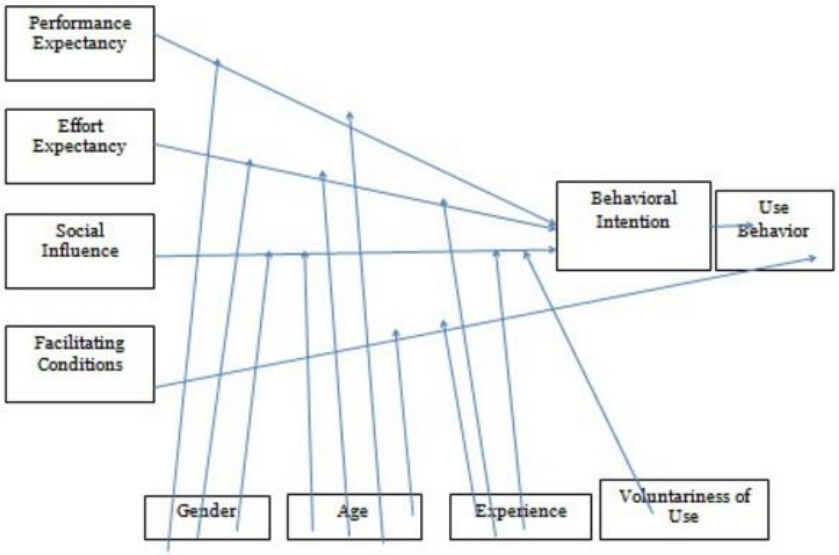

Figure 1. Source Abu-Al-Aish, A., & Love, S. [17]

Social Influence, which is defined as the extent to which a person perceives it is important that others believe he or she should use the new information system tool. Performance Expectancy is defined as acceptance as the extent to which a person believes that using an information system tool would help him or her to benefit in terms of job performance. Effort Expectancy is defined as the degree of ease that individuals think they will have when using an information system tool [17]. For our study, we will not use Facilitating Conditions and Use Behaviour as we feel it is irrelevant to the study of knowledge sharing behaviour.

After considering the factors that might students' knowledge sharing behaviour, we look at the antecedents Norm of Reciprocity and Learning Self Efficacy and look at how the constructs of UTAUT might affect these antecedents.

The research model to be tested in this study is shown in Figure 2.

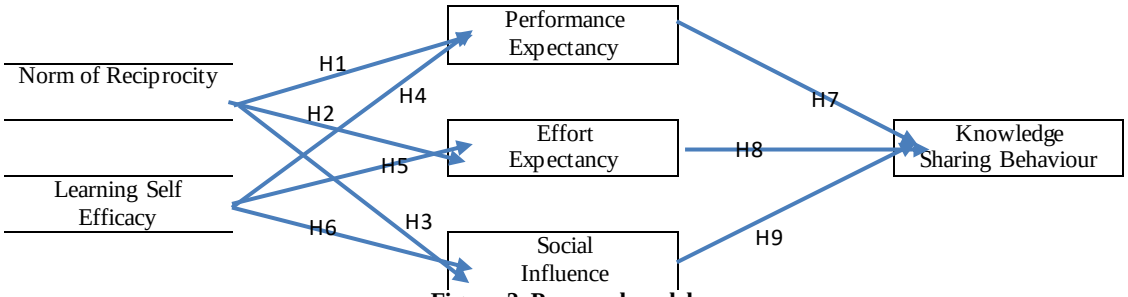

Figure 2. Proposed model

Hypotheses to be tested:

- H1. The Norm of Reciprocity has a significant and positive effect on Performance Expectancy
- H2. The Norm of Reciprocity has a significant and positive effect on Effort Expectancy
- H3. The Norm of Reciprocity has a significant and positive effect on Social Influence
- H4. The Learning Self Efficacy has a significant and positive effect on Performance Expectancy
- H5. The Learning Self Efficacy has a significant and positive effect on Effort Expectancy
- H6. The Learning Self Efficacy has a significant and positive effect on Social Influence
- H4. The Performance Expectancy has a significant and positive effect on Knowledge Sharing Behaviour
- H5. The Effort Expectancy has a significant and positive effect on Knowledge Sharing Behaviour
- H6. The Social Influence has a significant and positive effect on Knowledge Sharing Behaviour

This study will be a cross-section research on knowledge sharing behaviour among DBA students at Universiti Teknologi MARA Shah Alam.

4 Conclusion

Sharing information, discussion, understanding and arguments are actions that are more and more at the heart of the activity of work, the development and adaptation of knowledge [18]. Effective knowledge sharing among students will create positive synergy. From literature review, we have shown that the antecedents of Norm of Reciprocity and Learning Self Efficacy have a significant impact on knowledge sharing behaviour. But the study will look at the mediating impact that mobile technology play in knowledge sharing.

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Tacit Knowledge Innovation and Enterprise Development in Malaysia's Chinese Family SMEs: Longitudinal Case Studies on Plastic Production Across Generational Change

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Abstract This paper undertakes the tacit knowledge innovation and the trends of enterprise development among Chinese family-owned small and medium enterprises (FSMEs) in Malaysia to keep pace with an increasingly global economy and changes in the policy setting. A World Bank study showed that 67.2 percent of shares quoted on the Bursa Malaysia were owned by Chinese family owned while 13.4 percent were state owned. Thus, Chinese family firms have a dominant presence in the Malaysian corporate sector. The economic prosperity of Malaysia is largely dependent upon the success of these Chinese family firms in an increasingly 'global' marketplace as well as the adaption to the local government policy. This paper thus analytically and empirically delineates to highlight the issues about the tacit knowledge innovation and the generational change of Malaysia's Chinese FSMEs in the plastic production by using longitudinal case studies. This paper also appraises the succession of the new generation as owners of the family business, to transform the firm's knowledge. The case studies will assess first-generation, second-generation and third-generation Chinese family SMEs of family history, family tree and organization structure. Accessing the contention that a family business does not survive beyond the 3rd generation, this paper, in fine, provides a set of policy recommendations to facilitating the evolution from family capitalism to professional firms.

Keywords Tacit Knowledge Innovation, Generational Change, Enterprise Development, Malaysia Chinese Family SMEs, Plastic.

1 Introduction

The growing pressure of global competition has compelled Malaysian Chinese companies to concentrate on the links between production and marketing in their organizations so as to effectively develop new products and services. A similar trend can be discerned among companies in industrialized Japan as well as in the United States and in Europe (Drucker, 1946). Regarding natural resources, Malaysia's government has brought more opportunities in export trading and economic diversification since its independence in 1957. Rubber accounted for nearly 70 per cent of the total output value of agro-based industries. During the 1963 to 1967 periods, its share declined to about 65 per cent of total agro-based output (Lim, 1973). There are two types of diversification related to industries in Malaysia. The first type focused on agro-based industries, from rubber plantations to palm oil production and other crops while the second targeted manufacturing-related production, moving from primary into secondary industries.

During the colonial and immediate post-colonial periods, foreign enterprises, especially those owned by the British, controlled the economy. However, Puthucheary (1960) noted that the one sector where the Malaysia's Chinese had a dominant presence was in manufacturing with mostly family owned ranging from small businesses to household production. Most of the small scale enterprises were clearly seen in these sectors (Tan, 1982). This kind of family SMEs mostly owned by Malaysia's Chinese usually lacks of capital to develop their business during 1960-1970. As a result, the introduction of the promotion of the Investment Incentives Act of 1968, the 1971 Free Trade Zone Act and the establishment of the Malaysian Industrial Development Authority (MIDA) in the mid-1960s are aimed to promote

industrialization as well as providing funding for Malaysia's SMEs. By 1980-1990, the economy in Malaysia was more industrialized with the promotion of knowledge-intensive industries such as the electronic sector, high technology plastic engineering and ICT services which attracted direct foreign investment (DFI) to achieve a good GDP in the national economy.

Among Malaysia's top 100 publicly-listed firms by the turn of the century, barely 20 were involved in manufacturing. A majority of these 20 firms were foreign-owned, an indication that manufacturing companies of the colonial period had not managed to grow (Gomez, 2007). There were a few exceptions. Three of these 20-odd firms belong to the Chinese family owned. Hong Leong group; the Malaysian Pacific Industries (MPI) involved in the electronics sector as well as plastic engineering, OYL Industries, which is a producer of air-conditioning products and Original Equipment Manufacturing (OEM), and Hong Leong Industries, a tiles manufacturer. Most domestic manufacturing firms in the top 100 in 2001, have been owned by Chinese since Independence in 1957. A comparison of the top 100 companies in 1970 and 2001 demonstrates that only one enterprise managed to retain its position as a leading manufacturer which is the foreign-owned Rothmans (Lim, 1981; Gomez 2007). This suggeststhat Malaysian companies mostly family owned were not sufficiently investing in R&D with little development of pioneer tacit knowledge in the manufacturing sector.

Recognizing these issues, the Malaysian government has implemented technologically oriented clusters that have managed to create a huge community of components manufacturers, namely Original Equipment Manufacturing (OEM) suppliers consisting of family SMEs in exploring innovation capacities to enhance technology sharing partnership and collaboration opportunities. Many family SMEs have come to be 'locked into' an OEM relationship and slowly innovating their own branding and expanding their distribution channels in the marketplace. The implementation of the New Economic Policy (NEP, 1971-1990) has led to an important structural shift among Chinese family SMEs, resulting in Sino-Malay alliances though many were seen as 'Ali-Baba' alliances where the firm was owned by the Chinese while the Malay was a silent partner (Searle, 1999; Heng and Sieh, 2000; Wazir, 2000; Gomez, 2003). Thus, subsequent generations in these Chinese family enterprises in Malaysia faced different challenges due to changes in government public policy, including the NEP, depending on the sector they were situated in. It is interesting to investigate the trends of enterprise development among Malaysia's Chinese family SMEs in the manufacturing sector since few Chinese conglomerates have emerged as major publicly-listed firms in the manufacturing sector. Generational change studies in family SMEs is important to show how the subsequent generations solve the problems of poor management and control pyramids from the previous generation who is entrenched in preserving the value of old capital thus damage to creativity and innovativeness. 'New wealth' emerged in the 1990s after the Chinese enterprises in Malaysia successfully developed in compliance with the NEP and are presently managed by a highly educated second generation who have little problems creating cooperative ties with government agencies and foreign investors or Multinational Companies (MNCs).

These 'New wealth' Chinese enterprises played a crucial role in the Malaysian government's endeavor to rapidly industrialize the country with an emphasis from 'Japan Incorporation (Inc)' to 'Malaysia Incorporation (Inc)' emphasized in private-public partnership (Gomez, 1994). A new generation within Chinese family enterprises has also established cooperative ties with the government of Malaysia. YTL Corporation is one of Malaysia's largest conglomerates with a track record of 55 percent growth since it obtained pubic-listing in 1986. Besides its involvement in the construction sector where it made its name, this enterprise, led by the Yeoh family, is also involved in power generation, property development, cement production and high-end technology including plastic OEM production. Another famous family business is IOI. Like YTL, this family firm is now led by the second generation Lee family. However certain Chinese family enterprises in Malaysia might face the problem of lacked innovation drive as subsequent generations took over and failed to adapt successfully to the new trends of enterprise development, resulting in either the decline or stagnation (Heng and Sieh, 2000). These Chinese family

enterprises may have also declined because of slow growth arising from inefficiency caused by entrenched corporate control, high barriers to external investment, and perhaps a low investment in innovation. A great example is Yeo Hiap Seng (YHS) where third generation family members were urged to relinquish their positions as directors because of the company's poor performance (Gomez, 2009). In the late 1990s, following the 1997 Asian currency crisis, the Malaysian government expressed the need to integrate Malaysian SMEs into global supply chains created by Multinational Corporations (MNCs). To aid this process, the government introduced the Global Supplier Program (GSP) and Industrial Linkage Program (ILP) as attempts to adopt organizational capabilities that would successfully enhance diversification of the economy (Dosi et al., 1992).

2 Literature Reviews

In 1981-2003, small and medium scale enterprises (SMEs) particularly family owned have been encouraged by the Malaysian government to strive for excellence to compete in an increasingly globalized marketplace. The government has supported this endeavour by encouraging SMEs to invest in research and development (R&D) to enhance their capacity to innovate. The government's subscription to policies under the developmental state model from 1981 till 2003, particularly during the two decade-long premierships of Mahathir Mohamad (Malaysia 4th prime minister), can be said to have contributed to Malaysia's fairly rapid economic development. State-led development, replicating post-war Japan's form of economic growth, was imperative for Mahathir to support domestic enterprises and encourage the rise of large business groups. His desire to develop huge conglomerates was strongly influenced by East Asian corporate models, specifically the South Korean *chaebol* and the Japanese *zaibatsu*.

Mahathir appeared more enthusiastic about the family-controlled zaibatsu system than the interlocking stock ownership *keiretsu* pattern of corporate development, where corporate equity was very widely dispersed. The *zaibatsu* system would later evolve into the *keiretsu* mode of corporate holding after World War II (Morck and Masao, 2003) with an emphasis on the close links between the financial and industrial sectors to advance industrialization. Mahathir used these East Asian corporate development models as templates while promoting the creation of large, internationally recognized Malaysian Chinese conglomerates that would also help rapidly industrialize the economy.

2.1 Prominent Chinese Firms in Malaysia

There have been important studies on large Malaysian Chinese firms before the appointment of Mahathir, former Prime Minister of Malaysia. These studies include those by Lim (1981), Tan (1982), Sieh (1982). These studies drew attention to extensive interlocking ownership and directorship patterns among large Chinese firms which had led to significant specialisation, with a focus on foreign companies and Chinese-owned enterprises. By the turn of the century, the leading enterprises in Malaysia were government-linked companies though a few Chinese family-based firms also featured as prominent publicly-listed companies. These firms included those owned by the Lim, Yeoh, Quek, Kuok, Tan and Lee families (see Gomez, 1999).

In Malaysia, Gomez's masterpiece on *Chinese Business in Malaysia: Accumulation, Ascendance, Accommodation* provides an in-depth examination of eight large publicly-listed Chinese firms which are all family-owned though that was not his primary focus (Gomez, 1999). Gomez also conducted a comparative study of small and medium-sized Chinese family enterprises in the United Kingdom (UK) and Malaysia through an analysis of available data from the UK companies house (Gomez, 2007). Gomez found that most Chinese family SME owners in Malaysia preferred their heirs to become professionals, a factor that has hindered the development and direction of these family firms (Gomez, 2004). There were specific reasons for this lack of desire by Chinese family SMEs to develop their enterprises. One core issue was their response to discriminatory public policies such as affirmative action. Another was the lack of government support for Chinese family SMEs, specifically those owned by ethnic Chinese (Gomez, 2009).

2.2 Innovation of Tacit Knowledge in Family Business

The main obstacle of family business literature suggests that corporate organization features limit their ability to take advantage of incentives to innovate and upgrade the quality of their products (Hobday, 1995). Since economic change leads to market differentiation as changes in customer preference occur, family firms face the possibility of losing the market they have already captured unless firms invest in R&D (Appiah-Adu and Singh, 1998). This means that there is a need to cultivate and develop the extent of innovation based on customer orientation (Vossen, 1999) which directly influences the development of technical skills and competence knowledge in family enterprises (McConaughy and Phillips, 1999).

As family enterprises grow from one generation to the next, research shows that engagement with or involvement in decision-making plays an important role in adopting innovation to develop an enterprise (Aronoff and Ward, 2001). There has, however, been very little empirical research on Malaysian family firms, which constitute a large segment of SMEs, to assess if the contentions of this literature about their innovation capacity are valid. Thus, this paper evaluates how generational change, such as succession when a new generation emerges as owners, influence family firms regarding how the next generation explores their innovation capacity that is based on the founders' tacit knowledge. This study specifically assesses how multi generations in family firms (second and third generation) are transforming their tacit knowledge efficiently through new managerial styles, enterprise development characteristics and new product development.

This important topic of knowledge transformation is closely related to the concept of 'learning organizations' where man knows more than he can explain (Polanyi, 1966). In the literature on family enterprises, a founder's personal experience, inherent qualities and competence are persistently noted with many references to transforming this tacit knowledge into codified knowledge (Aoki, 2001). If this objective is achieved, the codified knowledge will serve as an asset for the firm that subsequent generations can develop to increase its competitive power. However, this task of transforming, commercializing and capitalizing on tacit knowledge is not easy. Codifying knowledge is considered a long term investment within an organization or family enterprise. It depends on how well tacit knowledge management can be developed within a traditional hierarchical organization to amore horizontal one in family enterprises.

Innovation is assessed regarding upgrading the technology used to create new products from tacit knowledge. Innovation helps the enterprise serve society by creating economic value. There is no fixed model of family innovation. It depends on the family enterprise's industry, characteristics and capacity to innovate. Innovation provides a structure and method to help a family business compete with other enterprises, increasing its revenue, creating brand products and obtaining funds to grow. It is only through innovation that family enterprises can create value in business activities during times of economic crises. Innovation is dynamic and continuous, and it changes the objectives and forms of value creation within a family enterprise.

In most family firms, the owner's leadership and management style have a significant influence on an enterprise's development to sustain longevity and achieve a competitive advantage in comparison to large organizations (Hale et al., 1996). When the leadership is dynamic and focused on innovation, considerable changes can occur within the firm, particularly regarding the quality of goods and services produced by converting tacit knowledge into codified knowledge (Voss, 1998). In fact, a crucial factor to ensure the development of a family enterprise is innovation through which tacit knowledge is developed in an effective way, thereby creating a niche for the firm, possibly also creating a product brand. Three basic company functions – research and development (R&D), marketing, and manufacturing – that can initiate this change from tacit knowledge to codified knowledge as well as create a system that avails itself to business opportunities that arise in the market as the economy rapidly evolves (Drucker, 1954) are considered.

2.3 Generational Change and Enterprise Development in Family Business

Innovation is crucial for the development and long-term survival of companies as it stimulates an enterprise's growth towards long term sustainability (Porter 1980; Craig and Moores, 2006). Many of the longest surviving firms are family-owned and have prospered over many generations. Schumpeterian has classically defined innovation as five entities: new production, new ideas, new marketplace or channel, new supply chain and a new mode of enterprise (Schumpeter, 1934). Innovative capacity refers to the extent in which the introduction of new methods can challenge the existing flow of processes in an organization to achieve their goal and objective (Damanpour, 1991; Hult et al., 2004). From time to time, change has been researched in different ways (Burns and Stalker, 1961). There is a motivation to learn of success factors related to top-down relations and leadership, customer relationship management and to upgrade skills and capabilities. To upgrade is defined as the ability of an enterprise to make better and value-added products (Giuliani et al., 2005). Networking is seen as an antecedent of innovation with a view of creating an ongoing process.

Generational change in family enterprises can influence tacit knowledge transformation when the next generation implements different strategies for innovation aimed achieving a competitive advantage which includes having an impact on management, marketing and manufacturing techniques, or the 3Ms (Chandler, 1962; 1977). Chandler (1962) has shown conclusively how, by focusing on the 3Ms, a small established enterprise, for example, a family firm, can overcome the first-movers' advantage and capture a place in an oligopoly. This focus on the 3Ms contributes to the promotion of 'organization capabilities' that foster effective functional and strategic competition by deeply influencing and exploiting economies of scale (Chandler, 1962).

The development of organizational capabilities helps a firm keep pace with rapid changes within an industry. Organizational capabilities influence and shape management structure during a generational change, converting the enterprise from a hierarchical organization to one that has a flattened organization structure which better encourages the flow of innovative ideas (Davis, 1983; Dyer and Handler, 1994; Upton and Heck, 1997). Generational change would necessitate investing in research and development (R&D), developing new markets and creating a new customer base in order to maximize chances of becoming a modern industrial enterprise (Chandler, 1990; Chandler, 1996).

Fletcher (2000) suggests that historical background and accumulated knowledge as well as experiences influence and shape present relations, situations and structures in family enterprises. In a multi-generation family enterprise, more than one family member is involved in ownership management, bringing about a separation of duties in the organization structure (Astrachan and Shanker, 2003). However, recent studies have shown that, as this generation grows older, their views of the world does not change. On the contrary, the new generation is significantly more likely to new ideas and open 'to enhance the reputation and status of the business in the local community' (Westhead, 1998). First generations in firms, on the other hand, are more likely to prioritize 'family objectives over business objective' (Westhead, 2003).

Different generations propose different characteristics, managerial styles and goals (Okorafo, 1999). Each generation brings new ideas and improvements developed from their past experiences and events (Ward, 1987; Drozdow, 1989). New generations bring new ideas and are more prepared and trained to develop an enterprise (Fernández and Nieto, 2005; Claver et al., 2009). In family businesses that operate over a few generations, research have shown that the founders would be less likely to transform their tacit knowledge (defined here as personal experience) to codified knowledge (that is, knowledge embedded in the firm but cannot become immediately available in the market) (Polanyi, 1966; Aoki, 2001).

Furthermore, the attitude and behaviour of family enterprises toward this need to convert tacit knowledge to codified knowledge can change when a new generation takes over (Swinth and Vinton, 1993). The form of business management may be influenced by many individuals within the family and is an issue that may have a bearing on organizational structure (Lambrecht, 2005).Historian and business analyst

Christensen (1997) argue that innovation can lead to major changes in business practices, contributing to a firm's longevity. There is a link between firm size and innovation dynamics where large firms are more likely to innovate than small firms. This is because large-scale enterprises are capital-intensive industries involving greater use of technology with a greater focus on horizontal and vertical integration and the employment of a professional management team (Chandler et al., 1999; Chandler, 1997).

Large corporations emphasize industry leadership as well as the need to have a well-developed competence to encourage large-scale R&D (Velde, 2001). Although R&D investment is crucial to maintaining a corporation's competitive advantage, different organizations exhibit different characteristics or behaviours based on R&D expenditure (Chen and Hsu, 2009). However, very little attention has been paid to R&D investment within the family enterprise scenario though some attention has been paid to firm size (Munari et al., 2010). R&D investment requires flexibility, openness in communication and non-rigidity in decision-making towards technical change to move up the value chain (Craig and Dibrell, 2006). Another body of literature has noted that SMEs, particularly family-owned enterprises, are more efficient than large firms in some industrial sectors (Little et al., 1987; Cortes et al., 1987; Liedholm and Mead, 1987). These researchers argue that efficient SMEs have better access to new technology, create joint ventures with foreign partners and obtain foreign contacts as buyers as well as suppliers, thus opening up opportunities for growth (Tan and Batra, 1995).

3 Data and Methodology

3.1 Gersick Transition Period Model

Family businesses can evolve across generations in terms of enterprise development, ownership management, strategies implementation and governance structure. In this paper, Gersick transition model has been adopted in the studies and Table 1 shows how the Chinese family enterprises in Malaysia can develop across several generations into diversified businesses, some owned by entities of "cousins" consortium. As the family business evolves to become a business dynasty, it acquires the innovation capacity to compete in domestic and international markets (Gersick et al., 1997). Three evolution stages are identified and labeled as follows: entrepreneur during the first generation, family partnership at second generation and business dynasty in the third generation (Gersick et al., 1997; Lansberg 1999).

Table 1 Stages of Chinese Family Business Evolution across Generations in Malaysia(Gersick et al., 1997; Lansberg, 1999)

Generation	First Generation: Entrepreneur	Second Generation: Family Partnership	Third Generation: Business Dynasty
Business Form	Entrepreneurship	Maturing business	Holding company or family subsidiaries, with diversified businesses
Mode of Control	Founder/owner/manager	Sibling team	Family branches
Strategy	Personal vision	Innovated the business	Profit sustainability, generate new wealth
Governance structure	Ad hoc, implicit	Informal board, implicit policies with government cooperation	Outsiders governance, formal policies to align with government policies

Table 1 demonstrates the evolution of family enterprises in Malaysia from a simple to a complex business during first, second and third generations. To achieve growth and development, risks might affect some of the business assets while being difficult to manage as well as the need to provide other plans for investment. These issues become more complex with diversified assets when a family business comes under the control of the third generation. First generation firms often have a "paternalistic" management culture and style with a personal vision and usually involve a first-mover entrepreneur to start the business. The governance structure is mostly ad hoc and implicitly and primarily led by a family member. The mature family business is clearly seen during the second generation, usually when sibling teams renew the business, providing better services and value-added products. The governance structure tends to have an informal board with implicit policies as the family business starts to increase its organization capabilities by promoting the 3Ms, namely management, marketing and manufacturing.

During the third generation when a family business begins to function as a holding company, more family branches occur and the strategy taken tends to be one that helps sustain profitability or generate new wealth due to rapid changes in internal and external environments. The governance structure tends to be one that has board members who are outsiders with the implementation of formal policies to commercialize tacit knowledge into a form that can last several generations. One key reason why family firms have survived the test of time is that family members are technically highly proficient in what they manufacture. Competence, cultural fit and previous experience are crucial while autonomy given during a generational change influences a family firm's capacity to hire experienced managers, outsource, fund R&D and obtain adequate resources to adapt to a "professional" style of management (Dyer, 1988) in order to create new products and identify more markets.

Gersick et al. (1999) introduced the Transition Period Model (see Figure 1) that deals with what happens as a business moves across the first three generations: Controlling Owner State (1st generation), Sibling Partnership (2nd generation) and Cousin Consortium (3rd generation). In a multi-generation study, Gersick discussed the formation of second generation sibling-partnerships to facilitate decision-making. At first, siblings either consider duty segregation by assigning management responsibility for certain areas or set up a top management to discuss major issues (Gersick et al., 1997). As a result, top management decisions play an important role to avoid a knowledge gap in a top down management to achieve organization outcomes (Chrisman et al., 2005). However, in reality, the interaction between the family, owners, management and business are much more complex, involving knowledge transfer from low-end to high-end industries or from a labour-intensive industry to a technology-intensive industry. A key advantage in researching family-owned businesses from an integrated systems perspective is that it facilitates an understanding of the context in which family firms stress the importance of business survival rather than product enhancement (Craig and Moores, 2006).

4 Results

From the 1930s to 2010s, the strategic location, manufacturing ability and institutional changes in Malaysia allowed many MNCs to establish themselves in key sectors. Malaysia became one of the largest sources of electronics, plastic production, automobiles, machinery and audio equipment. This historical analysis of the longitudinal case studies in plastics production show these Chinese family SMEs were undergone generational shifts and retained a prominent presence particularly between plastic injection and housewares production in terms of knowledge transformation. During the founding generation, knowledge of plastic production was acquired through hands-on experience and repetitive practice, policies were integrated and internalized in production, and partnerships with MNCs allowed participation in global supply chains. An analysis of the in-depth case studies of 11 Malaysia's Chinese SMEs in plastics production indicates that the next generation was allowed sufficient autonomy to perform their duties, from improving tacit knowledge to build on the reputation of the firm to rebranding core products. Tacit knowledge changed, as evidenced by new products and enterprises.

5 Conclusion

MNC partnerships spurred Malaysia's Chinese SMEs to continuously upgrade their machines, develop the range of their products, involve more professional managers and establish new subsidiaries to increase their sales volume. This is commonly seen in Chinese SMEs in Malaysia such as SKP Resources, Chang Huat, Polynic, Kemajuan, Guppy Plastic and Lam Seng, all of which are companies that frequently ventured into various industries in order to keep pace with the rapid changes in technology and market demand[4]. The business history of longitudinal case studies approach indicates that a majority of these Chinese SMEs in Malaysia relied strongly on projects and orders from MNCs to improve production processes. The major problem faced by these Chinese firms in nurturing a culture of R&D and new innovation is the high costs involved in designing new moulding with a new series of needed equipment and accessories since Chinese SMEs in Malaysia hardly get R&D funding from the government.

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Critical Success Factors (CSFs) of ERP Implementation: A Study with TRIZ Perception Mapping

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Abstracts Manufacturing solution like Enterprise Resources Planning (ERP) is designed for the manufacturing organization to streamline business operation by offering a suite of software modules for business and process improvement. Literatures showed that the success rate of the ERP projects was lesser than half because the ERP implementation process was rather complex and related to the issues that were difficult to address like people, process and methodology. There was not much specific finding on the relationship of the critical success factors (CSFs) and strategic intervention on people, process, methodology, technology and infrastructure as the best approaches. Hundreds of CSFs were identified however it was difficult to find literatures on specific CSFs that were indicated as the "most critical success factors" to address. In this paper, the authors employed content analysis on literatures to identify CSFs of ERP implementation based on research articles published between years 2005-2016. The constant comparative methodology was then used to harmonize the 332 identified CSFs to 90 CSFs. TRIZ perception mapping technique was then used to narrow down the search for the "most critical CSFs". The results showed the most critical CSFs of ERP implementation were "benchmark implementation progress on clear milestone and performance metrics", "project champion", "competence project team", "ERP system capability" and "user acceptance". The research findings also showed TRIZ perception mapping could help to improve the quality of the research output on CSFs studies.
Key words TRIZ Perception Mapping (PMap), Critical Success Factors (CSFs), ERP Implementation

1 Introduction

Enterprise Resources Planning (ERP) is the manufacturing solution that is used by the manufacturing enterprise for business and process improvement. In an effort to remain competitive, there has been an increasing need in organizations to connect the information supplied by each department into a common entity [1], [2]. ERP systems are designed for the manufacturing organization to address the problem of information fragmentation as they integrate and streamline internal processes by providing a suite of software modules that cover all functional areas of a business [3]. However, increasingly we hear of the failures of ERP implementations, or the complete abandonment of the system [4], [5]. Resultantly, there has been expanded research focusing on the implementation process and its critical success factors (CSFs) [6]–[9].

There are CSFs compilation, classification and taxonomy made available and they are intended to be used as good reference guide for ERP projects implementation [10]. CSFs shall enhance the probability of achieving higher success levels and, resultantly in timesaving, cost savings, quality and efficiency in their ERP system implementation [11]. However, the compilation of CSFs listing is typically long and there are not many specific findings on the relationship of the CSFs and its strategic intervention on people, process and methodology as the best approaches. There was none of the CSFs specifically indicated as the "most critical factors to address" [12]. Some of the CSFs case studies also found out there was no specific resolution given to attend the CSFs [13]. This has resulted in raised of the research question: *"**Out of so many CSFs identified through literatures, which CSFs are the most critical ones and should be putting highest attention in ERP implementation?** "*

This aim of this study was indented to find the answers for the research question in order to identify the most critical CSFs of the ERP implementation that would be more understandable and helpful to the practitioners in the industry. Our research work presented in this paper entailed two methodologies: the first involved the literature review study on CSFs; and the second related to the analysis and synthesis for the most critical CSFs. The results of the findings on the most critical CSFs were summarized in the last section of the article.

2 Literature Review

Researches in earlier 80's had indicated CSFs were those few things that must go well and must be given special and continual attention by a manager or an organization to bring about high performance to ensure success [14]. CSFs definition by Rorster & Rockart was "the limited number of areas in which results, if they are satisfactory, will ensure competitive performance for the organization" [15]. For a management team, a CSF processed a clear, explicit, and shared understanding of the organization's business environment and the actions which were necessary [15]. The CSFs concept promised a systematic way of identifying the key areas, or signposts, that required the constant and careful attention of management in order to achieve performance goals [12].

The success rate of the ERP system implementation was low even though companies did not show the failure of their implementation. The literatures showed there were different factors influence either **positively** or **negatively** on the successful implementation of the ERP, and CSFs were the reasons that determined the successful implementation [6], [16]. There were 3 stages of ERP implementation as indicated: **pre-implementation**, **implementation** and **post-implementation** and the CSFs occurred in all implementation phase stated above [6]**.** ERP solution implementation was complex and hence CFSs system processes were related to system selection process, project management process, implementation strategy, and success measure process [17]. Since the ERP system was used by the end users, CSFs were associated with users, project team, top management, consultants and vendors [18]. Different set of CSFs could be categorized under different classification to suite ERP projects lifecycle for different industry either SMEs or large organization, CSFs taxonomy were compiled the for ease of reference and providing good guideline for practitioners [10]

A comprehensive search through the relevant literatures for the past 12 years ranging from 2005 to 2016 for the articles from journals and conference proceedings found numbers of research articles that discussing on CSFs compilation, classification and taxonomy. Research conducted by Finney & Corbett (2007) over hundreds of journals using key terms search identified 45 CSFs articles. CSF constructs were then identified using content analysis methodology and inductive coding technique to identify 9 strategic CSFs and 17 tactical CSFs with total of 26 CSFs [11]. Ngai et. al. (2008) conducted similar search for relevant literatures for 10 countries/regions and identified 18 CSFs from the 48 related articles, and 'top management support' and 'training and education' were found the most frequently cited as the critical factors [19]. Dezhar and Sulaiman (2009) reviewed 95 articles and identified 17 taxonomy of CSFs through the literature review [10]. Ahmad *et. al* (2013) presented the results of a study to identify and analyze the interrelationships of the critical issues involved in the implementation of ERP in small and medium sized enterprises (SMEs) [20]. In their findings, the CSFs were mainly contributed by 18 organization factors, 2 neutral factors, and 12 operational factors with total of 33 CSFs. Ram and Corkindal (2014) search through 236 articles and found out 15 CSFs for the post implementation that associated with post-implementation performance improvements. Their study showed that still remained many proposed CSFs that needed to be robustly empirically tested for their actual influence on some aspect of ERP success [21]. Saade and Nijher (2016) searched for 37 case studies and extracted 64 CSFs from literature and subsequent detailed analysis found a total of 22 factors that were distinct. The proposed CSFs can be used by practitioners in five ways: assess implementation of an ERP; ex-ante assessment; comparative analysis with other implementation experiences; utilize CSFs from model as part of key

performance indicators; and utilize the model to establish a concise strategy to project management process for the ERP implementation [13].

Table 1 Literature Review Papers on CSFs

Authors	R. Saade, H. Nijher	J.Ram, D.Corkindale	M.Ahmad. R.Pinedo	S.Dezdar, A.Sulaiman	E.Ngai, C.Law, F.Wat	S.Finney, M.Corbett
Year Published	2016	2014	2013	2009	2008	2007
CSFs Articles Year-Range	1999-2013	1998-2010	1999-2013	1999-2008	2006-2007	1983-2000
Number of CSFs Related Articles	341	236	50	95	48	45
Number of CSFs Identified	64	46	33	54	80	55
Number of Distinct CSFs	22	15	10	17	18	26

The authors of this paper hardly discovered the most critical CSFs indicated specifically from all literatures mentioned above. However the articles had provided a good source of "raw CSFs" because the respective articles compiled the CSFs from the search on thousands of articles from journals, thesis and other form of publications. With regards to all the literature findings, the final results presented were merely CSFs taxonomy or categorization as distinct CSFs. In this research, the authors of this paper did not use the distinct CSFs but instead using the "raw" identified CSFs for analysis.

3 Research Methodology

The research approach and research methodology of this research is illustrated in Figure 1 below.

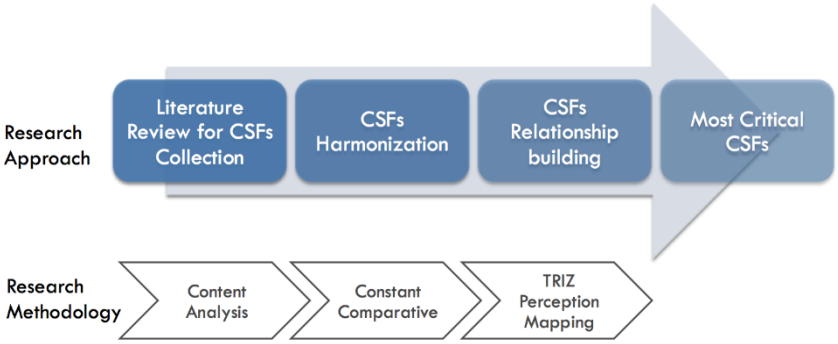

Figure 1 Research Approach and Research Methodology

3.1 CSFs collection and harmonization

This study was indented to find out the most critical CSFs for the ERP implementation. Given that the purpose of this study was to achieve a depth of understanding of the various CSFs already identified by other researchers, "content analysis" was a proper analysis approach. Patton (1990) declared that content analysis was the process of "identifying, coding and categorizing" the primary pattern in the data; and Cavana et al. (2001) suggested the similar for conducting "content analysis" using the "constant comparative method" [10]. Content analysis was employed in this research where researchers performed the theme coding manually and highlighted each theme as CSF as it occurred in the raw data being

perused. In this research, the 332 identified CSFs were used instead of the distinct CSFs because those identified CSFs were considered "raw" CSFs.

The following steps were used to analyze the CSFs in the published articles. The first step of content analysis was "data collection" that needs to determine which CSFs words or phrases will be selected as themes and the search was within the compiled related CSFs from the literatures. The second step was "open coding" where the raw data was coded to theme that allows first attempt of compressing the mass of data into categories. This stage of the coding process involved determining whether to code for a specific pre-determined set of CSFs or to permit for a more interactive coding approach. In this part of the analysis, emphasis was placed on the words or phrase themselves and not on the meaning of the words. The third step was "axial coding" that needed to work around the central axis of the CSFs until where it was necessary to decide whether CSFs were to be coded exactly as they appeared, or if they could be recorded in some changed to achieve the level of generalization. The forth step was "selective coding" that needed to look for facts that illustrated or justified CSFs and then made a comparison and identifies contrasts between sub CSFs and CSFs to allowed the researchers to investigate the relationships across categories. The end of this process would produce a list of harmonized CSFs to be used in next step to search for the most critical CSFs using TRIZ perception mapping.

3.2 TRIZ Perception Mapping (PMap)

The roots of the perception Mapping tool derives from the work on 'flow-scaping' done by Edward de Bono [22]. The tool is a simple yet powerful way of making sense of the relationships between the different attributes of problem [23]. Perception Mapping technique offers a systematic approach to manage the emotional and perceptual complexities present in business problem situations involving people. The tool uses the way human brain works in order to develop the lists of our perceptions about the situation under evaluation, and then progresses to examine how each of these connects to the others. [24]

The first step to do in TRIZ perception mapping was to identify and listing down and the identified CSFs as possible most critical CSFs from the content analysis. The most possible critical CSFs were then tabulated and indexed with a running number as illustrated in Table 2. The next process was building the relation of the potential critical CSFs by pairing them. By starting from the first CSF in the list, ask the question "what this will lead to?" and looked for the most possible of another potential CSF, then indicated the "lead to" CSF number at the end column in the table. The process continued with the second CSF and decided what it will lead to another potential CSF. The "lead to" CSF could be any other CSFs or same as the previous step. The process continued until the last potential CSF in the table list. All potential critical CSFs must have a "lead to" pair in the "lead-to" table, as illustrated in Figure 2.

Table 2 Perception Mapping Lead-To Table

CSF#	CSF Description	LEAD TO
1	CSF#1	2
2	CSF#2	3
3	CSF#3	4
4	CSF#4	1
5	CSF#5	10
6	CSF#6	5
7	CSF#7	8
8	CSF#8	9
9	CSF#9	10
10	CSF#10	1
11	CSF#11	6
12	CSF#12	6

Since it was difficult to visualize the linkages between each of the most possible critical CSFs, next step was to perform a graphical perception mapping by drawing each CSF with an arrow sign for each "lead to" pairs. The resulting perception map showed a system map of one attribute-pair leads to another, leads to another and so on until one led back to the initial pair. The process was continued until the last CSF was drawn in the perception map. Figure 3 illustrates the graphical view of the CSFs analysis with perception mapping for Table 2.

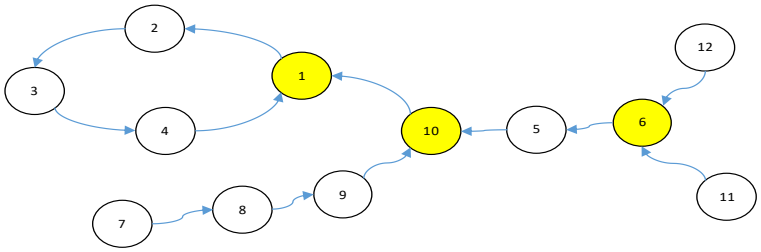

Figure 2 Graphical Perception Mapping of CSFs

There were 2 significant points to be observed in the perception map. Firstly, the system in map might contain at least one closed loop and all these closed-loops were significant (item #1, #2, #3, #4 in Figure 2). Secondly, there were possibilities that several root cause pairs of the "lead-to" could be pointing to a same connection point in the perception map, these were called the "**collector points**", as indicated as item #1, #6, #10 in Figure 2. Those CSFs collector points would be the most possible critical CSFs that we were searching for. Collector points could be the potential most critical CSFs as the other CSFs were merely perception and ultimately lead to the most critical CSFs [25].

4 Data Collection, Analysis and Results

4.1 Data collection

The data collection was based on the journal articles that focused on the CSFs compilation through literature reviews. The research papers that searched through were the research articles published from 2005 to 2016. After the detail reviews, the chosen articles were publication from S.Finney & M.Corbett (2007) [11], E.Ngai, and C.Law & Wat (2008) [19], S.Dezdar & A.Sulaiman (2009) [10], M.Ahmad & R.Pinedo (2013) [20], J.Ram et. al. (2013) [21], and R. Saade & H. Nijher (2016) [13]. Total of 332 CSFs were identified in the first stage of data collection.

4.2 Data analysis

With the collected raw "CSFs", constant comparison analysis was performed. After details analysis and harmonization, a total of 90 CSFs were harmonized as listed in Table 3.

Table 3: Perception Mapping Table of CSFs

NO	Critical Success Factors (CSFs)	Lead To	NO	Critical Success Factors (CSFs)	Lead To
1	Appropriate business and IT legacy systems	4	46	Managing consultants	56
2	Business plan/vision/ goals/justification	1	47	Staff retention	38

3	Justify the project based upon factors of cost and economic scale	27
4	Business process/rules are well understood	10
5	Business process reengineering	26
6	Minimal customization	59
7	Change management culture and programme	87
8	Change management	5
9	User involvement	76
10	Organizational culture and political structures	12
11	Commitment to change	8
12	Understanding corporate culture	7
13	Re-train IT workforce in new skills	40
14	Training and education	13
15	Developed clear education and training strategy	14
16	Education on new business process	33
17	Communication	18
18	Inter-departmental communication	20
19	Communicated regularly with all who would be affected	66
20	Open and honest communication	19
21	Data management	22
22	Data analysis and conversion	23
23	Data accuracy	24
24	Data quality control	21
25	ERP strategy and implementation methodology	34
26	Regard as a technological, business, and organizational project	39
27	Alignment between business strategy and IT strategy	2
28	Begin process changes first	29

48	Full-time team members	16
49	Employee/personnel relations	55
50	Sparing use of consultants	37
51	ERP vendor	52
52	Vendor-customer partnerships	54
53	Use of vendors' customization tools	6
54	Vendor support	51
55	Kept suppliers/customers informed	60
56	Monitoring and evaluation of performance	57
57	Benchmarked implementation progress against clear milestones or performance metrics	3
58	Focused performance measures	59
59	Client acceptance	60
60	Monitoring and feedback	57
61	Organizational characteristics	62
62	Had technology/infrastructure in place	58
63	Organizational experience of IT or organizational change projects of a similar scale	42
64	Company-wide commitment	61
65	Implementation of ERP was not due to competitive pressure	64
66	Project champion	56
67	Project management	68
68	Clear and defined project plan (goals, objectives, strategy, scope, schedule) Smaller scope	73
69	Avoid scope creep	71
70	Implementation costs	72
71	Realistic deadlines for implementation are set	70
72	Realistic expectations with regard to ROI and reduced IT/IS costs exist	57
73	Management of expectations	69

29	Strategic alignment of exercise	57	74	Total-quality management	75
30	ERP is treated as a programme not a project	25	75	Interdepartmental cooperation	9
31	Phased vs. Big Bang	32	76	Dedicated resources	48
32	Use accelerated implementation strategy	28	77	''To-be concept'' as project guideline	86
33	Deep understanding of the key issues relating to ERP implementations	66	78	Knowledge management	15
34	Select a good methodology	31	79	Managing conflicts in ERP projects	66
35	Careful selection of appropriate package	36	80	Clear and simple project organization	39
36	Suitability of software and hardware	82	81	Software development, testing, and troubleshooting	83
37	Decision-making process/style	60	82	Defining the choices of architecture	83
38	ERP teamwork and composition (Personnel)	40	83	System Integration	23
39	Steering committee	44	84	Software configuration	81
40	Project team competence	63	85	Troubleshooting	84
41	Empowered decision makers	66	86	Functional requirements are clearly defined before selecting an ERP product Perceived complexity	35
42	Selecting the right employees	45	87	Top management support	5
43	Employee morale (incentives)	47	88	Fit between ERP and business/process	84
44	Business and technical knowledge of team members and consultants	40	89	National culture	90
45	Balanced or cross-functional implementation team	41	90	Country-related functional requirements	10

The next stage of data analysis was to perform perception mapping to find out the most critical CSFs. This activities were carried out together with 3 industry experts. The first expert was a solutions consultant (IExp#1) with over 20 years of experience in implementing enterprise solutions including ERP, Product Lifecycle Management (PLM), turnkey ICT software development and ICT system infrastructure. The second expert was a Project Manager (IExp#2) with 12 years of experience in engineering solution implementation in CAD/CAM, ERP and PLM implementation for the manufacturing companies. The third expert was an industry consultant (IExp#3) from a government agency that having 15 years of experience in providing solution advisory and consultancy in product and process innovation to the local manufacturing enterprises. He has experience in conducting training on Manufacturing Management Course at university and industry. These industry experts were fully involved in the processing of perception mapping and had provided unbiased opinions and expert views to make the "lead to" decision. When there was different opinion occurred, the team would discuss and brainstorm for the best lead-to CSF decisions. The outcome of this exercise provided full lead-to results as shown in Table 3.

The graphical perception mapping was then produced and as indicated in Figure 3 below.

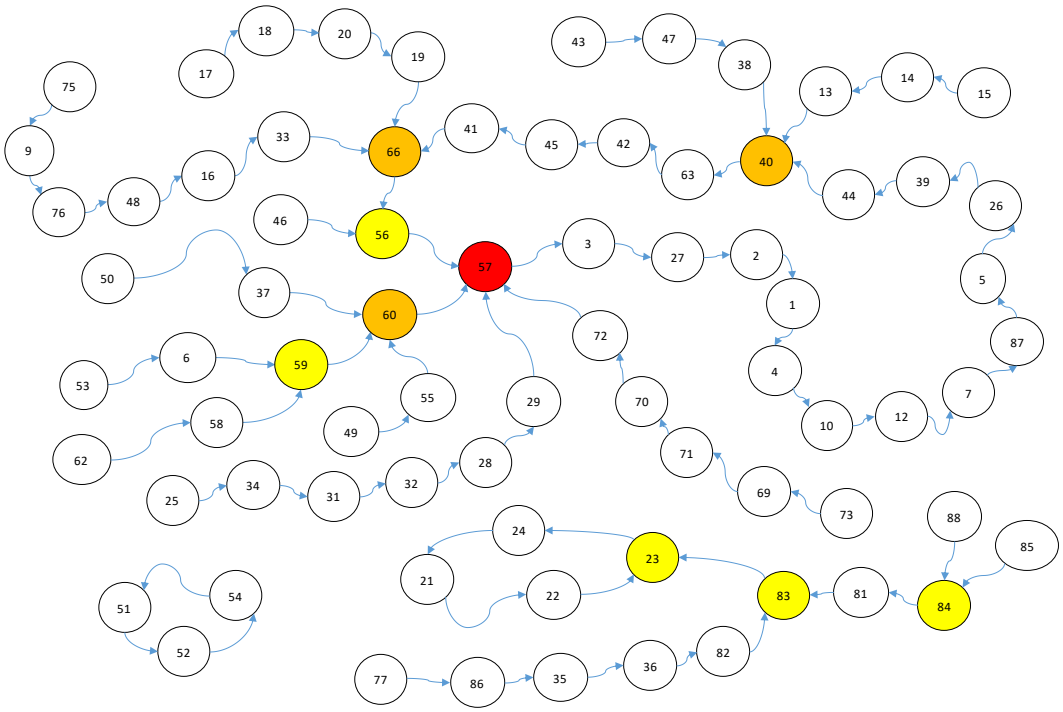

Figure 3 Graphical Perception Mapping of CSFs

4.3 Results

Referring to the graphical perception mapping in Figure 3, there are 3 closed-loops and 9 collector points are identified. The first closed-loop is the largest closed-loop, centering to CSF#57 (red colour) with 5 connecting joints, then CSF#60 and CSF#66 (brown colour) with 4 connecting joints, and CSF#56 (yellow colour) with connecting 3 joints. Nearby there is CSF#59 that leading to CSF#60.

The second closed-loop consists of CSF#21, CSF#22, CSF#23 and CSF#24; and connecting to CSF#83. CSF#83 and CSF84 (yellow colour) are collector points that come with 3 connecting joints respectively.

The third closed-loop is a small closed-loop consists of CSF#51, CSF#52 and CSF#54 that all linked together in a closed circle. There is no collector point found in this loop.

The ranking of the most critical CSFs shall be determined from the CSFs that come with most connection points found in the graphical perception mapping. Hence, the most critical CSFs discovered in this research are:-

(i) CSF#57 Benchmarked implementation progress against clear milestones or performance metrics
(ii) CSF#66 Project Champion
(iii) CSF#40 Project Team Competence
(iv) CSF#56 Monitoring and evaluation of performance
(v) CSF#60 Monitoring and feedback
(vi) CSF#59 Client acceptance
(vii) CSF#84 Software configuration,
(viii) CSF#83 System integration
(ix) CSF#23 Data accuracy

5 Discussion

For first closed-loop, the graphical perception mapping that comes with full descriptive information is shown in Figure 4 below:

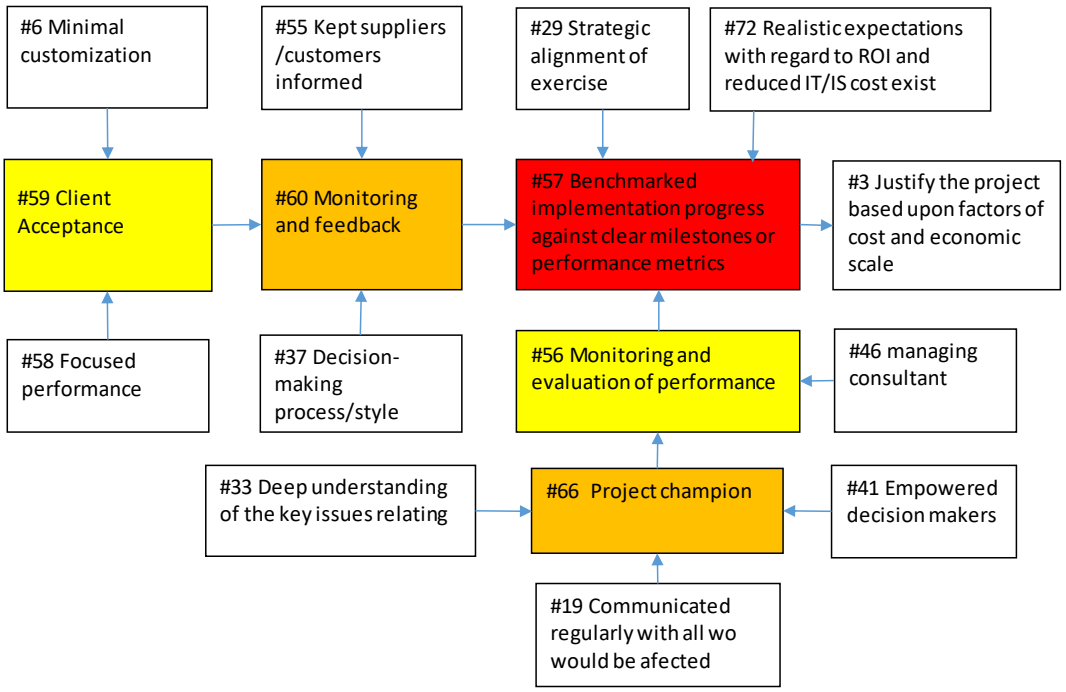

Figure 4 Perception Mapping of First Closed-loop

Referring to Figure 4, CSF#57 is the most critical CSF because it is the central for the other CSFs that leading to. Yeoh (2014) has indicated the central of the root cause will have the most connecting joints because that's the cause of the problems are leading to [25]. With respect to that, IExp#1 and IExp#2 supported that fact that it is very crucial to always benchmark the implementation progress against the clear milestone and performance metrics, because that shall be the measuring point whether the project is successfully completed and achieving the desired performance and productivity. This is aligned to Boynton & Zmud (1986) indicated that the critical things that must go well and must be given special and continual attention from a manager or an organization to benchmark against high performance to ensure implementation success [14]. It is critical to pay high attention to benchmarking to the performance metric and milestone as that's the measure to avoid the project cost overrun and ensure it can bring high return of the investment (ROI) with the desired results.

CSF#66 is critical because IExp#1, IExp#2 and IExp#3 fully supported the fact to appoint a project champion in position to carry out the ERP project implementation is very critical. Project champion should have deep understanding on the key issues related to the project requirements. Project champion should be empowered to make-decision (CSF#41) and having ability to communicated with all level of people in the project (CSF#19). The finding of criticality to have a Project Champion is align to the findings by (Yeh & Xu (2013) that indicated choosing the right full time project manager, training of personnel, and the presence of a champion could be related to project success [26]

CSF#56 shows criticality in monitoring and evaluation the performance of the project implementation is crucial and it shall be the responsibility of the project champion (CSF#66) and consultant (CSF#46). This is matching to the research findings by Trkman (2010) that technology-task should monitor to fit between IT and business processes for the standardization of processes, information, automation, training and empowerment of employees [27].

CSF#60 indicates another aspect of monitoring and feedback on the system users and suppliers. Continue monitoring and feedback from all related party shall facilitate decision-making process and to determine the better action to be adopted for improvement. With respect to this, the fact supported by Tsai et al. (2011) who had conducted investigation of the impacts of internal/external facilitators on the project success of ERP. The results reveal a significant causal relationship by monitoring system providers, implementation consultants and project team and users [28].

CSF#59 shows the criticality to have the client acceptance on the system. Both IExp#1 and IExp#2 pointed out it is always a challenge to get user acceptance and sign-off the system. With regards to this, user must "buy-in" and accepting the fact that the system has helped them to increase their productivity. Rajan & Baral (2015) claimed that in order to achieve this there are many factors including the computer self-efficacy, getting organizational support, giving them training will have a positive influence on ERP usage which in turn has significant influence on panoptic empowerment and individual performance [16].

This group of CSF#57, CSF#66, CSF#56, CSF#60, CSF#50 are very much related to the organization internal issues that related to people, monitoring project and implementation methodology.

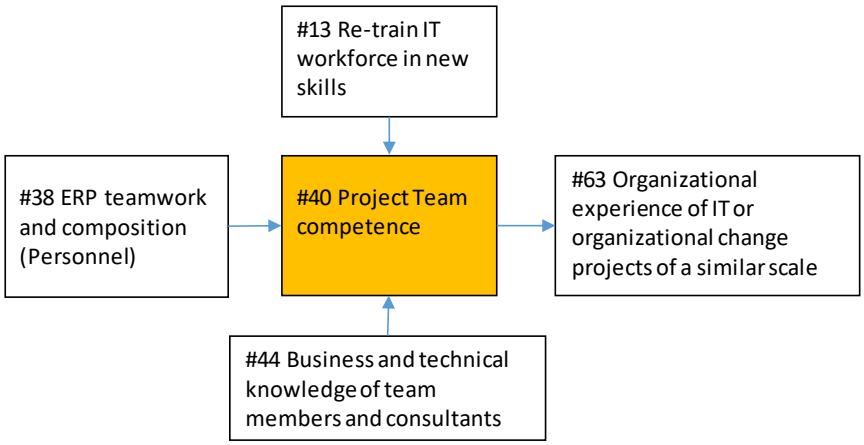

Figure 5 Perception Mapping on Project Team Competence

In Figure 5, it shows that CSF#40 (project team competence) resides in the first big closed-loop. CSF#40 is the collector points from CSF#38 (ERP teamwork and composition), CSF#13 (re-train IT workforce in new skills) and CSF#44 (business and technical knowledge of team members and consultant). It has indicated that the project team competence can lead to organization change through the experience gained. Empirical study from Kerimoglu et. al (2008) did reveal that organizational adoption can only be accomplished if the satisfaction with the ERP system was achieved by competency and flexibility of the technology along with the special efforts of project management during project implementation [29]. With regards to this, both IExp#1 and IExp#2 shared their past experiences that it is critical to form a competent project team and impart the team with the relevant industry knowledge and

further trained them with the software usage skills. If this is carried out properly, it would be able to help to execute the project implementation successfully.

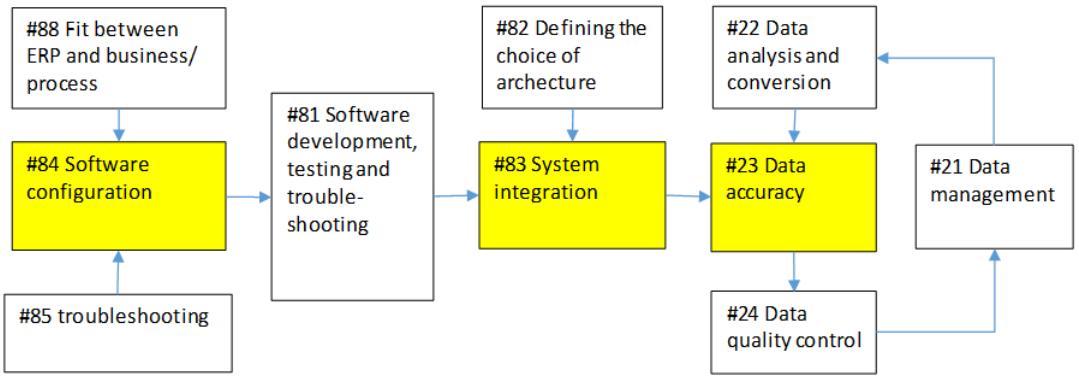

Figure 6 Perception Mapping on Second Closed-loop

Figure 6 shows another separate group of CSFs showing 3 collector points on CSF#84, CSF#83 and CSF#23. It is interesting that the perception mapping on CSF#83 lead-to a closed-loop of CSF#23, CSF#24, CSF#21 and CSF#22. This group of CSFs is mostly ERP technology functions that related to the capability of the ERP system, the flexibility of the system and the integration need to link the ERP system to other system. Similar results were presented by Kerimoglu (2008) that all of these factors are determined at the very beginning of the project when the ERP product is being selected by the organization [29]. CSF#84 shows the need to tune the system to match to the business processes requirement for the organization. CSF#83 indicates the need to integrate the system with the other related enterprise solution or system. Either the system is having configuration or integration, CSF#23 reveals it is critical to ensure the Data Accuracy because the usefulness of the system rely on the ability to generate the accurate reports to the management for decision making. IExp#3 indicated organizations always try to find the most suitable ERP packages in the market through details requirement study, and system demonstration were just to ensure there is a perfect match between the ERP system and their specific business industry and requirements. ERP system selection is difficult especially the organization business operation and process is very complex and dynamic [30].

A PMap loop can be considered a vicious cycle especially when one root cause worsen, it leads to another root cause to worsen too, which the results in a spiral down to chaos [25]. Therefore the CSF#23 Data accuracy loop may cause chaotic if the ERP system is not able to provide good quality of data and the proper data management.

Finally, there is a small closed-loop of CSF#51 (ERP vendor), CSF#52 (Vendor-customer partnerships) and CSF#54 (Vendor support) reside independently outside the two main circles. Even though there is no collector point in this closed-loop, whole closed-loop may consider as a critical factor too. This could be explained the ERP vendor could be outside the organization but they are the external entity that could affect the ERP implementation success. If an organization selects an inadequate ERP to fit their needs, the project will most likely destine to fail. Research and practice have provided several cases of ERP project failures because of a faulty selection process [31]. Therefore, the supplier selection criteria shall include their market position, training given by the supplier and the technical support and experience because the supplier service quality is critical to the project success [32].

6 Conclusions

The initial research in this study has given a good overview about the CSFs, CSFs taxonomy, CSFs categories and its classifications. This research has achieved its objective that identified 9 most critical CSFs from the 90 shortlisted CSFs candidates filtered through the literature reviews. The first phase of the research compiled the CSFs through literature review on the articles that had searched hundreds of researches articles on CSFs from research publications. This has given 332 raw CSFs and had provided sufficient sampling of data for analysis. The subsequent harmonization using constant comparative methodology had filtered down to 90 CSFs for further investigation. The second phase of the research using TRIZ Perception mapping had allowed the study on the relationship of the CSFs that could further helping us to narrow down the search for the most critical CSFs.

Based on the outcome of the study, the 9 most critical CSFs can be further consolidated to 5 most critical CSFs as followings. This shall answer the research question of this research.

#1 **Benchmark implementation progress on clear milestone and performance metrics** – A close monitoring of performance review and evaluation on ERP systems implementation can in turn lead to the achievement of all the business desired goal and objectives.

#2 **Project Champion** – appoint a dedicated project champion to lead the ERP implementation. Project champion should have deep understanding of operation of the organization and the key issues related to the project requirements. Project champion shall be empowered to make-decision and have ability to communicate with all level of people. Project champion shall conduct regular evaluation and monitoring the performance.

#3 **Competence project team** – setup of competence project team can lead to the success of ERP implementation that can be resulted organization change. Hence the project team shall consist of a pool of competent members that has been given sufficient training and knowledge transfer to implement the ERP software.

#4 **User Acceptance** – End user must "buy-in" to accepting the system and "hands-on" to use the system to improve their productivity. Project team shall continue to monitor their satisfaction level and give positive influence on the usage to the others.

#5 **ERP System Capability** – try to get a right and perfect match for the most suitable ERP system. The ERP system shall be easy to learn up, easy to configure, tune or customize to bridge-up the business requirement gap, and to generate accurate reports for decision-making. Select a vendor with track records to provide a capable system to suite the organization is very crucial.

The limitations of this study comprise the difficulty to conduct generalizations on the CSFs compiled from the literature articles and the process of making decision on the CSF lead-to in perception mapping. Therefore the industry experts were invited to participate in the data analysis in order to get some expert views in the decision making process.

The novelty of this research is using TRIZ perception mapping is new in CSFs study and this research shows the methodology could help to narrowing down the search to improve the quality of the search output for CSFs in ERP implementation. The approach can be used for the researches that come with similar requirements in future.

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Problem Solving Process in Malaysia Automotive Industry

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Abstract Purpose of this research is to analyse the application of A3 Methodology in problem solving process of Malaysian automotive manufacturing process. In this paper, the researcher analyse the problem solving process between OEM of carmaker and its first-tier supplier. Based on the seven steps of A3 Methodology, the analysis of current OEM practices in managing their defective part claim is observed. The findings of this research are (i) OEM and supplier conducted problem validation on-site as first process of the problem solving, (ii) OEM has provided the problem solving report template to it's suppliers which to ensure the problem solving analysis is properly recorded, (iii) the root cause analysis was using 7 QC tools and 5 Why analysis, (iv) verification of supplier corrective action has not been recorded in report template but recorded in separate minutes of meeting. From the findings result, the application of A3 Methodology in problem solving process of Malaysian automotive manufacturing process have not been fully practice between OEM and it's suppliers. The researcher propose to enhance the existing OEM problem solving report template with additional guideline of conducting problem solving analysis and instruction to fill up the template.
Keywords A3 Methodology, Problem solving process, Root Cause Analysis (RCA), Containment Action, Corrective action

1 Introduction

In the automotive manufacturing industry's supply chain, carmakers are customers to suppliers. As customers, the carmakers shall define its product requirements and specifications to its suppliers. Suppliers are required to produce and deliver products according to customers' requirements and specifications. Defective products resulted to customers' complaint or production stoppages.
According to Clause 8.3 of ISO 9001:2008 Requirements, the suppliers shall identify and control the product that did not conform to product requirement (also known as defective product) to prevent its unintended use or deliver to 'customer'. The actions need to be taken are 'immediate response' to preclude and eliminate the defective product and implement 'corrective measures' [1].

The question here is how do suppliers manage defective product discovered by customer? Currently, most suppliers complain the difficulty in identifying the quality improvement processes in order to manage and resolve the defective products problem. This is due to the lack of adequate methods in determining the financial consequences of poor quality [2].

Quality improvement processes such as DMAIC, 8D Problem Solving and A3 Methodology are prominent problem solving process among manufacturing suppliers. This research focuses on the A3 Methodology which is quality improvement processes that created little attention among researchers and practitioners. It has been used to determine the root cause and define the corrective action in manufacturing sector and services.

Initially, Toyota practitioners use A3 paper to make the quality improvement report in defect elimination [3]. After sometime, the fundamentals of Plan-Do-Check-Action (PDCA) have been adapted into the A3 report by Toyota management team in order to determine accurate root cause and corrective action with correct quality tools [4][3]. Toyota has introduced the A3 thinking process (hereafter known as A3 Methodology) to its suppliers for quality improvement process.

The research scope of this research is problem solving process between a Malaysian carmaker and its suppliers. The objective of this research is to analyze the application of A3 Methodology in problem solving process of Malaysian automotive manufacturing process.

2 Problem Solving Process

The result of poor control leads to delivery of defective product to customers. The establishment of manufacturing process control plan before the start of production is important to suppliers to define the appropriate process control method and re-action plan. Re-action plan means action to be taken if product or process cannot be controlled. In case of defective product discovered, the suppliers need to re-act and use the right quality tools and techniques to eliminate the defect phenomenon [7].

With respect to problem solving process, response to the defective product is most important for containment action. Containment action is defined as immediate action to address the phenomenon of defective product. Containment action taken must be dedicated, short-term, extraordinary and remain until effective corrective action implemented [8].

Exercising the right quality tools in determining the correct root cause is important to ensure right corrective action plan. [9]. There are four (4) important lessons to achieve the objective of problem solving process [6][10] which are listed as

(i) Consistently using quality tools for quality improvement
(ii) Eliminate the defective products by analyzing the data from quality tools
(iii) Deploy the corrective action plan from the result of analysis
(iv) All staff within the supply chain to exercise the quality tools.

Effective root cause analysis is discovering three main questions [8], which are listed as

i. Why did the defective product reach the customer?
ii. Why did the defect occur?
iii. Why did the system fail to detect?

In some cases, the root cause analysis requires creativity and innovative thinking to get the specific corrective action [11]. According to [12], the most important factors in the successful implementation of the corrective action are full management support and commitment and giving the correct problem solving process training to the right staff at the right time.

Techniques and tools	Percentage of firms					
	Not familiar with	Familiar with	Not implemented	Used	Regarded as a basic tool	Implemented
Internal audits	0.0	0.0	0.0	16	84.0	100
Graphics	2.8	16.0	18.8	62.3	18.9	81.2
SPC	10.4	37.7	48.1	39.6	12.3	51.9
Flow chart	17.9	30.2	48.1	42.5	9.4	51.9
Problem solving methodology	21.7	32.1	53.8	42.5	3.8	46.2
Quality costs	12.3	42.5	54.8	35.8	9.4	45.2
Histograms	27.4	36.8	64.2	31.1	4.7	35.8
Benchmarking	21.7	46.3	68.0	31.1	0.9	32.0
FMEA	40.6	34.0	74.6	20.8	4.6	25.4
Pareto diagrams	40.6	35.8	76.4	17.9	5.7	23.6
Cause and effect diagrams	31.1	47.2	78.3	19.8	1.9	21.7
Scatter diagram	46.3	37.7	84.0	15.1	0.9	16.0

Source: Quality tools and techniques: Are they necessary for quality management?, J.J Tari (2004)

Figure 1. Implementation of Quality tools and Problem Solving Methodology among the suppliers

Figure 1 shows 53% of suppliers have not implemented problem solving methodology in their organization [12]. Due to that situation, it is recommended for suppliers to apply any problem solving methodology like A3 Methodology. Mentioned below is the A3 Methodology found in literatures

2.1 Defective Product in Manufacturing Process

In manufacturing processes, 'defect' is one of the threats that leads to poor business performance in term of quality, cost and delivery. When there are high percentage of defects occurred in manufacturing processes, managing defect is crucial to ensure the defect would not disseminate. From OEM's defect claim reports, the effects of defective product for examples parts cannot install, production stoppage, rework and field return are critical to the customer process. Thus, the respective suppliers have to take appropriate action to eliminate the defects and prevent recurrence. In many cases, defective products are caused by 'mistakes' and there are several type of mistakes that frequently happened; (i) omitted process (ii) processing mistake (iii) mistake in setting up workpiece, (iv) missing part (v) wrong part (vi) processing the wrong workpiece (vii) mis-operation (viii) adjustment mistake (ix) equipment not set up properly, and (x) tools and jigs improperly prepared [5].

Table 1. Type of Defects

Manufacturing Process	Type of Defective Product
Plastic Injection Moulding	White mark, Shrinkage, Short shot, Dimension error
Metal pressing	Burr, Seizure, Scratch, Wrinkle, Dimension error
Welding	Nut weld miss, pin hole, weld crack, detached
Assembly	Part missing, part malfunction, appearance defect, misprocess

Source: A Textbook of Manufacturing Technology: Manufacturing Processes, R.K Rajput (2007)

According to [6], defective products depend on the type of manufacturing processes. Table 1 shows the common type of defects in manufacturing processes.

2.2 The A3 Methodology Problem Solving

The A3 Methodology is a sequential thinking process adapted in Toyota to derive the Plan – Do – Check – Action (PDCA) cycle in process improvement [3]. The thinking process started with Plan stage which the team members need to fully understand the background of the problem or project [13]. At this stage, team members have to define also the status of the problem and the objective of future goal. The team requires approval from management level to start with the next stage of Do and followed by stage of Check [13]. The corrective action plan of A3 Methodology encourages to implement lean activity such as 5S, Total Preventive Maintenance, Jidouka and Heijunka [14]. The verification of corrective action effectiveness is required to ensure the problem of defective products is successfully executed. Only if the corrective action plan is successfully implemented, new standard will change the current operating procedures. After the change is made, the stage of Act is completed to close the PDCA cycle as a loop [13]. Otherwise, the process begins from other new Plan stage [3].

Once the PDCA cycle is successfully completed, the practitioners will establish the A3 report for record purposes. The term "A3" derives from the paper size used for the report, which is the metric equivalent to 11" x 17" (or B-sized) paper. The A3 report for problem solving consist of six steps [15] [3] as listed below

Step 1 – Theme and Background: The themes indicates the problem(s) being addressed to and they are descriptive.

Step 2 – Current condition: The current problematic processes highlighted on the diagram and future goal.

Step 3 – Root cause analysis: The analysis is using QC tools to define the root cause such as Why-Why Analysis.

Step 4 – Countermeasure proposals / plan: The corrective action proposals to eliminate the root cause of defective product.
Step 5 – Countermeasure execution plan: The schedule to execute the corrective action.
Step 6 – Follow up plan: The verification of corrective action execution.

As a conclusion, the analysis of PDCA in problem solving process is adequate for A3 Methodology application. The below section highlights the problem solving process in Malaysian automotive manufacturing industry.

3 Methodology and Data Analysis

The research on the application of problem solving process in automotive manufacturing industry was conducted at one of Malaysia-Japan brand name carmaker. For the purpose of this research, the carmaker is named as OEM and the organization applies A3 Methodology in its problem solving process. The OEM's defect claim reports to its suppliers from October 2014 until December 2014 have been collected.

As a result, ten suppliers which are Malaysian owned companies operating more than 10 years in the plastic product within automotive supply chain have been chosen. Each of the suppliers may have one or more plastic product manufacturing process types which are injection molding, blow molding and thermoforming.

Table 2. Defective product summary of 10 suppliers

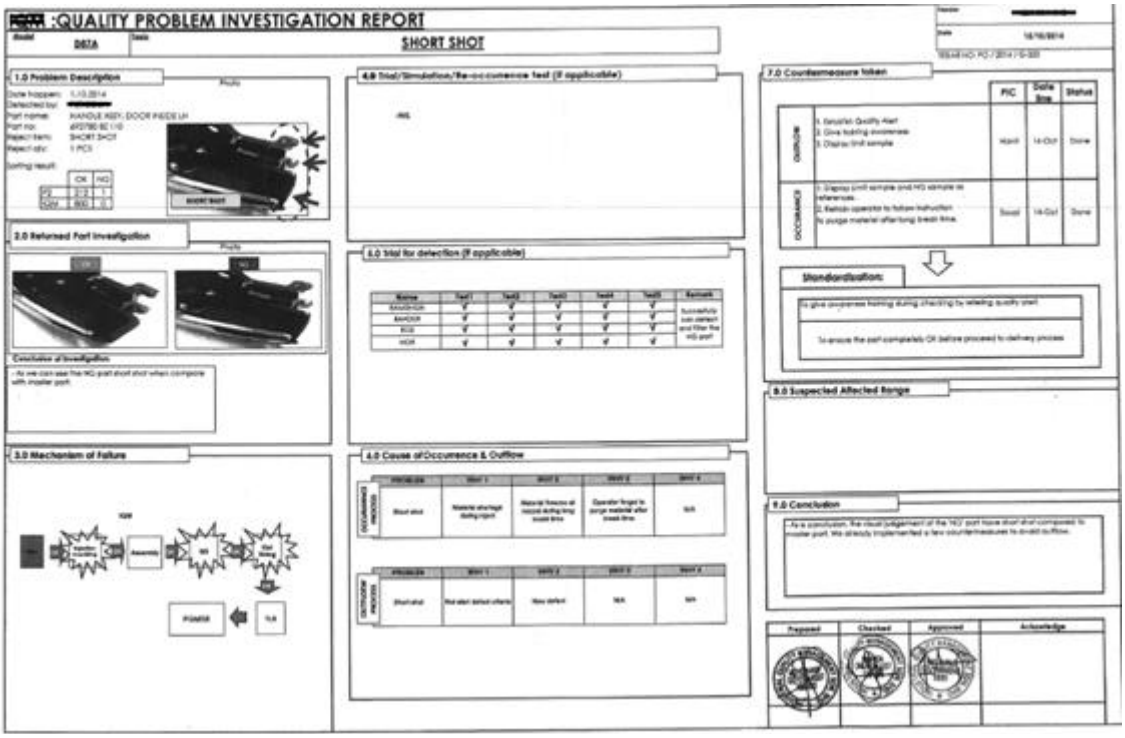
Company	No. of claims	Type of defect	Root cause
A	2	Short-shot	Start-up sample mix part
		Dented	Start-up sample mix part
B	3	Part broken	Customer false
		Surface Un-even (wavy)	Start-up sample mix part
		Sink mark	Start-up sample mix part
C	2	Short-shot	Start-up sample mix part
		Sink mark	Start-up sample mix part
D	1	Weld line	Irregular parameter setting
E	2	Sink mark	Start-up sample mix part
		Part broken	Irregular parameter setting
F	3	Warping	Irregular parameter setting
		Dimensional error	Mold worn out
		Excessive material	Mold worn out
G	2	Dimensional error	Irregular parameter setting
		Short shot	Start-up sample mix part
H	3	Short-shot	Start-up sample mix part
		Dimensional error	Start-up sample mix part
		Dented	Irregular parameter setting
I	2	Dimensional error	Mold worn out
		Part broken	Mold worn out
J	1	Excessive material	Irregular parameter setting
Total	21		

Source: This research

A total of 21 defect claim reports have been reviewed from all ten suppliers and the summary of defective claim reports as shown in Table 2 above. The suppliers' problem solving process proceeded after receiving OEM's defect claim reports.

3.1 The OEM defect claim report

The OEM defect claim reports listed the details of product descriptions and defective products background. The pictures or sketches of product(s) comparison between defective and good product(s) were presented. The OEM investigator conveys the information of defect occurrence to supplier and request the supplier to review the problem(s) at OEM together. The investigator will record the supplier arrival time and supplier representative names in the defect claim report. In case of defective product can be sorted out, the quantity of defective product will be recorded in the defect claim report. The OEM investigator also records the supplier process control method for defective product(s), suspected root cause(s) and follow up plan respectively.The suppliers are required to give feedback, by submitting Quality Problem Investigation Report (OEM report template) or supplier's report to OEM within a period given.



Source: OEM's Defect Claim Report – Quality Problem Investigation Report (QPIR)

Figure 4. Sample of supplier's quality problem investigation report

3.2 Suppliers' Quality Problem Investigation Report

The OEM supplier's Quality Problem Investigation Report header as shown in Figure 4 above (hereafter known as QPIR) contains defective product description and supplier's name. The report is divided into nine sections which are (i) problem descriptions, (ii) returned part investigation, (iii)

mechanism of failure, (iv) trial/simulation/re-occurrence tests (if applicable), (v) trial for detection (if applicable) (vi) causes of occurrence and outflow, (vii) corrective actions taken, (viii) suspected affected range, and (ix) conclusion.

Section 1 of the QPIR describe the defective product description. For examples product name, product number, car model, defect type, quantity of defective product and result of sorting activity. The supplier's findings between defective product and good product are presented at Section 2 and the supplier states the conclusion of the investigation. Section 3 of the QPIR, where suppliers are highlighted the effected manufacturing process of defective product. The supplier will focus on the highlighted process as source of possible root cause.

In the QPIR Section 4 and Section 5, the suppliers are encourage to simulate the problem occurrence and detection. The purpose is to confirm the problem phenomenon. Section 6 of QPIR is showing the supplier's analysis of problem root cause and the quality tool why-why analysis has been used to determine the possible cause of defect and outflow. From the result of root cause analysis, the supplier table out the corrective action proposals and announce the due date to complete the corrective actions execution in Section 7. In this section, supplier will state the status and responsible staff of corrective action execution. The supplier presented the process standardization in this section after the corrective action taken is successful. Section 8 is for supplier to indicate the other process that effected to the corrective action. Finally, the supplier will write the conclusion of the effectiveness of problem root cause and the corrective action taken. From the research data analysis above, the researcher discusses the finding of A3 Methodology application and problem solving process of automotive manufacturing industry in following section.

4 Result

The problem reviews between OEM and its suppliers are the process of 'problem know-how' which can be categorized as an initial step in problem solving process towards root cause analysis. It can be defined as Plan stage of A3 Methodology process. The outputs of problem review between OEM and its suppliers will provide the information of problem background, current conditions and future goals for improvement. The information are recorded as Step 1 and Step 2 in A3 report.

As mentioned in the problem solving report of A3 Methodology, the root cause analysis categorized as Plan stage of A3 Methodology and mentioned as Step 3 in A3 report. The research data shows the root cause analysis begins with two steps as listed below;

(i) recognizing the effected manufacturing process and

(ii) eliminating the not-possible causes.

Within these steps, the suppliers are encourage to use two quality tools which are identified as *process flow diagram* to recognize the effected manufacturing process and *why-why analysis* to eliminate the not possible causes. From the research observations, the suppliers are also required to make simulation of defect phenomena which A3 Methodology is not required.

Other research observations also found that the analysis of other manufacturing process data has not been mentioned in QPIR. The example of manufacturing process data are process check sheets, inspection check sheets, production reports, statistical process control sheets and material certifications.

Step 4 and Step 5 in A3 report is supplier's corrective action plan and execution schedule which categorized as Do and Check stages in A3 Methodology. In this step, the researcher found that suppliers provided the corrective action plan to improve the defect occurrence and outflow. The suppliers' corrective action plan also indicate the responsible staff, due date and status of the executions.

The other finding from this research, OEM verification on supplier corrective action have been conducted and it was recorded separately in minute of meeting.

At the end of the problem solving stage, the researcher found that suppliers have made a few changes in their operation standardization such as Work Instruction, Inspection Check sheet, Process Flow, and foolproof as permanent corrective action.
There are several recommendations discuss in section below for future researchers or industrial practitioners to improve the A3 Methodology application in problem solving process.

7 Conclusion and Recommendations

The A3 Methodology has not been applied in full at the problem solving process between OEM and its supplier. As a result, appropriate quality tools for root cause analysis and corrective action plan are essential to ensure corrective action actions implemented accordingly. The suppliers have to consider the availability of current resources and capability to execute the corrective action plan accordingly [16]. For future research, it is recommended to the other researcher to explore and establish the problem solving procesguideline and template including the root cause analysis and implement corrective action.

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The Effect of Entrepreneurship Training on the Capacity Building Program of Kano State Enterprise Development Training Institutes

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Abstract Kano state enterprise development training institutes were established with the expectation to further promote and increase the number of small enterprises owners, improve the sustenance of small businesses, and reduce unemployment in the society. The institutes have graduated many students some of whom have ventured into businesses and others did not start any. Even those that have started hardly sustain them beyond six months. It is against this backdrop, the study therefore aimed at understanding the effect of entrepreneurship training on capacity building program with concerns to training quality, trainers competence, and availability and functionality of training facilities in the institutes. A survey research design was used, hence primary data were collected through questionnaire. A sample of 370 respondents were selected using convenient sampling technique. With the use of multiple regression analysis, the results of the study showed that training quality, trainers' competence and training facilities have significant effect on capacity building effectiveness. The study thus recommended that the training institutes should standardise the admission process, curricula and improve on post training support activities. They should also determine trainers training needs and should send them for further training. The institutes should provide up-to-date training facilities with effective maintenance mechanism. Also, the study make some recommendations for future studies to in-corporate other effective variables like government political will and funding that could explain the remaining variance in enterprise development.

Key words Capacity-building, Entrepreneurship, Training, Trainers and Development

1 Introduction

Globally, countries are using entrepreneurship development training as a tool in building and improving capacities of their people to take on productive enterprises. It is increasingly becoming a means in the creation of small enterprises as well as employment creation in developing economies. This entrepreneurial drive and the benefits that comes with it, made Nigerian government to develop programs and agencies to promote entrepreneurship training at various levels in the country. According to Davidson et al, (2006) entrepreneurship development is very relevant in the economic development of countries across the world. These productive enterprises can succeed in managing and growing their businesses if they have the appropriate skills and expertise that would enable them carry out their daily business undertakings effectively. The skills and expertise are often learned or acquired through capacity building programmes.

Capacity building is the process whereby individuals, groups, and organisations abilities are enhanced to mobilize and use resources in order to achieve their objectives on a sustainable basis (UNDP, 2002). Capacity building consists of activities designed to increase the competence and effectiveness of individuals and organizations (Stryk, Damon, & Haddaway, 2011). These activities, such as entrepreneurship training are intended to help participants acquire new skills, methods and capabilities of creating new and growing their existing enterprises.

De Cenzo and Robbins (2007) argued that training is basically a learning experience, which seeks a relatively permanent change in an individual's skills, knowledge, attitudes or social behaviour. Entrepreneurship development training is a personal development through which an enterprise culture can be created into the minds of potential entrepreneurs (ILO/UNDP, 1990; Harper, 1993). It is therefore well-recognised that training opportunities play a key role in cultivating future entrepreneurs and in developing the abilities of existing entrepreneurs to grow their business to greater levels of success (Henry, Hill and Leitch, 2003).

Evidence suggests that capacity building program has several positive effects. For example, the participants in capacity building training experienced, as cited in (OECD, 2014), increased problem-solving and decision-making abilities. Also experienced were improved interpersonal relationships, teamwork, money management, enhanced social psychological development (i.e. self-esteem, ego development, and self-efficacy) and improved creativity. Therefore, entrepreneurship training recognises the importance of multiple intelligences and talents as prerequisites for creativity, innovation and entrepreneurship (OECD, 2014). Entrepreneurship training is often viewed within the framework of lifelong learning.

The notion that entrepreneurs are born, is rather weak, instead it is well recognised now that the entrepreneurs can be created and nurtured (Kuratko, 2003). When these skills are learned through capacity building program, the potential entrepreneurs could display change in personality traits, attitudes, motivations and enterprising tendencies, which will in turn improve the performance of participants' ventures. Very importantly, the effectiveness of the capacity building program should be an area of concern. The effectiveness might be affected or influenced by the whole of the entrepreneurship training process and activities, such as the quality and relevance of the training programme, trainer's competence and capabilities and facilities available in the institutes. Trainings could take the form of apprenticeship, workshops, seminars, schools and or training institutes. Common among the trainings in Nigeria is that of the training institutes, where people are kept for certain period of time to learn and acquire skills necessary for their businesses development.

In view of the need to build the capacities of its people so as to encourage small business development, create employment, reduce poverty level and to improve the economy of the state, as was buttressed by (Tijjani-Alawiye, 2004; Izedonmi, 2009; and Unachukwu, 2009). Kano state government established a number of training institutes in the state within the years of 2011-2013. The Kano state entrepreneurship development institutes offer various programmes and have graduated many people. Although the capacity building programmes covers people with existing businesses and those who may start new enterprises, what is not clear is how effective are the capacity building programmes in developing the desired entrepreneurship skills of the trainees.

Earlier researchers like Rae and Woodier-Harris (2012), highlighted a model for entrepreneurship education and training that considered 'effectiveness' as the key outcome rather than learning, hence it focused on issues that concerns training design and techniques, trainee mind-set, capability and training effectiveness. An elaborate research on effectiveness of entrepreneurship training has been provided by Colette, Hill and Leitch, (2005), they established that there are some difficulties associated with the design of programs, as well as their objectives, content and delivery methods. There is still room to conduct this research with additional variables such as trainers competence and training facilities which were not covered by earlier studies, specifically in Kano state, Nigeria.

This study therefore tries to assess the effect of entrepreneurship training on capacity building run by these institutes with emphasis on the process of the training as was supported by TIER model. It is also aimed at understanding specifically the effects of training quality, trainers competence and training facilities on capacity building effectiveness. It is therefore hypothesised that the quality and relevance of training program has no significant relationship with capacity building effectiveness; Trainers' professional competence and experience do not have any effect on capacity building effectiveness; and

availability and functionality of training facilities in the institutes has no effect on capacity building effectiveness.

2 Literature Review

Capacity building is the art of enhancing new and improved entrepreneurship skills. Capacity is a dynamics involving a complex combination of attitudes, resources, strategies and skills, both tangible and intangible (Schacter, 2000). Capacity is more of capabilities of performing certain tasks. Capacity building is a complex notion – it involves individual and organisational learning which builds social capital and trust, develops knowledge, skills and attitudes and when successful creates an organisational culture which enables organisations to set objectives, achieve results, solve problems and create adaptive procedures which enable it to survive in the long term (UNDP, 2002). According to ESRC (2012) capacity building is a process where individuals, groups, networks, and organisations are encouraged and facilitated in enhancing their knowledge and skills so as to increase their ability to perform innovative and high quality social science research. As a process it involves imparting new and improved skills to individuals or group of individuals. Capacity building can be defined narrowly in this context as the act of increasing knowledge and skills for starting and growing enterprises and every other support (financial and enabling environment). The capacities for enterprise development are built through certain activities such as internship and training.

Entrepreneurship development training is a personal development through which an enterprise culture can be created into the minds of entrepreneurs to be (ILO/UNDP, 1990; Harper, 1993). It is therefore well-recognised that training opportunities play a key role in cultivating future entrepreneurs and in developing the abilities of existing entrepreneurs to grow their business to greater levels of success (Henry, Hill and Leitch, 2003). Considering its importance worldwide, entrepreneurship training is often included in national curricula for vocational training in the European Union and other developed countries (CEDEFOP, 2011). Not only Europe, countries like Nigeria had made it a compulsory course of study in all tertiary institutions in the country.

The increasing desire to develop and nurture entrepreneurial attitudes and skills through training necessitated the creation of training institutes and or development centres in many states of Nigeria. According to (Bronte-Tinkew and Redd, 2001; Gibb, 2005) some key features of entrepreneurship training are interdisciplinary of different settings; development of both soft and hard skills, and particularly the combination of the two; Learning process is embedded in different contexts that are relevant for different disciplines; and, Outcomes seek to foster entrepreneurial behaviours, skills and mind-sets. Entrepreneurship skills such as idea development, problem-solving, network development, resource management, risk management and leadership are often required competences and generally appeal to trainees. At the same time, a more narrow set of skills are increasingly taught to support those trainees to start-up a business. This includes, for example, learning how to draft a business plan, manage the day-to-day operations of a business (e.g. accounting, management, commercial law, and marketing) and complying with legal and regulatory requirements (e.g. business registration, filing taxes) (European Commission, 2009).

The quality of training program comprises of the program structure, training course content and the methods of conducting the training. Program structure comprises of pre-training, training and post training activities. One of the major activities in the pre-training phase is the selection of participants and their respective institutes to be trained in. Once the institutes or centres have been identified to have the capacity for potential trainees, the program coordinator or the institutes undertakes promotional campaign (Nwazor, 2012). Screening and selection of trainees could make training more qualitative because all those selected would have to qualify through which certain traits can be identified and the trainees would therefore choose which profession or trade to be trained in. Training programmes undertaken without adequate promotional campaign fails to evoke much response and this can be a major reason for the failure

of EDPs (Sebastian & Awasthi, 1992). This would enable wider reach to potential trainees who may wish to enrol into the program.

Training course content is equally an element of training quality, because it shows necessary skills to be taught in the training program. According to Brown (2000) as cited in the work of Azila-Gbettor & Harrison, (2013) curriculum has to focus on the features that needed to be conceiving of both business and technical skills. According to (Nwazor, 2012; Sebastian & Awasthi 1992; Singh, 1990) some of the major inputs provided in a training content are; behavioural inputs like achievement motivation training, communication skills, problem solving skills, interpersonal skills, creativity, decision making, etc. The objective of this input is to reinforce the motivation and entrepreneurial traits of the trainees. The other input is to facilitate decision making process to set up a new venture, like business opportunity guidance, information, project planning and technical inputs.Furthermore, Brown (2000) as cited in the work of Azila-Gbettor & Harrison, (2013) maintain that the curriculum has to focus on the features that needed to be conceiving of and starting a new business and or growing an existing enterprise. The said skills includes technical, management, people skills, sales and marketing skills, time management skills etc.

Another important factor is the training method. Even if the course or training content is perfectly appropriate to the target group in question, the training can be rendered quite ineffective if the delivery methods are not chosen well. To develop entrepreneurial practice requires methods capable of instilling transversal entrepreneurial skills (Mwamisha & Wanjau, 2013). The way and manner to which the training is being conducted is the method of training. Okudan & Rzasa (2006) posit that effective entrepreneurship training should provide opportunities for participants to practice a combination of all the entrepreneurial leadership components. These components have to do with role play or on the job training for the participants. According to Brown (2000) entrepreneurship training and education should be viewed in terms of the skills that can be taught and characteristics that can be engendered in trainees in order to help them develop new and innovative plans for their future business endeavours. Romijn, (1989) argued that different EDP seems to indicate that practical training, involving a variety of people who actually deal on a day-to-day basis with the problems of small-scale businesses in different capacities is much more successful than training that relies more on lectures by professional teachers.

Entrepreneurship development training requires a great deal in terms of competence and experience on the part of the trainers. Increasingly, trainers are identified as the most important factor influencing the quality of training (European Commission, 2013). Ideally, different sessions should be conducted by specialists in different areas. According to Romijn, (1989) achievement motivation training for instance requires considerable skills, which can only be offered by a mature trainer with a sound background in psychology and lively interest in people. That is to say a professional trainer with bank of experience makes more contribution to success of capacity building program. Donovan, Bransford & Pellegrino (1999), in their review of training evaluation models from the economic and human resource literature, pointed out that when dealing with the issue of human competence, trainers' expertise is critically important. Good quality entrepreneurship training requires qualified personnel responsible for its conceptualisation and delivery; being qualified as a trainer for entrepreneurial skills means to be in possession of highly developed individual competencies, in terms of personal and professional knowledge, skills, attitudes and values. It also means being able to apply these competencies alone (i.e. autonomously) and in interaction with participants and or other trainers (European Union, 2002).

2.1 The TIER model of Training Effectiveness Research

In this study the TIER model was used in accepting the basis to which this whole work was conducted. According to Gregory& Thaddeus (2009) the TIER model systematically structures training effectiveness research across four stages. Stages 1 and 2 are components of formative evaluation in which the objectives and processes of training are conceptualized, drafted, and refined. During these stages, researchers explore instructional alternatives to determine which are most appropriate for study. Stages 3 and 4 are

components of summative evaluation—a systematic attempt to determine whether the fully developed training intervention is meeting its objectives as planned or desired (Scriven 1967, 1991) as cited in the work of Gregory& Thaddeus (2009). The model therefore means that research could be conducted at any of the four stages outlined in figure 1 below.

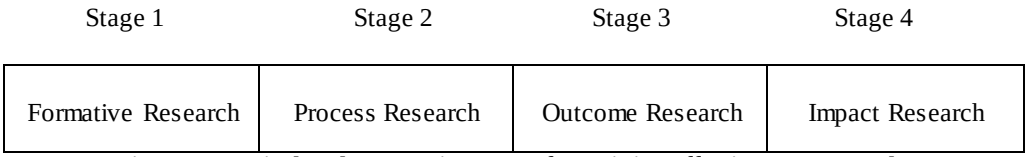

Figure 1: Logical and progressive stages for training effectiveness research.

2.2 Study Variables Under the TIER Model

The TIER model regards five types of study variables as integral to training effectiveness research: independent, dependent, modifying, intervening, and confounding variables (see Figure 1). Studies depend on access to measurable data for these variables. This study considered only independent and dependent variables under the TIER model.

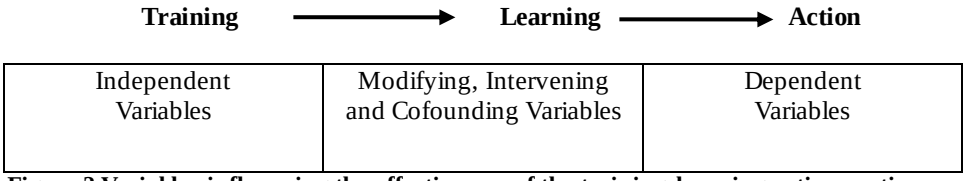

Figure 2 Variables influencing the effectiveness of the training-learning-action continuum

Independent variables are the working variables—that is, the training inputs and activities that are implemented and studied. They are presumed to cause or influence certain training outcomes. Depending on the study, independent variables could include timing, format, and location of training as well as modifications to the training rationale, content, or educational approach under study (Gagné 1985) as captured and developed in the work of Gregory& Thaddeus (2009). The Dependent variables on the other hand are the intended aims of training, which are expected to result from exposure to the independent variables. As exposure varies, results may differ, allowing effectiveness to be measured. The TIER model differentiates between dependent variables that are immediate effects of training (termed "outcomes") and dependent variables that are later-emerging effects of training (termed "impacts") (Mohr 1992) as put by Gregory& Thaddeus (2009).

The TIER model was adapted as it positioned this current study on the second stage of the model. At the second stage, the study focussed on the PROCESS stage as put by the model. The process stage study says that training effectiveness study can be conducted on the learning elements such as program structure, training methods and pedagogy, trainer's competence and facilities for training.

3 Methodology

Survey research design was used in carrying out this study because it involves collecting data in order to test hypothesis or answer research questions. Three variables were identified to include capacity building as the dependent variable and on the other hand, the independent variables are training quality, trainers' competence and experience and training facilities.

The variables are represented by Y, X1, X2 and X3.

$Y = f(X1, X2, X3 + u)$

$Yt = bo + b1X1 + b2X2 + b1X3\ u$ *... (Linear Form)*

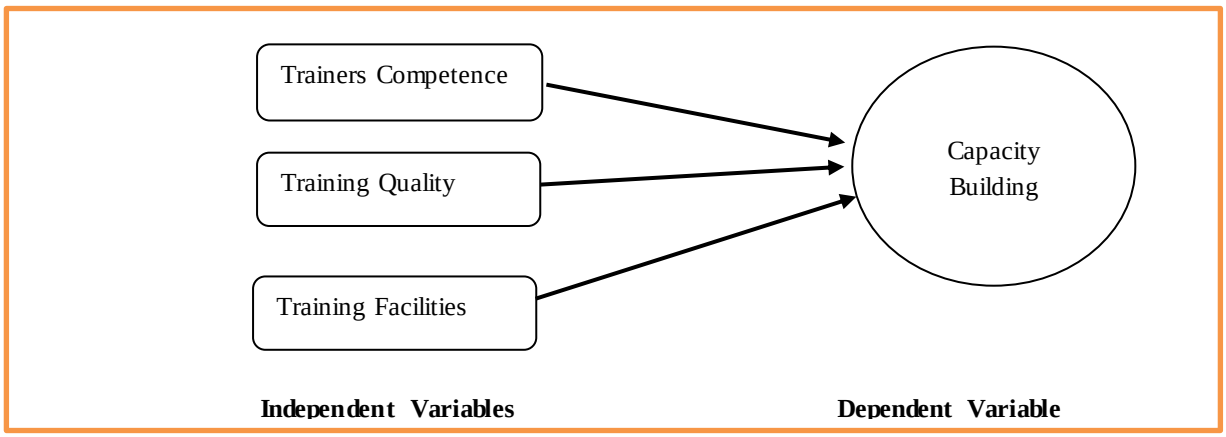

Figure 3: Research Conceptual Model

The population of the study covers the graduates of the eight (8) entrepreneurship training institutes in Kano State. The number of graduates is upto 10000 people, hence a sample size of three hundred and seventy (370) respondents was chosen based on Krejcie and Morgan (1970). A convenient sampling technique was used in selecting the respondents, where closed- ended questionnaire was used as the instrument, considering 5 point Likert scale interval in measuring the data.

Cronbach's alpha statistics was used in testing the reliability of the instrument. It was measured on the scale Pearson's product moment correlation coefficient that varies between 0 and 1, so the closer the alpha to 1.00 the greater the consistency of questions in the study instrument. Hence,0.60 Cronbach's alpha was adopted as supported by Hair et al., (2010).

The data analysis, inferential statistics specifically multiple regression was used, using SPSS software to test the dependency of the relationship between the dependent and independent variables and was also used to test the study hypothesis. Pearson's correlation was used to explain the relationship between the independent variables. Therefore the cronbach's alpha obtained in this study for the dependent variable (Capacity Building) is 0.621 and for the independent variables are 0.707, 0.749 and 0.731 for training quality, trainers competence and training facilities respectively.

4 Results and Findings

Response rate showsthat197 valid copies of the questionnaire were used for further analysis. Thus, a response rate of 53% was achieved by this study. A response rate of 30% is acceptable for survey studies (Sekaran, 2003; Hair, Black, Babin & Anderson, 2010).

Table 1: Inter-correlation among Variables

Constructs	1	2	3	4
Capacity building	1			
Training quality	.502	1		
Trainers competence	.449	.235	1	
Training facilities	.390	.630	.415	1

**. Correlation is significant at the 0.01 level (1-tailed)

The values of Pearson correlation show the relationship between dependent variable (i.e. Capacity building and independent variables (Training quality, Trainers competence & Training facilities). Cooper and Schindler (2003) and Allison (1999) indicated that correlation of 0.80 or higher are problematic despite the maximum of 0.75 acceptable by the rule of thumb.

Table 1 above, the highest correlation between independent variables was between training quality and training facilities, which was significant at 0.01 level ($r = 0.630$, $p<0.01$). On the other hand, the lowest correlation was between trainers competence and training facilities significant at 0.01 ($r = 0.015$, $p<0.01$) this indicates a weaker correlation. The correlation between dependent variable and independent variables were all positive- showing significance at 0.01 for capacity building and training quality ($r = 0.502$, $p<0.01$), capacity building and trainers competence ($r = 0.449$, $p<0.01$) and between capacity building and training facilities ($r = 0.309$, $p<0.01$). Athough the correlation shows significance, the coefficients were not large enough to cause collinearity problem as argued by Cooper and Schindler (2003) and Allison (1999). Hence correlation between independent variables and the dependent variable in this study did not go beyond the acceptable range and as such would not cause multicollinearity problem.

To generate an ideal conclusion on the results of regression analysis that would enable application of the model on another population of interest, would require a thorough examination of normality, collinearity, linearity, homoscedasticity and independence of the residual (Hair, Black, Babin & Anderson, 2010). The authors put it that, these assumptions are applicable to both dependent and independent variables and their relationship as a whole.

Table 2 : Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.616[a]	.379	.369	1.83496	1.887

a. Predictors: (Constant), TRAININGFACILITY, TRAINERSCOMPETENCE, TRAININGQUALITY

b. Dependent Variable: CAPBUILDING

The results of multiple correlation (R), squared multiple correlation (R^2) and adjusted squared multiple correlation (R^2adj) shows how well the combination of independent variables predicts the dependent variable. This study's R^2 of 0.379 in table 3 above indicates that the variability in Capacity building being the dependent variable was up to 37.9%. This means that the independent variables are good predictors of capacity building effectiveness. The 1.887 Durbin Watson has fallen within the acceptable range of 1.5 – 2.5 as recommended by Norusis (1999).

Table 3: ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	392.427	3	130.809	38.849	.000[a]
	Residual	643.115	191	3.367		
	Total	1035.541	194			

a. Predictors: (Constant), TRAININGFACILITY, TRAINERSCOMPETENCE, TRAININGQUALITY
b. Dependent Variable: CAPBUILDING

Regression model is considered significant when it is 0.000 under Anova. Having Sig. F Change value (F(3, 191) = 38.849, p< .0005 in table 4 shows that the model used in this study was appropriate as 0.000 significance value was attained.

Table 4: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	6.443	1.037		6.212	.000					
	TRAININGQUALITY	.097	.029	.251	3.321	.001	.467	.234	.189	.570	1.754
	TRAINERSCOMPETENCE	.480	.069	.420	6.963	.000	.483	.450	.397	.895	1.117
	TRAININGFACILITY	.184	.075	.180	2.465	.015	.329	.176	.141	.610	1.639

a. Dependent Variable: CAPBUILDING

4.1 Results of Multiple Regression (Hypotheses Testing)

This section presented results of the coefficients, meaning hypotheses testing concerning the relationship between Enterprise development which is the dependent variable and independent variables – training quality, trainers competence and training facility. To establish the actual effect of independent variables on the dependent variable multiple regression analysis was conducted. In testing the hypotheses developed for this study, the choice of p< .05 and p< .01 as level of significance was adopted as put by (Cooper & Schindler, 2003; Hair et al., 2010).

Table 4 above showed that Trainers competence is having the highest Beta value of .420 indicating a strong prediction of the dependent variable. With standardized coefficient Beta of .420 relative to other predictors, Trainers competence emerged as the strongest predictor. This implies that when all other independent variables are held constant, Trainers competence explains exactly 42 percent variation in the dependent variable of this study. Training Quality appeared to be the second predictor with Beta value of .251 relative to other predictors in this study's model. Meaning that, should other dependent variables be held constant, Training Quality explains 25.1 percent of the relationship with Capacity building as the dependent variable of the study.

Additionally, at Beta point .180 in the coefficient table above indicated that Training Facilities represent the lowest predictive power among the dependent variables. With 18 percent of the variation in the dependent variable implies that whenever other variables are dropped Training Facilities explains the weakest relationship in this study.

The multiple regression and the hypotheses testing results as indicated in table 4 and the model summary in table 2 above showed that the independent variables were able to explain 37.9 percent of the variance in the dependent variable. Notwithstanding any other independent variables not used in this study, the achieved $R^2 = 0.379$ is adequate enough to predict variation in Capacity building for enterprise development as the dependent variable of this study.

A detail investigation of the contribution of individual independent variables in the explanation of the dependent variable showed that Training Quality with ($\beta = 0.251$, $t = 3.321$, $p = 0.001$), Trainers Competence ($\beta = 0.420$, $t = 6.963$, $p = 0.000$) with significant contribution and Training Facilities with ($\beta = 0.180$, $t = 2.465$, $p = 0.015$). With positive values of Beta, Sig. and t in the regression result, therefore shows that all the null hypotheses of the study which states that "The quality and relevance of training program has no significant relationship with capacity building effectiveness", "Trainers' professional competence and experience do not have any effect on capacity building effectiveness" and "Availability and functionality of training facilities in the institutes has no effect on capacity building effectiveness" are not supported and therefore considered rejected.

Table 5: Summary of the Study Hypotheses Testing

Null Hypothesis	Statement of Null Hypothesis	Remarks
Ho1	Trainers' professional competence and experience do not have any effect on capacity building effectiveness.	Not Supported
Ho2	The quality and relevance of training program has no significant relationship with capacity building effectiveess.	Not Supported
Ho3	Availability and functionality of training facilities in the institutes has no effect on capacity building effectiveness.	Not Supported

As shown on the summary of findings of the hypothesis of this study, all the null hypotheses are deemed rejected and the statements remain untrue as regards Capacity building effectiveness.

5 Discussion of Findings

The results of this study were earlier presented in the previous section. The result shows clearly that all the three (3) null hypotheses were dropped or rejected. This is because the independent variables were found to be good predictors of capacity building effectiveness. In this section therefore, the discussion on the finding would be based on the study objectives and hypotheses.

One of the objectives was to assess the quality of training programme run by the institutes and its effects on capacity building effectiveness. This study finding is not in consistent with the null hypotheses Ho1, which states that training quality has no significant relationship with capacity building effectiveness. From the finding it shows that there is significant relationship between capacity building and training quality, meaning that the higher the quality of training the better the effectiveness of capacity building. This quality comprises of the manner trainees were selected, the training method used and the post training support and follow-up rendered by the institutes. The more effective these factors are the better the capacity building effectiveness. This therefore was in consistent with several previous studies like (Romijn, 1989; Mwamisha & Wanjau, 2013; and Azila-Gbettor & Harrison, 2013) where they both established that method and content of training are significant in training effectiveness.

Another objective of the study was to assess the professional competence and experience of the trainers in the training institutes and how it affects capacity building effectiveness. Whereby the corresponding null hypotheses Ho2 states that trainers professional competence and experience do not have any effect on capacity building effectiveness. On the contrary, the result showed that, there is positive relationship between trainers' competence and capacity building, meaning that trainers' competence has great effect on capacity building effectiveness. This is in line with the sayings of Donovan, Bransford & Pellegrino (1999), pointed out that when dealing with the issue of human competence, trainers' expertise is critically important.

The other objective of this study was to examine the availability and functionality of training facilities in the institutes and how it affects capacity building effectiveness. Consequently, the null hypothesis Ho3 states that the availability and functionality of training facilities in the institutes has no effect on capacity building effectiveness. This study's finding was not consistent with the null hypotheses because it indicates that availability of training facilities has positive effect on capacity building effectiveness with p .000.

6 Conclusion

Although previous studies established positive link between some of the variables and capacity building in different contexts, the linkage was not empirically examined on a sample of 370 respondents who were participants of Kano state enterprise development training institutes. This study was presumably the first of its kind to be conducted in Kano state Nigeria that examines the effect of training quality, trainers competence and training facilities on capacity building effectiveness. The study was able to establish and validated that the higher the quality of training,the more competent the trainers are and availability and functionality of training facilities the more effective a capacity building program would be in the development of micro, small and medium enterprises.

The study findings show clearly that these gaps uncovered from the literature review have been covered. It also laid a foundation for further studies in the near future that would employ other effective variables capable of predicting capacity building effectiveness which were not examined under the current study.

7 Recommendations

Having discussed the various findings of the current study in previous section, this section presented recommendations based on the findings as well. The recommendations are provided to Kano state entrepreneurship development training institutes, Kano state government, any other training institutes within and outside Nigeria, state governments who may wish to establish these kinds of training institutes in the country and every other stakeholder. Specifically the recommendation concentrated on the practical and theoretical effects of training quality, trainer's competence and training facilities on capacity building. Again the recommendation is concerned with policy formulation that can promote entrepreneurship and enterprise development culture in the society.

i. Improving the quality of training- based on the result of the study, it was established that training quality had a positive relationship with capacity building effectiveness. Training quality comprised of the pre-training, training (methods and content) and post-training activities. It thus became pertinent for training institutes to provide adequate information through the available and wider reached medium (radio, newspapers, hand bills, television etc.) to prospective trainees for upcoming training program; and trainees should be screened without bias of any kind (political, religious, ethnicity and or gender) and be allowed to choose institute of their desire and trade or profession to be trained upon before admission.

The training method (class room and practical) should be of high standard as obtained in other parts of the world. Similarly the training content (curriculum) should be rich enough to instil self-dependence through enterprise development into the minds of trainees. The issues of motivation, innovation, small business management, marketing, sources of funding, record keeping, working with others, financial discipline, mentoring etc. should be part of the content of the training.

Post training activities include provision of starting capital/equipment either on soft loan basis or free of charge to participants and post training supervision/follow-up. It is recommended therefore, that the training institutes employ adequate mechanism for follow-up supervision of participants established enterprises. The starting capital be it cash, equipment or machineries be splitted into two folds; half would be a grant and the other half be a soft loan that would be issued at developmental stages of the enterprise. This would go a long way in controlling or reducing problems of beneficiaries selling off the equipment for their selfish interest. Also supervisory mechanism has to be employed to help check and correct the activities of graduates of the capacity building programs.

ii. Building on trainers competence – the result of the regression analysis of this study showed trainers competence having 0.420 (42%) predictive power as the strongest predictor of capacity building effectiveness, hence the need for training institutes to always consider professional competence of trainers before recruitment. Also, the institutes should continuously determine trainers training needs and send them for further trainings and maybe internship, both local and international to upgrade their competences.

iii. Provision of up-to-date and functional training facilities – even though this variable maintained the least predictive power of capacity building, it still indicated positive relationship with training effectiveness, having up-to 0.180 Beta (18%). It is therefore recommended that the institutes/government to provide up-to-date and adequate facilities like workshop, equipments and machines in the institutes. This would carter for the practical aspect of the training and it will make training very effective.

This study's R^2 of 0.379 indicated that the utilised variables as shown by the model variance did not sufficiently explained capacity building effectiveness, meaning that there are other effective variables that were not treated in this study. Variables like funding of the institute, affiliations with other institutes, government political will, duration of the capacity building program etc. It is therefore recommended that the above mentioned additional variables be incorporated in future studies which may better explain the remaining 62.1% variance in capacity building.

This study also suggests that further research can be conducted on capacity building assessing the impact of entrepreneurship training on potential entrepreneurs or existing small business owners. Again, a study could be conducted on impact of the training measuring before and aftereffect on entrepreneurs' business development and growth.

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Strategies to Improve Cost and Time Control Using Building Information Model (BIM)

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Abstract The demand for the use of a more advanced technology to manage projects information all through their life cycle is very important. An increase in construction sector productivity also means employing modern construction technologies, such as improved and increased mechanisation and such technologies as Building Information Model and Industrialised Building Systems. More also, it is important that skills are improved and intensify to raise productivity that can handle more sophisticated building methods. Presently it is believed to a large extent that the emergence of Building Information Model (BIM) can lead to better productivity in the industry. However, BIM as an alternative technology in Malaysia need to be studied to provide proof that it can satisfy the industry's need to improve on cost and time control. The aim of this research is to develop strategies that will be used to improve cost and time control in the industry through the use of BIM. This will be achieved through the use of a mixed method of enquiry (semi-structured interview and questionnaire).

Keyword Building Information Modeling (BIM), Causes of cost overrun, Cost and time control, Cause of delay.

1 Introduction

Control of cost and time in a construction is a standout amongst the most critical issues in development since the advent of the industry (Minchin et al., 2013). In this light, an effective project ought to meet the quality yield norms, as well as the time and spending targets. Time and cost controls are key criteria for the achievement of any project. Notwithstanding, delay of construction work finishing are exceptionally common in the industry, such delays are because of issues of inadequate cost and time control (Forbes and Ahmed, 2010). The core aim of cost and time control in is to guarantee that projects are done on time and this is feasible through consistent estimation of progress, assessment of engagements and taking suitable steps on the project as it progresses (Kerzner 2013). Buttressing this likewise is the project management body of knowledge (PMBOK) which proposes that with a specific end goal to accomplish the benchmark targets of any project, there must be an effective checking on project cost and time control (PMI, 2013).

However, construction industry has numerous branches as it layers, and in that capacity it contains much data about construction projects. These data are vital to projects, and can be the fundamental establishment for making decisions, purchases, and joint efforts. The accomplishment of a fruitful project requires cost administration among different elements to be considered before the initiation of the project (Masrom et al., 2015). However, construction industry globally are littered with high profiled projects which are confronted with delays and cost overrun (Smith, 2014).

Presently, a number of tools that can be used for cost and time control have been developed (Mohd-Nor & Grant, 2014), some of which differ for their functions, and some are mostly designed for particular type of projects (Yamin & Harmelink, 2001). Tools such as Earned Value Management (EVM), Gantt Bar Chart, Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM)

(John, 2003; Lester, 2003). More also, different software have been developed to assist in the use of these project control tools such as Microsoft Project, Primavera, Asta Power Project etc. Regardless of these tools and software packages, construction projects still suffer delays and cost overruns.

However for project cost and time control, the industry have put up lots of effort techniques considering only quantitative factors, but ignoring the qualitative factors (Zhang & Gao, 2013). A research conducted by CIOB in 2008 indicated that the growth in training, education and skill levels within the construction industry in the use of time management techniques has not kept pace with the technology available. The emergence of new technology is believed to solve or minimize the issues relating project cost and time control. Furthermore it is also believed that the emergence of Building Information Model (BIM) can lead to greater efficiency by means of increasing collaboration (Zhang & Gao, 2013).

Aranda-Mena, Crawford, Chevez, and Froese (2009) stated that, *"For some, BIM is a software application, for others it is a process for designing and documenting building information, for others it is a whole new approach to practice and advancing the profession which requires the implementation of new policies, contracts and relationships amongst project stakeholders."*

A widely cited definition of BIM is provided by the US National Institute of Building Sciences (2007) which defined it as *"a digital representation of physical and functional characteristics of a facility, and a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition".*

Similarly, the McGraw-Hill (2009) *"The Business Value of BIM" Report [2009], a commonly referenced document by contractors, defines BIM as, "the process of creating and using digital models for design, construction and operations of projects."* This report mainly defines the contractors' perspective in defining BIM.

For the purpose of this research, the definition credited to the National BIM Standard (NBIMS) Project Committee of the Building SMART alliance (2010) will be adopted, which defines it as, *"a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle from inception onward. The BIM is a shared digital representation founded on open standards for interoperability"* (Succar, 2009).

Building information model (BIM) is an optional way to deal with construction design, it does not just make less demanding the computerized representation for plans, but also all the fundamental data for any project before it is constructed. Not only is BIM resourceful design tool, it might fundamentally modify the way a construction project will be secured, built, and managed (Xiao and Respectable, 2014). The data in BIM models is exceptionally helpful and can be dissected to upgrade the design, planning and construction processes (Azhar, 2011). BIM is an innovatively improved approach that upgrades digital representation, storage, management and sharing of building data in a way that permits access to the project database all through its lifecycle (Eadie, Browne, Odeyinka, McKeown, and McNiff, 2013).

According to Bryde, Broquetas, and Volm (2013), BIM is an appropriate tool for project managers and should be considered by the project management profession as a way to help manage construction projects. BIM has been so far proved to be a beneficial technique in construction industry, which has allowed it users in reducing uncertainties and achieving successful completion of a project. BIM can be applied on all the stages of construction processes starting from planning to operation and maintenance. Major advantages of BIM are improved scheduling, improved drawing coordinated, controlling time and cost and single detailed model (Memon, Rahman, Memon, & Azman, 2014).

Problem Statement

The Malaysian construction industry contributed 10 to 12 per cent to the national gross domestic product (GDP) in the fourth quarter of 2015 in Malaysia (D.O.S, 2016). Increasing construction sector productivity also means employing modern construction technologies, such as improved and increased mechanisation and such technologies as Building Information Model and Industrialised Building Systems.

While the labour productivity of the construction sector is expected to rise to RM61,939 per worker by 2020 from RM39,116 in 2015. It therefore becomes very necessary that skills are improved and intensify to raise productivity that can handle more sophisticated building methods (CIDB, 2016).

The construction industry drives economic growth and development in Malaysia, but unfortunately, its projects often suffer from delays and cost overruns. The construction industry in Malaysia faces lots of trouble from cost and time overruns that transform what should have been successful projects, into those projects incurring additional costs, disagreements, litigation and in some cases abandonment (Ramanathan, Potty, & Idrus, 2012; Shehu, Endut, & Akintoye, 2014; Ting, Khoo, & Wong, 2009). A study on 359 projects estimated to cost billions of Ringgit was conducted in Malaysia in 2009, it found out that only 42 per cent out of the total projects where completed within the budget (Endut, Akintoye, & Kelly, 2009).

According to studies conducted on delays and cost overrun in Malaysian construction industry projects, time and cost performance is an important issue that need to be addressed in the construction industry (Alaghbari et al., 2007; Bazjanac, 2006; Ramanathan et al., 2012; Sambasivan & Soon, 2007; Shehu et al., 2014; Ting et al., 2009).

As a result of this, there is a demand for the use of a more advanced technology to manage projects information all through its life cycle. Presently it is generally believed that the emergence of Building Information Model (BIM) can lead to greater efficiency by means of increasing collaboration (Zhang & Gao, 2013). However, BIM as an alternative technology in Malaysia need to be studied to provide proof that is can satisfy the industry's need to improve on cost and time control. It is also important to further find out how cost and time control can be improved using BIM technology.

Research Objectives

The aim of this research is to study how cost and time control can be improved in construction industry upon the use of BIM technology. To achieve the aim of this study, the following specific objectives have been defined:

I. To determine and rank the different causes of delay and cost overrun in Malaysian construction industry.
II. To identify the main application areas of BIM in project management.
III. To develop strategies to improve cost and time control using BIM in Malaysia.

Significance of the Study

Building information model is changing the construction industry to a high productivity and high technology driven industry (Succar, 2009). Similarly, BIM has a great potential to be used by all the major stakeholders involved in a construction project. BIM technology can be used by the client to know the needs of the project, the design team make use of it to design, analyse and develop the project, and the contractor makes use of it to manage the construction phase of the project and finally by the facility manager for operation and maintenance of the project.

This research is significant as it is just in time in Malaysia and only few researches done to know it application in construction management Malaysia. This research is intended to investigate how BIM can be used to improve project cost and time control through a case study project. A nother significance of this study is that at the end of the research, a new strategy will be developed to help improve on cost and time control in construction using BIM technology. At the end of the research, the result is expected to benefit all the stakeholders in the construction industry especially the project management practitioners through the provision of an insight on the barriers to cost and time control and how to solve the issues using BIM technology in Malaysia.

Scope of the Study

This research will be primarily concerned with investigation on the causes of delay and cost overrun in construction and the application of building information model (BIM). The causes of delay and cost overrun will be investigated, analysed and ranked to know those that occur more in the construction

industry. Data for this study will be obtained using questionnaire from construction contractors with G7 rating who are members of CIDB in Selangor (Klang Valley).

The study will also investigate the application and benefits of using BIM in construction industries. Data for this investigation will be obtained from academicians, project managers, and contractors who have knowledge of BIM. The result from both of the investigation will be correlated to determine the relationship between the two. The result from the analysis will be used to develop a new strategy for improving cost and time control in the construction industry using BIM. It is important to note that this research will not cover the control of quality.

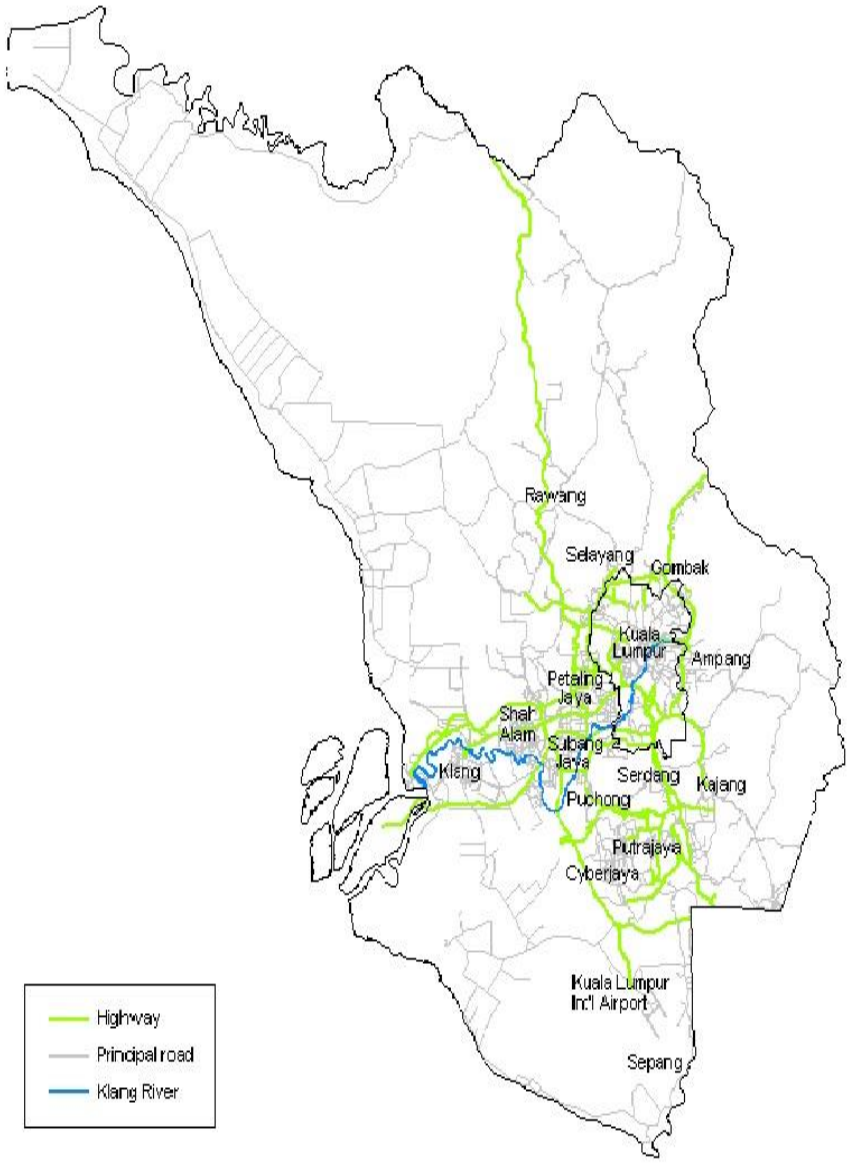

Figure 1 Map Showing Klang Valley.

2 Literature Review

The review of relevant literature will evaluate critically the concepts that are been investigated in this research, which are project management, cost control, time control, existing issues on cost and time control in the construction industry, current methods of project time and cost control, building information model application are to be reviewed. These concepts are integrated and directed to relate to the research problem. Thus, in this chapter, the researcher examines, compare and contrasts previous researches done on cost and time control and analyse the selected literatures to concentrate on cost and time management in BIM technology.

Project Time Control

Project time control is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan (PMI, 2013). This process has a key benefit as it provides the means of recognising deviations from the actual plan and taking corrective and preventive measures and as such reduces the risk. The period of time it will take for the execution of a project is most times very important to the parties involved (Zhang, 2012). However, it is common around the world especially in developing countries and underdeveloped countries that project are most times not completed on time (Nassar, Gunnarsson, & Hegab, 2005).

Olawale and Sun (2010), in their research work titled *"Importance of Cost and Time in Construction Project: Inhibiting Factors and Mitigating Measures in Practice"*, conducted a questionnaire survey and found out that 58% of the respondents make use of time control in their projects all the time. While only 11% of the respondents said they seldom or do not apply time control to their projects. From the result above, one can say that it is important to apply time control to projects.

Many researches have been carried out to find solutions in reducing the difference between the scheduled time and the actual time taking to complete a project. Presently, there exist a number of tools that are used for time control for projects, most of them which have disparity in their functions while some are project specific (Yamin & Harmelink, 2001). Research work are still on seeking for a unified standard that will integrate the tools (Cho, Hong, & Hyun, 2010).

Project Time Control Process

Project time control process involves three main parameters which are the inputs, tools and techniques, and outputs. This process is represented in the figure below.

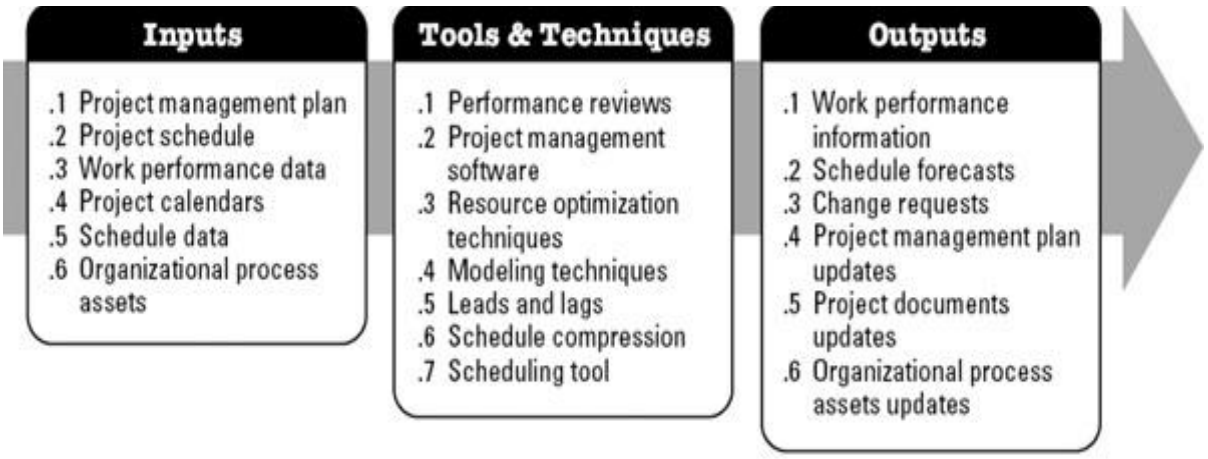

Figure 2 Inputs, tools & techniques, and outputs (PMI, 2013).

Project Cost Management

Project Cost Management involves planning, estimating, budgeting, financing, funding, managing, and control of cost processes to ensure the completion of the project within the approved budget. It is primarily concerned with the cost of the resources needed to complete project activities. These processes are the design of plan cost management, estimation of cost, determining budget for the project, and control of cost (PMI, 2013).

Project Cost Control

Project cost control is the process of monitoring the status of the project to update the project costs and managing changes to the cost baseline. This provides means for the recognition of variance from the plan so as to take corrective actions and reduce risk. It is important for all companies to control cost irrespective of their sizes, it should be performed by all personnel who incur cost. According to Zhang (2012), project cost control is a vital ingredient for a successful project.

About 84% of companies and organizations make use of cost control in their various projects (Olawale & Sun, 2010). This shows how important the use of cost control techniques are in project environments. According to Gould (2005), there is need for effective cost control as it is difficult to estimate the exact cost to complete a project due to the presence of numerous factors that need to be considered.

Project Cost Control Process

Project cost control process involves three main parameters which are the inputs, tools and techniques, and output. The process and its parameters are represented in the figure below.

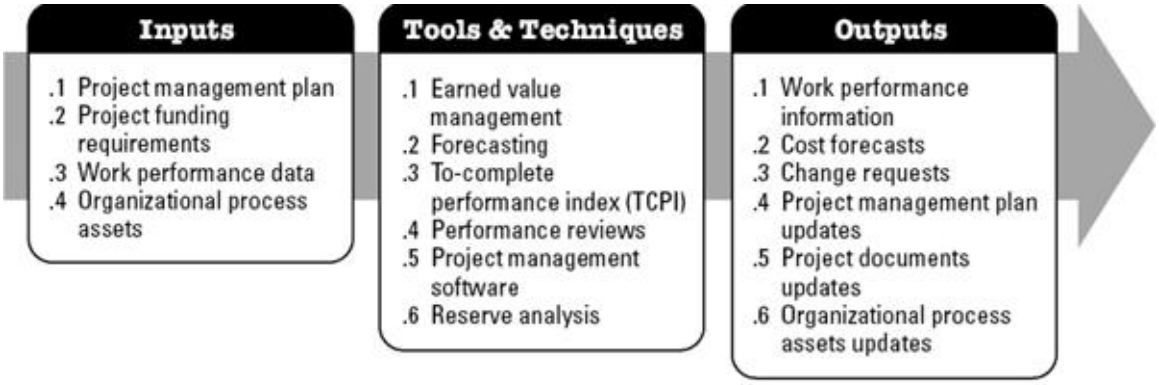

Figure 3 Project cost control: Input, Tools & Techniques, and Output (PMI, 2013).

Conventional Project Time and Cost Control Tools.

There have been several tools developed by researchers for controlling time and cost resources in the construction industry. Most of this tools have limitations as some are project or industry specific and cannot be applied to other projects (Ismail, Rahman, Memon, & Karim, 2013). Tools used for project cost and time control also are:

- Forecasting
- To-Complete Performance Index (TCPI)
- Variance Analysis
- Performance Reviews
- Gantt Bar Chart
- Milestone Date Programming Techniques
- Earned Value Management (EVM)

- Program Evaluation and Review Technique(PERT)
- Elementary Trend Analysis/Line of Balance Method (LOB)
- Precedence Network Diagram
- Simulation
- Critical Path Method (CPM)

More also, there are computer software used for project cost and time control. This software are used for instantaneous mathematical computation of cost and duration of activities. These software include: (a) Primavera Project Planner (b) Microsoft Project (c) Asta Power Project (d) Microsoft Excel (e) Project Commandar (f) Deltek Open Plan.

Causes of Delay and Cost Overrun in construction Projects.

It is important to note that the study of the different causes of delay and cost overrun in Malaysia construction projects has been carried out by many researchers also. Delay factors such as shortage of materials, change orders, delay in payment of suppliers, poor management of site, and late submission of drawings are the main causes delay (Abdul Kadir, Lee, Jaafar, Sapuan, & Ali, 2005; Ramanathan et al., 2012). Alaghbari et al. (2007)conducted a study on the causes of delay and the results were analysed to rank the causes of delay. The researcher found out that financial problems and coordination problems are the two most important factor causing delay in construction projects in Malaysia.

Sambasivan and Soon (2007) conducted a research using questionnaire to describe the 10 main causes of delay in Malaysian construction projects which include poor site management, late payment, labour supply, improper planning, lack of experience, problems with subcontractors, and shortage of materials. While Al-Tmeemy, Abdul-Rahman, and Harun (2012) listed several causes of delay in Malaysia to include; labour productivity, slow decision making, inflation, material delivery, and insufficient equipment. Shehu, Endut, and Akintoye (2014) stated that contract delays are predominantly caused by the contractors and are factors associated with finance.

S. M. Ahmed, Azhar. S., Kappagntula, P. and Gollapudil. D. (2003) and Al-Aghbari (2005) in their separate research, classified the factors causing delay and cost overrun in Malaysian construction projects into four (4) as shown in the table below.

Table 1 Showing the classification and factors causing delay and cost overrun.

S/No.	Classification	Factors
1	Contractors responsibilities	Delay in delivery of materials to site; Shortage of materials, equipment, and tools on site; Construction mistakes and defective work; Poor skills and experience of labour; Shortage of labour; Low productivity; Financial issues; Poor coordination and site management; Lack of subcontractor's skills; Lack of site contractor's staff.
2	Consultant's responsibility	Absence of consultant's site staff; Lack of experience of the consultant; Lack of experience of the consultant's site staff; Delayed and slow supervision in taking decisions and giving instruction; Incomplete documents.
3	Owner's responsibility	Lack of working knowledge; Slowness in making decisions; Lack of coordination with contractors; Change in scope; Financial issues.
4	External factors	Lack of materials, equipment, and tools in the market; Poor weather conditions; Poor site conditions; Poor economic conditions; Changes in laws and regulations; Transportation delays; External work due to public agencies.

Concept of Building Information Model (BIM)

BIM is basically a 3D digital representation of a facility. The model could be used in expressing the entire facility life-cycle. The quantity of material and it properties can be easily obtained, and the scope of work required can easily be defined and isolated from the model. Contract documents, drawings, procurement details, specifications, and other construction documents can easily be interrelated using the model (Bazjanac, 2006; Khemlani, 2007). The model which is data rich, object-oriented, intelligent, and a digital representation of the facility in which drawings and appropriate information for various stakeholders can be extracted for project delivery and decision making (Rogers, Chong, & Preece, 2015). It integrates architectural, structural, Mechanical, Electrical and Plumbing (MEP) models (Smith & Edgar, 2008).

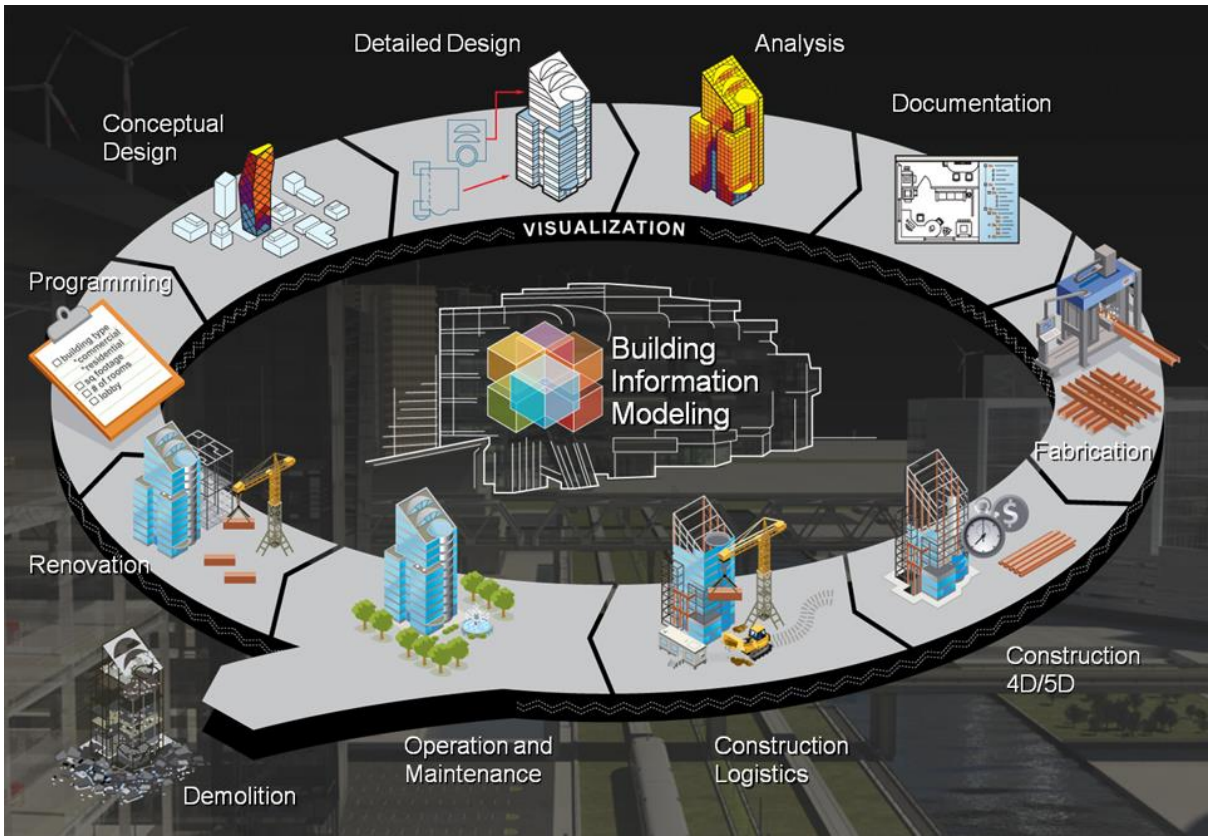

Figure 4 BIM concept (BuilderStorm, 2016)

According to the BIM industry group (BIWG) (2011), it defined the levels of BIM from level 0-3 as;

- Level 0: unmanaged CAD which is most likely 2D, with paper (or electronic paper) as the exchange mechanism.
- Level 1: managed CAD in 2D or 3D format using BS1192:2007 (collaborative management process) with a collaboration tool providing a common data environment, standard data structures, and formats most likely.
- Level 2: BIM has been defined in the UK as a *"Managed 3D environment held in separate discipline 'BIM' tools with attached data. Commercial data managed by an Enterprise Resource*

Planning application (ERP). Integration on the basis of proprietary interfaces or bespoke middleware could be regarded as 'pBIM' (proprietary). The approach may utilise 4D programme data and 5D cost elements as well as feed operational systems".

- Level 3: BIM is defined as *"Fully open process and data integration enabled by web services compliant with emerging IFC/IFD standards, managed by a collaborative model server. It could be regarded as iBIM or integrated BIM potentially employing concurrent engineering processes".*

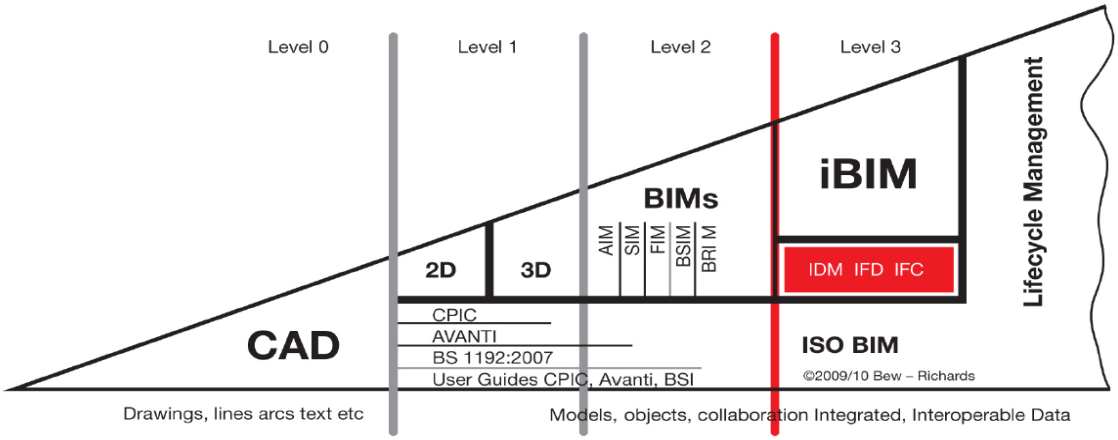

Figure 5 BIM levels (Applecore, 2016)

BIM Tools

A lot of tools are been developed as a result of the spread of the concept of BIM in achieving its perspectives. These tools are used for management of construction projects. Most of these tools are designed for specific purposes to meet the need of it users, while few are designed for multiple functions and information collection. The type of tool to be used depends on the purpose, user, and stage in which it will be used. BIM tools enable 3D modelling and the management of information. This makes the adoption of BIM technology more than just changing to the use of software that supports it. The use of these tools make BIM a unified system which interacts with all it parts. The table below shows BIM tools, manufacturer and it function.

Table 2 BIM Tools

Manufacturer	Tool	Function
AutoDesk	Navisworks	To manage 3D model-based design and clash detection.
Bentley	Bentlay Navigator	Dynamic coordination between models and disciplines.
Vico Software	Vico Office	Analysis of various 3D models for coordination, scheduling and estimating.
Gehry Technologies	Digital Project Suit	Full featured suite: for design, review and information management.
Tekla	Tekla Structures	3D structural modelling and detailing.
Solibri	Solibri Model Checker	For quality assurance/quality qontrol (QA/QC).
Synchro Ltd.	Synchro Professional	Scheduling of systems and planning simulations.

Application of BIM in Project Management

The potentials of the application of Building Information Model (BIM) in the management of construction projects is similar to the PMBOK knowledge areas. As such, BIM is regarded as an important tool for effective and efficient project management as it integrates all the stakeholders in the project (Rokooei, 2015). BIM as a promising technology facilitates project management, the possibility of integrating building models and products makes BIM to have a high potential for management of projects life-cycle (Gourlis & Kovacic, 2016). BIM can be used at all the stages of a project in it life-cycle, it is used in understanding the project needs by the owner, it is also used for analysis, design and development of the project by the design team. The contractor also makes use of it in managing the construction phase, and it is used for decommissioning, maintenance and operation by the facility manager (Grilo & Jardim-Goncalves, 2010).

In a nutshell, the application of BIM in project management are stated in table 2.3 below.

Table 3 BIM application

Application of BIM	Source
Quality compliance management.	(L. Chen & Luo, 2014).
Reduction in information exchange (IE) and resource waste.	(Bryde et al., 2013; Dubler, Kreider, & Messner, 2010).
Improvement in the accessibility of facility management data.	(Azhar et al., 2008; Kang & Choi, 2015; Kassem et al., 2015; Liu, 2010; Meadati, Irizarry, & Akhnoukh, 2010)
Sustainability of project design and building performance.	(Wong & Fan, 2013).
Clash detection and coordination.	(Arayici et al., 2011; Azhar et al., 2008; Bryde et al., 2013; Foster, 2008; Lahdou & Zetterman, 2011; Young, Jones, Bernstein, & Gudgel, 2009).
Automated safety checking platform.	(Zhang & Gao, 2013).
Constructability analysis.	(Foster, 2008).
Visualisation and sequencing of activities.	(Ding et al., 2014; Memon et al., 2014; Tulke & Hanff, 2007; Wilson & Koehn, 2000).
Cost Estimation of Material and quantities.	(Azhar et al., 2008; Hergunsel, 2011; Sabol, 2008).
Integration of key stakeholders.	(Foster, 2008).
Optimization of prefabricated construction components.	(Hergunsel, 2011; Winberg & Dahlqvist, 2010).
Risk assessment of design component of facility for prevention through design.	(Kamardeen, 2010).
Scope clarification.	(Bryde et al., 2013).

3 Methodology

This research aims to develop a strategy for the control of cost and time in construction industry. This will be achieved through the processes in Figure VI. The analysis of the data obtained will be done using SPSS 23, to give accurate results which will be interpreted objectively.

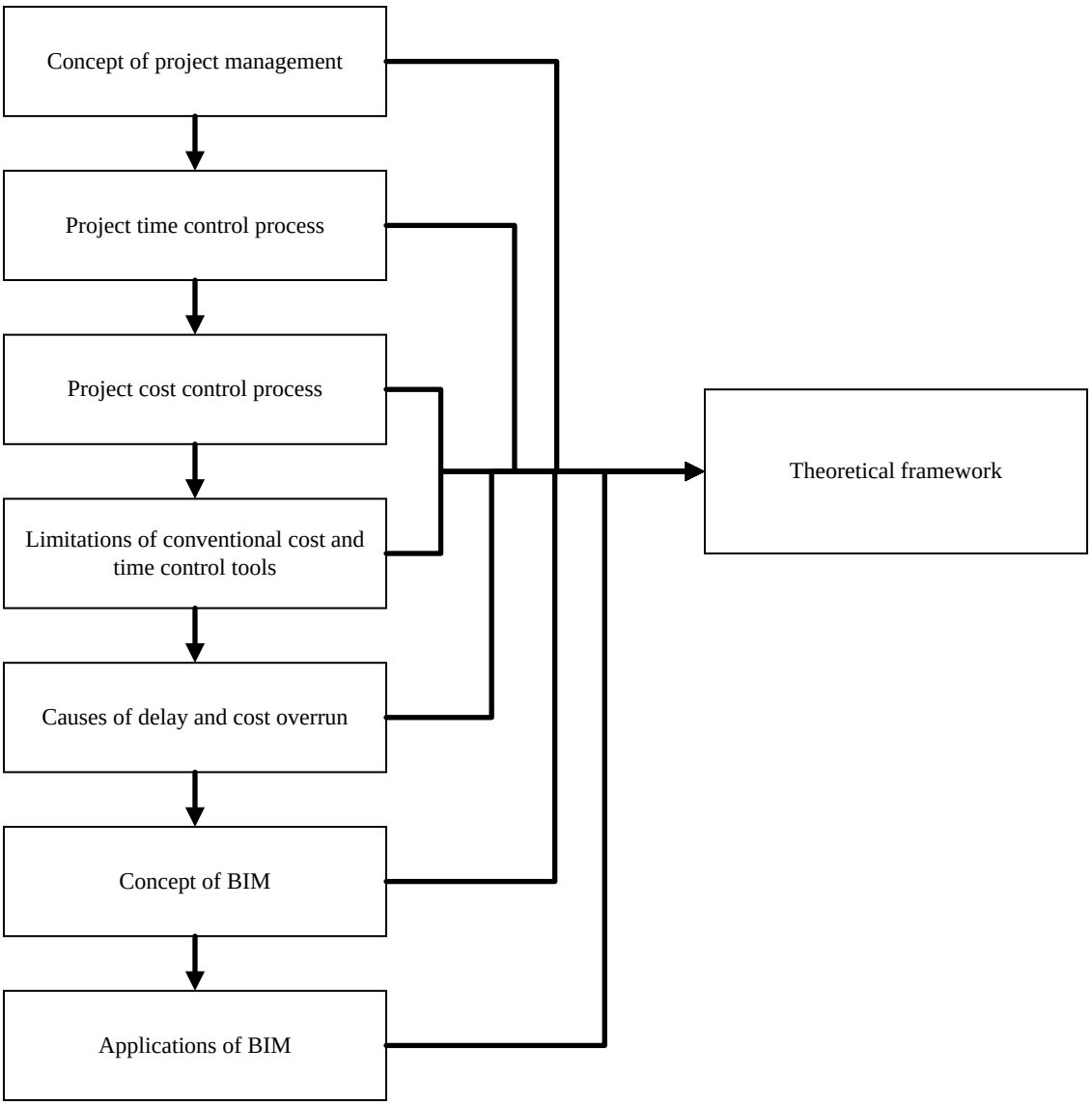

Figure 6 Theoretical framework and processes

As for the research method, a mixed method will be adopted for this research in achieving the objectives. A descriptive and exploratory research design will be used for the study. The research design for this study contains the following:

- The research problem and research questions.
- Sampling design.
- Method of data collection.
- Method of data analysis.

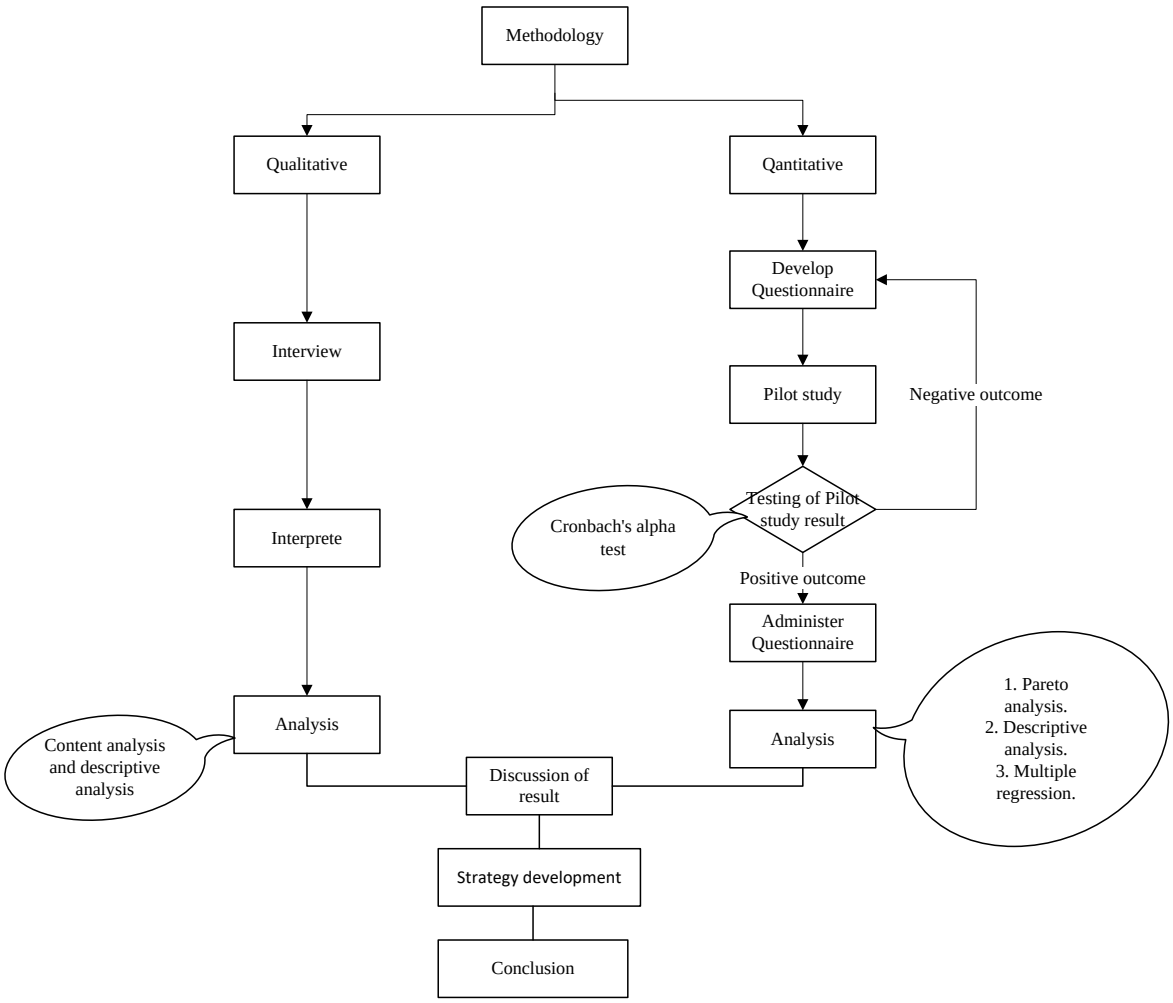

Figure 7 Research methodology/strategy development process.

From Figure VI above, the processes to be followed for the development of the strategy are shown. For the qualitative study, expert sampling will be adopted to determine the respondents for the semi-structured interview to re-affirm the main applications of BIM from literature. This will be analysed using content analysis and descriptive analysis. For the quantitative study, the target respondent for this phase of the research are the G7 member group of companies registered with CIDB Malaysia. The result from this phase of the research will be analysed using Pareto analysis to determine the main causes of delay and that of cost overrun also. The relationship between the applications of BIM and the causes of delay and cost overrun will be done using correlation and regression analysis methods.

4 Conclusion

The demand for the use of a more advanced technology to manage projects information all through their life cycle is very important. An increase in construction sector productivity also means employing modern construction technologies. The result of the study is anticipated to show a negative relationship between the causes of delay, cost overrun and BIM applications. This means that, as a result of use of BIM technology, the occurrence of the causes of delay and cost overrun are reduced to the barest minimum.

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Conceptual Business Model for MOOCS in Universiti Teknologi Malaysia

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Abstract Massive Open Online Courses (MOOCs) has exponentially brought forth myriad discussions on viable business models for higher education due to the disruptive innovation in the democratization of learning. MOOCs are heralded to be provided free of charge to users worldwide despite the demographic and socio cultural background. However, the strategic planning, execution and sustainable development of MOOCs require massive investment from higher education. From the past studies, business models for MOOCs in higher education are under-researched albeit its importance in expediting the competitive advantage of global higher education. In the context of Malaysian higher education, the Ministry of Higher Education has launched Malaysia MOOC, the first country in the world to implement government-initiated MOOCs for all public universities. The ministry allocates RM500 million for all public universities to offer the MOOC, under the 2016-2020 Eleventh Malaysia Plan. Nonetheless, there is not much studies published specifically on MOOCs business model in Malaysian higher education. Within the parameter of Universiti Teknologi Malaysia, the research university has developed UTM MOOC which prolifically entering its third cycle of implementation. Nonetheless, there is a deficit in studies on the business model for UTM MOOC to solidify its execution in a long run. Hence, this paper aims to explore and develop a Conceptual Business Model for MOOC in Universiti Teknologi Malaysia which optimizes internal operations, increases brand marketing as well as extend existing activities to new business based community. A qualitative study is conducted based on nascent literature review and stakeholder analysis with the UTM MOOC champion, administrator and the users. The development of the Conceptual Business Model for MOOCs for Universiti Teknologi Malaysia is hoped to be a guideline for policy makers, practitioners and researchers on perpetuating MOOCs sustainability in the hyper-speed era of innovation.
Keywords Massive Open Online Course; MOOC; business model; Universiti Teknologi Malaysia

1 Introduction

Massive Open Online Courses (MOOCs) have distinctively gained traction as the prime force of global learning innovation in higher education. The escalating implementation of Massive Open Online Courses (MOOCs) in higher education worldwide propagates higher knowledge accessibility beyond physical, socio-culture and demographic barriers. In the context of Malaysian higher education, 20 public universities in Malaysia are implementing Malaysia MOOC which slightly differs from the prior structures of existing MOOCs implemented in universities in Western countries. Although MOOCs has been heralded as ‘free’ to be accessed by eager learners worldwide, the cost of producing MOOCs The cost of producing MOOCs course is escalating yet there has been high demands from stakeholders in producing MOOCs that are of high quality infrastructure, efficiency, viable value proposition of the institutions yet remains cost-effective. There has been increasing concern on shifting the focus of higher education in the aspect of sustainability, yet based on literature and empirical studies, very limited studies have been conducted on business models for MOOCs in Malaysian universities. One of the primary universities in Malaysia that has prolifically championed Malaysia MOOC is Universiti Teknologi Malaysia and there is yet study conducted on the business model for MOOC implementation at the

aforementioned institution. Hence, this research main objectives are twofold. First, it analyses existing MOOCs business models in higher education. Secondly, by synthesizing the findings, a Conceptual Business Model for MOOC in Universiti Teknologi Malaysia is developed to reach three objectives: (1) optimize internal operations (2) increase value proposition (3) extend activities to new business based on the community.

This paper is divided into five sections. The first part explores the prior development of MOOCs in Global Higher Education. The next section focuses on MOOCs conducted in Malaysian higher education. In this section, Malaysia MOOC initiative is discussed apart from the national policies that underpin the initiative. This is followed by literature review on MOOCs in Universiti Teknologi Malaysia (UTM) which is known as UTM MOOC. The section on Methodology and Design outlines the mapping of the qualitative research and methodology via Stakeholder Analysis and interviews with Malaysia MOOCs stakeholders. Section on Result and Discussion synthesizes the data findings using Thematic Concept Matrix and further discussion on the discourse analysis. A Conceptual Business Model for UTM MOOC is proposed based on the synthetization of the findings. Lastly, the paper is concluded with summarization of this research and propagation of future studies.

2 Literature Review

MOOCs provide a new methodology and modality for teaching and learning. The newness does pose some problems for learners but also provides for exciting new possibilities. MOOCs require learners to be more proactive in their education and in building their personal learning networks. Everyone can be successful in a MOOC, provided that certain steps are taken and strategies devised before, during and after a MOOC. For this research, a Systematic Literature Review (SLR) is conducted where the aim is to study the existing MOOCs business models based from four major categories; Education, Socio-culture, Institution and Finance. From this literature analysis, a theoretical framework is developed, as depicted in Figure 1. This leads to the development of Conceptual Business Model for MOOC in Universiti Teknologi Malaysia (UTM). Throughout this paper, MOOC in UTM will be addressed as UTM MOOC.

2.1 MOOCs in Higher Education

The inception of MOOCs started in 2008 when Stephen Downes and George Siemens initiated Connectivism and Connective Knowledge course that propagates the underpinning learning theory of Connectivism [1]. Since then, MOOCs initiative in higher education has globally gained traction where some of the leading MOOC platforms are EdX, Coursera and Udacity. To date, more than 12000 MOOC courses have been offered and more higher educational institutions are using MOOCs or initiating MOOC platforms [2], [3].

2.2 MOOCs in Malaysia

Malaysia MOOC is initiated by the government in tandem with Malaysian Education Blueprint for Higher Education, National Economic Model and Economic Transformation Programme [4]. It was pre-launched on 19 September 2014 by the then Second Education Minister, Datuk Seri Idris Jusoh. It was a milestone for Malaysian higher education as Malaysia is the first country in the world to implement the government-initiated Massive Open Online Courses (MOOCs) initiative for public universities. [5] Contrasting with main objective of global commercial MOOC providers that specifies on monetization, MOOCs in Malaysia focuses on complementing the blended learning ecosystem with existing on-campus learning environment [6]. In this context, the main objective was to to ensure online learning complements the on campus learning experience and ease accessibility to synchronous and asynchronous learning.

The Malaysia MOOC initiative is part of the Ministry of Higher Education strategic plan in expedite the quality and “boost the ranking of Malaysian higher education on global scale” [5]. Prior to Malaysia MOOC, Taylor‟s University was the first Malaysian higher educational Institutions that initiated MOOC courses. Apart from Taylor‟s University, Open University Malaysia has also initiated MOOC courses [7]

and by 2025, all Malaysian universities are expected to adopt MOOCs to add value to on-campus learning experience [8] Figure 1 depicts the timeline of MOOC progress in Malaysian higher education.

Figure 1. Timeline of MOOCs Progress in Malaysian Higher Education

2.3 MOOCs in Universiti Teknologi Malaysia

Universiti Teknologi Malaysia (UTM) is one of 20 public universities in Malaysia as well as the primary research university in Malaysia that is the forerunner in MOOCs execution and implementation extensively. Known as UTM MOOC, it is implemented since 2014 and up to September 2016, it has reached its third cycle. UTM MOOC is one of the strategies for UTM to be a globally-connected higher education player that is renowned for its academic and research expertise. UTM MOOC is the hub for accessing online courses via OpenLearning platform and could be accessed via https://www.openlearning.com/utm. OpenLearning is an Australian-based MOOC platform provider which has been appointed as the official MOOCs platform for the Malaysia MOOC initiative. [9] From the inception of UTM MOOC to its third cycle, 37 courses were developed and offered to UTM undergraduate students. Table x depicts the enrollment for all the 37 MOOCs on UTM MOOC. Up to September 2016, 5132 students are taking UTM MOOC. As part of the Malaysian Education Blueprint, [10] UTM implemented Blended Learning for MOOCs execution where 30 percent of learning is conducted via MOOCs while 70 percent is carried out via face –to-face and classroom interaction. Figure 2 depicts the screenshot of MOOC courses offered to students.

Figure 2. UTM MOOC on Open Learning platform

Above all, UTM MOOCs used as a blended learning approach in higher learning institution to complement traditional teaching and learning methods. It is an innovative and competitive initiative to increase institutional visibility in the global higher education.

2.4 Business Model for MOOCs in Higher Education

A business model describes the rationale of how an organization creates and deliver values to the business [11] From literature analysis, the needs of business model for MOOCs has been highlighted in many research pertaining to MOOCs in global higher education. Yet, there is a deficit on the development of business model for MOOCs. According to [12], MOOCs will dramatically and irreversibly change the existing business model for higher education. Yet, viable business model that allows for sustainability of MOOC in higher education poses major challenge for higher education worldwide. Pertaining to business models, challenges of sustaining MOOCs in higher education have raised concerns, especially on how revenue streams, market positioning, value proposition as well as offering tangible and non-tangible benefits to both institutions and end-users. Hence, analysis on the potential business models by pioneers of MOOCs, edX, Coursera and UDACITY [13] acts as a foundation to this study, as depicted in Table 1. It is vital in identifying revenue streams as well as factors in MOOCs sustainability in higher educations. EdX is not-for-profit platform while Coursera and UDACITY are for-profit organisations and the business models may vary depending on the value proposition, financial as well as institutional aspects. From the study, certification is a common aspect of revenue stream for all the MOOCs platforms, although both Coursera and UDACITY focuses on trans-institutional partnership, sponsorship, marketing and human-resource capital as pivotal aspects of their business models.

Table 1. Overview of business model for major MOOCs platforms (edX, Coursera and Udacity)

edX	Coursera	UDACITY
• Certification	• Certification • Secure assessments • Employee recruitment • Applicant screening • Human tutoring or assignment marking • Enterprises pay to run their own training courses • Sponsorships • Tuition fees	• Certification • Employers pay for recruit talent student • Students résumés and job match services • Sponsored high-tech skills courses

3 Methodology and Design

For this study, qualitative approach is adopted to identify the Critical Success Factors for MOOCs in Malaysian higher education. A literature review is conducted extensively as well as stakeholder analysis of UTM MOOC are conducted in order to identify the factors and components for the conceptual business model. A stakeholder analysis is chosen as the qualitative tool as UTM MOOC is still at its nascent

implementation. The stakeholders in UTM MOOCs are identified as the UTM MOOC manager, UTM MOOC administrators, lecturers and selective UTM MOOC users.

4 Data Collection and Analysis

Stakeholder Analysis is chosen in order to study the roles of stakeholders and their influences on MOOCs Sustainability in Higher Education. The main aim is to facilitate divergent viewpoints from stakeholders on MOOCs sustainability. This method is chosen as the current needs of the stakeholders are addressed and potential strategies can be drawn from the synergy of viewpoints. There were ten in-depth interviews with semi-structured questions carried out with ten stakeholders in MOOCs for higher education where the interview was audiotaped and transcribed using qualitative data analysis software for qualitative data analysis. From the synthesis of the interview, a Thematic Concept Matrix is used to map the stakeholders' views on UTM MOOC. Table 2 depicts the classification of the factors, constructs and elements for MOOC from the UTM MOOC's stakeholders' views.

Table 2. Thematic Matrix Analysis on MOOC in UTM

FACTORS / AREA	VALUE PROPOSITION	INFRASTRUCTURE	FINANCIAL
Educational	Offer niche subjects. MOOCs in multi-languages. Collaboration opportunities with top-tier higher education.	Develop courses with good instructional design. Wide choices of learning resources. Well-designed courses that meet the needs of the end-users.	Free provision of online quality post-secondary education. Motivate higher intake of international students to study in Malaysian HE.
Institutional	Marketing positioning through global institution branding. Distinguish core competencies of HE. Market the quality of academics. Provide talents to industry.	Execution of policy by top management. Skilful instructors. Enhance efficiency of operating management. Complement on-campus experience.	Viable business model. Government grants and corporate sponsorship. Revenue through certification, courses, advertisement.
Technical	Offer wide accessibility to end-users. Discount in HE entrance fee upon completion of selective courses.	Ease of access. Free WiFi for on-campus students. Efficient technical support.	Cost-effective technological architecture.
Socio-Cultural	MOOCs provides quality education at low or zero cost. Transferable MOOC credits to a degree. Reward incentives for completion and active participation.	Establish global networking with academics and scholars. Expedite knowledge dissemination.	Increase national productivity with competent knowledge workers.

From the Thematic Concept Matrix, nine elements have been identified based from the analysis conducted using qualitative data analysis software. The nine elements derived from four main factors; educational, institutional, technical and socio-cultural. This is then followed by three constructs adapted from Kalman's Business Model for MOOCs; value proposition, infrastructure and financial. Comprehensive data analysis on the in-depth interview led to the nine elements of MOOCs sustainability; product, service, market positioning, competitive advantage, organisation, core resources, technological architecture, value-added processes, source of income and revenue of income. The identified factors, constructs and elements are vital findings of this research on impacting MOOCs sustainability in Malaysian higher education.

5 Conceptual Business Model for Moocs in Universiti Teknologi Malaysia

Based from the synthesis of literature review and Stakeholder Analysis, a Conceptual Business Model for MOOCs Sustainability in Higher Education is developed based from Disruptive Innovation Theory and Connectivism Theory that underpinned the business model. Inductive approach is chosen for the development of this business model. The reason for developing business models is twofold. First, it is a pragmatic way for stakeholders to manage strategically-oriented choices in UTM MOOC. Secondly, it fills the gap of underdeveloped business model for UTM MOOC in a long run. Table 3 depicts the Constructs and Elements of UTM MOOC based from the synthesis of literature and stakeholders' analysis.

Table 3: Constructs and Elements of MOOCs in UTM

UTM MOOC	
Constructs	**Elements**
Value proposition	Product Service, Market Positioning, Competitive Advantage
Infrastructure	Organization, Core Resources, Technological Architecture, Value-Added Processes.
Financial	Source of Income, Revenue of Income.

For Value Proposition, the three main elements are Product Service, Market Positioning and Competitive Advantage. In the context of this research, Product Service refers to MOOC courses and complementary services such as guidance and tutorials. For Market Positioning, it refers to branding and marketing the institutions via quality courses as well as reputable academics. For Competitive Advantage, it refers to offering niche and in demand MOOC courses that would draw the attention of end-users to sustain their interest in undertaking the MOOC courses. For the second factor, Infrastructure, the four elements are Organizational, Core Resources, Technological Architecture and Value-added Processes. Organizational refers to the administration of MOOCs by the policy makers at the respective institutions, followed by core resources which could be categorized to physical and human resources. Physical resources could be in the form of computers, Wi-Fi setup in the premise and servers while human resources refer to trained MOOCs trainers and instructors. Next is technological architecture that supports the technological maintenance and sustainability for MOOC in the respective institution of higher education. Last but not least, value-added processes refer to the sociability aspects of the MOOCs processes such as tutorials, live-streaming chats, discussions, badges and certification. The third factor for the Conceptual Business Model is financial which encompasses two elements; source of income and revenue structure. Hence, the UTM MOOC business model aims to integrate all the factors and elements identified from the prior literature analysis and derived from the existing business models and literature reviews on MOOCs in higher education in perpetuating the current needs of global higher education effectively and efficiently. Figure 3 illustrates all the constructs and their elements that are integrated and synthesized to develop the Conceptual Business Model for UTM MOOC.

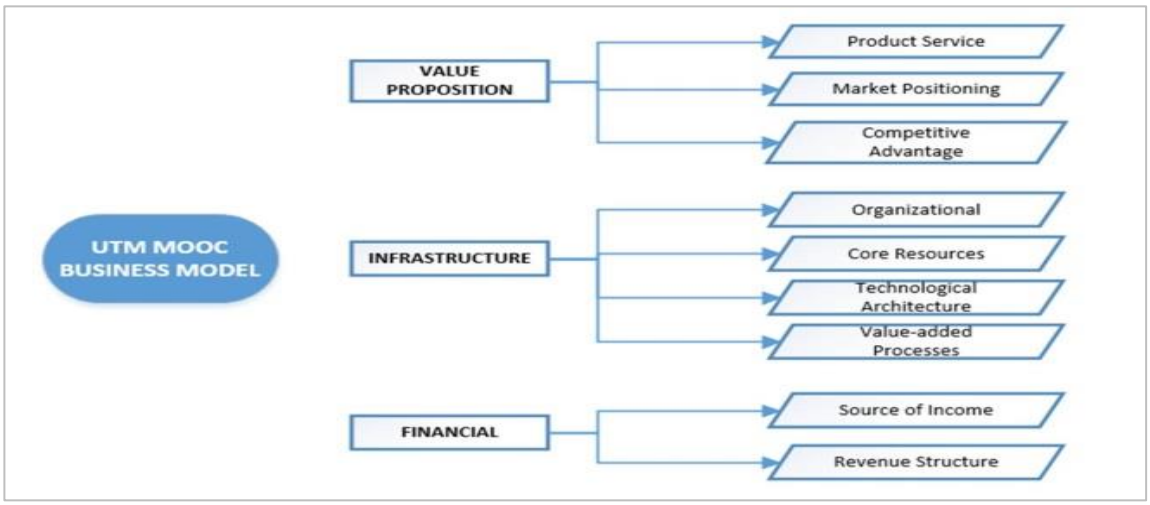

Figure 3. Conceptual Business Model for UTM MOOC

6 Conclusion

Higher education has an eminent influence on expediting global knowledge capital via innovative initiatives such as MOOCs. MOOCs implementation has dramatically shifted the focus of higher education where it exponentially gained attention as one of the main drivers of global learning innovation in higher education. Due to the under-researched aspect of business model for UTM MOOC, this research is timely as it supports UTM vision to be the stalwart leader of learning innovation as well as streamlining the higher educational strategies. This is in lieu with the stakeholders' needs in wider access to cost-effective quality education in UTM. A viable business model for UTM MOOC is vital in offering customer value proposition, tangible and intangible benefits to end-users, apart from optimizing revenue stream. The future studies stemmed from this research will explore the stakeholders' views of the conceptual business model for UTM MOOC in order to optimize competitive advantage to both institutions and end-users. Hence, the conceptual Business Model for UTM MOOC is hoped to propagate the knowledge capital, wielding it to expedite value and of higher education beyond physical, financial and demographic barriers.

7 Future Studies

For future studies, it is hoped that the Conceptual Business Model for MOOCs in UTM could be tested and verified by the UTM MOOC developers as well as the users, predominantly academic staff and students. A study on the business model impact on UTM MOOC sustainability is currently in progress by the authors.

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Developing Building Information Modelling (BIM) Implementation Model for Project Design Team

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Abstract Building Information Modelling (BIM) is implemented by the project design team to overcome the insufficiency of information in project design, which leads to design changes and design clashes. However, it seems difficult for project design team to implement BIM and get the benefits from its implementation in the project design stage because they do not know the right way to implement BIM especially to the beginner. Therefore, this paper proposes a model called '*BIM Implementation Model for Project Design Team'*. A literature review was carried out to explore on adaptation of BIM in the project design stage and types of maturity model in construction field. Apart from that, several semi-structured interviews were conducted with project design team to explore potential improvements to increase BIM implementation in project design stage. Both data from the literature review and the semi-structured interviews are important and contributed to the development of '*BIM Implementation Model for Project Design Team'*.This model is created to assist the project design team to improve the implementation of BIM in the project design stage and getting benefits from its implementation. The model purposes, the concept of the model, procedure of its development as well as details of the model elements presented in this paper will form the basis for the development of the *'BIM Implementation Model for Project Design Team'*.

Keywords Building Information Modelling (BIM), Construction project, Construction industry, Design stage, Maturity model, Innovation, Technology.

1 Introduction

Building information modelling (BIM) is known as a human activity, which ultimately involves broad process change in the construction industry [1]. Nowadays, BIM implementation in construction projects is vital in the achievement of the construction industry development goals in many countries. Countries such as the United States of America (USA) and Finland were globally implementing BIM in their construction projects. Meanwhile, other countries such as Australia, Singapore, Hong Kong (HK) and Malaysia have started to realize the opportunity and have started to implement BIM in their construction projects [1, 2]. The countries are now starting to invest in order to implement BIM in construction projects [2].

The main objective of BIM implementation in construction projects is to reduce any threat, which lead to construction problem such as low of construction productivity, low of project quality, project delay, construction cost overrun and disputes among construction players [1, 3, 4]. Several authors identify one of the factors contribute to the problems is related to poor in managing project design [5, 6]. In order to avoid the problems, the construction players have to improve efficiency and effectiveness of managing

project design. Therefore, the implementation of BIM in project design stage is one of the best way to improve efficiency and effectiveness of construction projects in reducing construction problems [1, 7].

Many construction players agreed to implement BIM in their project because they believe that BIM could increase their works performance based on their projects performance especially in preparing project design [8]. Most of construction players especially the project design team agreed that the process of preparing project document is faster by using BIM compared with project without BIM [1, 8, 9]. For example, the ability of BIM in visualise project design in form of 3 dimensional (3D) has increase client understanding on project design compare to 2 dimensional (2D) design [10]. Therefore, client can identify any changes earlier and it help design team to produce a better project documents faster than conventional process.

Moreover, the BIM uses is not only limited to project design stage. It could be used for the whole project lifecycle. There are twenty-six (26) types of BIM uses that could be applied in a construction project. BIM could be implemented in all stages of construction project, which are pre-construction stage, construction stage and post-construction stage. In order to get used all the BIM uses in construction projects and get the benefits from its implementation, it is necessary to have a proper guideline to assist the right way to implement BIM.

Therefore, this paper highlight on the barriers and challenges of BIM implementation, potential improvement to increase BIM implementation in the project design stage as well as presents a maturity roadmap to facilitate the BIM implementation among the project design team.

2 Data and Methodology

There are two (2) methods used to develop *BIM Implementation Model for Project Design Team*. Figure 1 illustrates the methods.

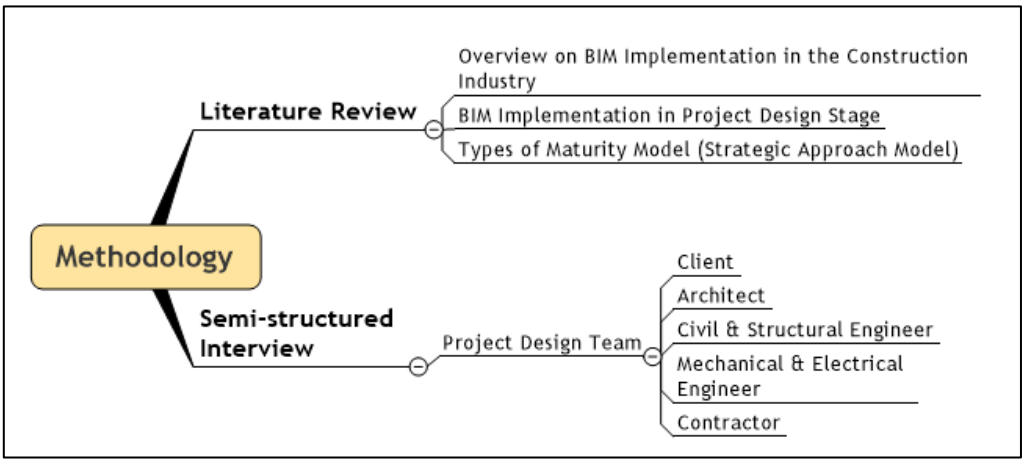

Figure 1 Method used for developing the *BIM Implementation Model for Project Design Team*

Based on the figure, literature review and semi-structured interviews were conducted to gather information on BIM implementation in project design stage. The literature review was conducted to obtain information on adaptation of BIM in project design stage and types of maturity model in the area subject to BIM and construction field. The literature review was made by referring to books, journal articles, international conference papers and materials available on the internet.

Moreover, semi-structured interviews with project design team (client, architect, civil and structural engineer, mechanical and electrical (M&E) engineer and contractor) were conducted to explore potential improvements to increase BIM implementation in project design stage. The face to face interviews involved eight (8) respondents, which have used and currently using BIM in project design stage. The respondents come from different organizations; public and private sectors. All respondents are responsible to manage project design. Apart from that, all respondents have been asked based on a set of interview questions.

The aim of the interview questions is to obtain data on the current practices of BIM implementation in project design stage in the Malaysian construction industry. All data gained from the interviews were recorded with the permission of respondents, transcribed and analysed using content analysis. Content analysis is one of technique used in this paper to analyse all data from semi-structured interviews, which all data will be presented in form of texts, tables, figures and expressions.

Both data, from the literature review and findings from semi-structured interviews with respondents were used to develop *BIM Implementation Model for Project Design Team*. Detail on the model development will be discussed on following section.

3 Results

This section discusses on results and findings from the interviews. The interviews provided an in-depth analysis of BIM implementation in project design stage among client, architect, civil and structural engineer, M&E engineer and contractor. Discussion on results and findings were reported into three (3) sub-sections as follows:

i. Respondent's background;
ii. Benefits of BIM for project design;
iii. Potential improvements to increase BIM implementation in project design stage.

All the information lead to development of *BIM Implementation Model for Project Design Team*. Details results on each sub-section are discussed in the following section.

3.1 Respondent's Background

The respondents consist of BIM principle director, BIM coordinator, project manager, client, architects, civil & structural engineers as well as M&E engineer. Brief on respondent's background is shown in Table 1.

Table 1 Respondent's Background

Respondent	Position in Project Using BIM	Experience in Project Using BIM (Year)	No. of Project Using BIM
R1	BIM Principle Director	6	3
R2	BIM Coordinator	4	2
R3	Project Manager	3	3
R4	BIM Coordinator	4	4
R5	Client	5	2
R6	Civil & Structural engineer	3	4
R7	M&E engineer	3	2
R8	Architect	4	4

Based on the table, all the respondents have experienced in managing project design using BIM in between three (3) to six (6) years. All respondents are responsible in managing project design in construction project using BIM. Most of projects using BIM conducted by all respondents are residential project and commercial building. Based on the respondents' positions and experiences in project using BIM, it is reasonable to conclude that all respondents have knowledge on BIM implementation in project design stage. Moreover, the longer the experiences of the respondent in project using BIM, the greater of their understanding and knowledge on BIM implementation in project design stage. This is supported by

Mendenhall, Oddou and Osland [11], where they stated that personal experience is the essential element in knowledge creation.

3.2 Barriers and Challenges of BIM Implementation in Design Stage

There are several factors and causes contributed to barriers and challenges of BIM implementation in design stage. Based on the interviews, all respondents agreed the first factor contributed to slow implementation of BIM in project design is people. With regards to the people, all respondents agreed that, most of construction players are comfortable with traditional or conventional process in managing project design hence they refused to implement BIM in managing project design.

In addition to that, all respondents acknowledged that, lack of awareness on BIM among clients and top managerial is one of the reasons why construction players are comfortable with traditional process in managing project design. This problem contributes to slow implementation of BIM in construction projects. Apart from that, lack of encouragement by top managerial in an organization to implement BIM in construction projects also contributed to the lack of knowledge and skill on BIM [12].

The second factor contributed to barriers and challenges of BIM implementation in design stage is the process. All respondents agreed that, there is no standardisation guideline in the Malaysian construction industry that they can follow. Consequence to that, construction players are mostly implement BIM improper way and failed to get the benefits [5, 13, 14]. This issue causes the construction players were despairing to implement BIM in their next projects.

The last factors, which contribute to barriers and challenges to implement BIM in design stage is technology. According to all respondents, the elements of tools or software, hardware and BIM training are related to the technology as a barrier and challenges to implement BIM. They agreed that most of top managerial in construction organisations refuse to invest on BIM tools or softwares, hardwares and trainings. This might be due to the cost issue as the total amount to implement BIM in construction project could reach RM 15,000.00 to RM 30,000.00. As a result, only large organisations can afford to own the technology.

From the interviews, all respondents agreed that the number of BIM expert in the Malaysian construction industry is limited due to reluctance of construction players to implement BIM in their projects. This is in line with Ahmad Latiffi *et al.* [13] and Construction Research Institute of Malaysia [14] where the reluctance of construction players to implement BIM is contributed to slow adoption of BIM in the Malaysian construction industry.

Based on the discussion regarding barriers and challenges to implement BIM, it can be concluded that most of Malaysian construction players are not ready to implement BIM in construction projects especially in managing project design. Therefore, the barriers and challenges of BIM implementation must be addressed in order to increase BIM implementation among construction players. Figure 2 illustrates barriers and challenges stated by all respondents.

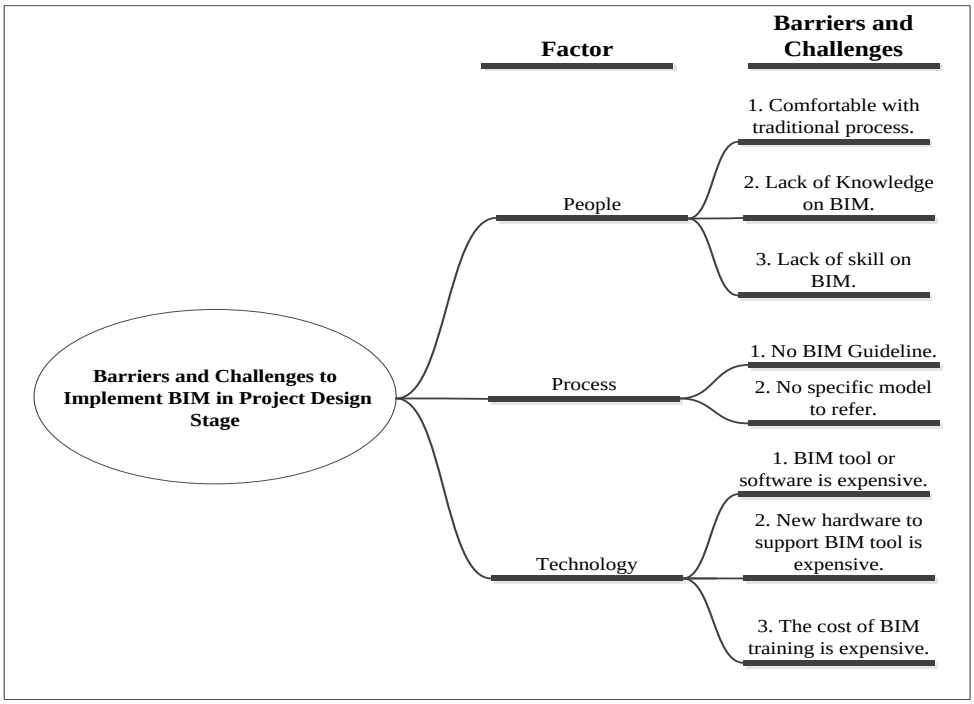

Figure 2 Barriers and Challenges to Implement BIM in Project Design Stage

3.3 Potential Improvements to Increase BIM Implementation in Project Design Stage

All respondents have suggested several potential improvements in order to improve BIM implementation in managing project design stage. There are seven (7) potential improvements to increase BIM implementation in project design stage revealed from the interviews. The potential improvements are the ways to increase BIM implementation in project design stage.

All respondents agreed, the first approach to increase BIM implementation in project design stage is by educating top managerial in construction organisation to understand and aware on benefits of BIM in project design stage. Understanding and awareness of top managerial on BIM benefits is important to increase its implementation in projects. This is because, the top managerial have the right to instruct their staff to implement BIM [15, 16].

On top of that, R2 and R5 explained the best way to increase knowledge and skills on BIM is by participating in training and seminar related to BIM. The training and seminar will benefit construction players in their career, organisation and construction projects. However, awareness of BIM must be extended to top managerial in the organisation, as top managerial is the indicator to encourage their staff to implement BIM [15, 16].

Furthermore, four (4) respondents (R3, R6, R7 and R8) agreed that other way to increase BIM implementation in project design stage is cooperation from any government bodies in construction projects. The enforcement in implementing BIM by the government can help to increase BIM practices in construction projects [13]. Apart from that, R1, R2 and R3 also agreed that the government should provide BIM guideline, where the guideline can assits construction players to implement BIM. Further to that, R6, R7 and R8 explained that their organisation (public authority) is developing BIM guideline for government projects. Therefore, the guideline can be used by construction players in order to manage

BIM government projects. R6, R7 and R8 also stated that toward the beginning of 2016 all construction players, which interested to involve in government projects are required to implement BIM. BIM guideline is one of the approaches to increase BIM implementation in construction projects [15].

Furthermore, all respondents agreed that any strategic approach or model is required in order to assist construction players to implement BIM in construction projects. R1 and R4 explained that, the model must able to assist construction players to implement BIM in a right ways. Another potential improvement to increase BIM implementation in project design stage stated by all respondents is by educating undergraduate or postgraduate students in any institutions on BIM. R2, R5 and R6 explained that, the cooperation between practitioner and academia as well as researchers can give early exposure to students on BIM. Apart from that, the role of researchers is also important in order to share current practices on BIM in the Malaysian construction industry through research publication. This approach at once could increase knowledge on current practices of BIM in construction projects with other construction players. Apart from that, the cooperation between government, BIM practitioners and researchers can increase BIM implementation in construction projects by assisting construction players on how to implement BIM in construction projects.

Overall, in order to increase BIM implementation in construction projects, all parties, which are construction players, the government, researcher and academician have to cooperate. Cooperation among them can increase knowledge on BIM implementation in construction projects among construction players and youth in any institutions. All respondents agreed that, the cooperation among all the parties accelerate the process to increase awareness of BIM in the construction industry. Table 2 shows the summary of the potential improvements to increase BIM implementation in project design stage.

Table 2 Potential Improvements to Increase BIM Implementation in Project Design Stage

No	Approaches	Respondent	Total Respondent
1	Early understanding by top managerial in an organisation on BIM.	R1, R2, R3, R4, R5, R6, R7, R8	**8**
2	Awareness on BIM by undertaking training and attending seminar on BIM.	R1, R2, R3, R4, R5, R6, R7, R8	**8**
3	Encouragement from top managerial in organisation to implement BIM.	R1, R2, R3, R4, R5, R6, R7, R8	**8**
4	Enforcement on implementing BIM by the government in construction projects.	R3, R6, R7, R8	**4**
5	Government should provide BIM guideline.	R1, R2, R3, R4, R5, R6, R7, R8	**8**
6	A strategic approach model is needed to assist construction players to implement BIM in construction projects.	R1, R2, R3, R4, R5, R6, R7, R8	**8**
7	Educate and expose on BIM to undergraduate and postgraduate students in any institutions.	R1, R2, R4, R5, R6, R7, R8	**7**

3.3 Development of *BIM Implementation Model for Project Design Team*

There are two (2) methods used in order to develop the *BIM Implementation Model for Project Design Team*. The first method is data from past literature review on types of maturity model and the second method is data from the current studies of BIM implementation in project design stage based on semi-structured interviews with project design team. Both methods were used in developing the model, so that it is more relevant and can be used in the current situation.

Maturity concept has been used to develop the research model because the research model has the same intention with the concept, which is to point out the current position to the desire position with

the intention of giving benefits to project design team. There are four (4) steps to develop the BIM implementation model for project design team, which has been adopted from BIm^3, Construction Supply Chain Maturity Model and Performance Measurement (PM) Migration Path Model [17-19]. The models have described a clear steps on how to develop a model, which based on maturity concept. The steps are as follows:

i. Step 1: Model purposes;
ii. Step 2: Concept of the model;
iii. Step 3: Procedure of model development; and
iv. Step 4: Details of the model elements.

All the steps have been adopted to develop *BIM Implementation Model for Project Design Team*. Details on each step will be discussed in following sections.

3.3.1 Step 1: BIM Implementation Model for Design Team Purposes

Maturity model is a platform towards achieving a mature process [20]. Each level in maturity model indicates a level of capability process. Meanwhile, others author assumed that maturity model as that progress towards goal achievement that comes in stages [21]. Therefore, the progress toward goal achievement for BIM implementation model for project design team will comes in stages or levels. The purpose of the maturity model is used to develop BIM implementation model for project design team, will help construction organisation or project design team to structure and organise BIM activities in project design stage. The maturity shows the currents position of project design team in the project design stage and the next level to be achieved by them. The *BIM Implementation Model for Project Design Team* is developed as follows:

i. To classify the maturity of BIM implementation in project design stage of an organisation;
ii. To guide project design team in an organisation towards an effective of BIM implementation in project design stage; and
iii. To assists project design team in a place to start and follow several elements in each level of the model. Each element in each level of the model must be fulfilled by project design team in order to move to the next level.

3.3.2 Step 2: Concept of *BIM Implementation Model for Project Design Team*

There are seven (7) maturity models used as reference to develop research model as illustrated in Figure 3. The main reason for choosing CMM [20], The BPO maturity model [21], People CMM [22], STEPS maturity model [23], Construction Supply Chain Maturity Model [18] and Performance Measurement Migration Path Model [24][35] as references for the research model development is that the research model has similar purposes with the other models. The purpose of the research model is to provide a structured approach to assist project design team to implement BIM in project design stage.

Moreover, CMM was adopted in developing research model because other maturity models adopted in this research have been developed based on CMM as reference. Although CMM was created for a different area, but it can still be accepted as main reference to develop *BIM Implementation Model for Project Design Team*. Moreover, the Bew-Richards BIM maturity model [25] and BIm^3 [19] are used as reference to discuss on current level of BIM maturity in the Malaysian construction industry. Nevertheless, the purpose of all the models was assisting individual, organisation and industry to achieve something more and better from its current position.

All adopted models consisted of several levels, stages or phases, which the pattern of each model shows the lowest level to the highest level in the model. Moreover, each level describes different characteristics to achieve success of each level. The selected levels from each model have been used as references to develop the *BIM Implementation Model for Project Design Team*.

Figure 3 Concept of *BIM Implementation Model for Project Design Team*

3.3.3 Step 3: Procedure to develop *BIM Implementation Model for Project Design Team*

Construction Supply Chain Maturity Model [18] and Performance Measurement (PM) Migration Path Model [17] has considered four (4) things to develop maturity model. The things have been considered and adopted in developing a maturity model for '*BIM Implementation Model for Project Design Team*'. The things are as follows:

i. Identify criteria to be considered in implementing BIM in project design stage;
ii. Identify number of levels needed for the model;
iii. Identify the first element should be in the first level and later. Give consideration to what should be achieved at each level, and action taken by whom; and
iv. Identify the lowest level of the model should demonstrate an understanding of BIM concept and processes. The highest level should show that the design team has awareness of expanding BIM implementation in project design stage to other stage in construction projects process.

In this research, all these things have been considered before developing '*BIM Implementation Model for Project Design Team*'. Details on model development are discusses in the next sub-section of this section.

3.3.4 Step 4: Details of the '*BIM Implementation Model for Project Design Team*'

The *'BIM Implementation Model for Project Design Team'* could help project design team to implement BIM in project design stage. It also helps project design team to benchmark their implementation efforts and guide them in improving their construction projects in order to achieve their targets. The result from using the model will takes time and it depends on project design team success to fulfil each element at each level of the model. There are several factors, which influencing the differences. The factors are lack of awareness on BIM, lack of knowledge and skills on BIM among project design team, the ability of project design team to manage BIM implementation in project design stage, lack of support from top managerial in organisation to invest on new hardware and software. Figure 4 shows the *'BIM Implementation Model for project Design Team'*.

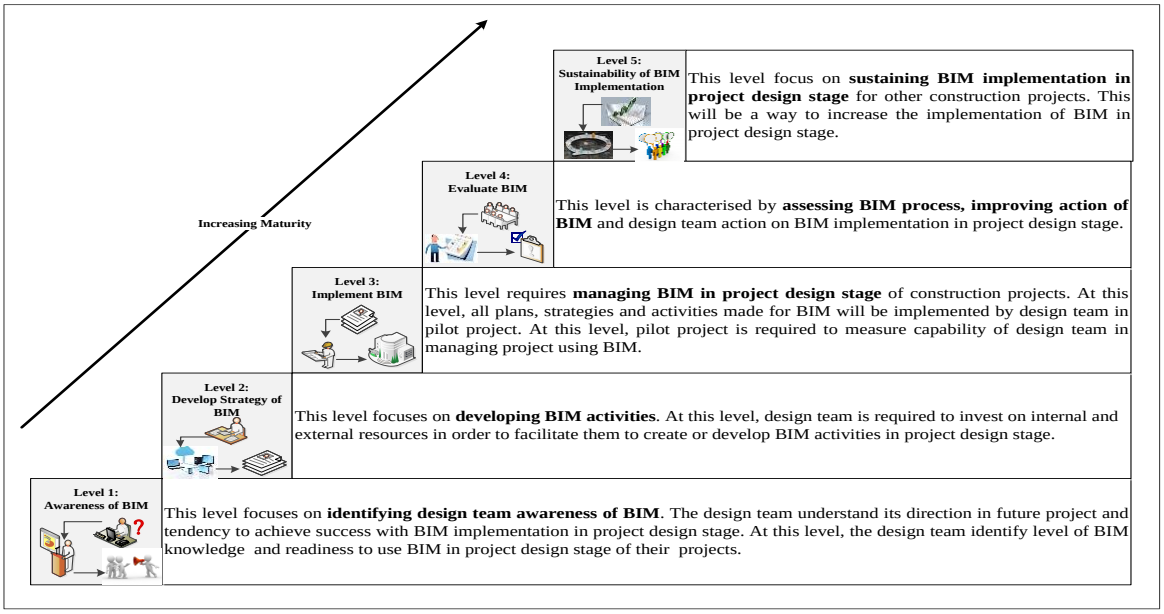

Figure 4 '*BIM Implementation Model for Project Design Team*'

Based on the figure, the model consists of five (5) levels of maturity. The levels are **level 1**: Awareness of BIM, **Level 2**: Develop Strategy of BIM, **Level 3**: Implement BIM, **Level 4**: Evaluate BIM and **Level 5**: Sustainability of BIM Implementation. Based on the figure, the arrows indicate the direction of movement of each level. Each level moves from Level 1 to Level 5. Level 1 is the lowest level, meanwhile Level 5 is the highest level. Each level in maturity model consists of several main aspects that need to be addressed. The level 1 is the initial level in maturity model and it is the lowest level. Readiness of the project design team to implement BIM in project design stage was identified in this level. Level 5 (the highest level), is where project design team has awareness to sustain BIM implementation in project design stage in their future construction projects. Each level in the model contains several key aspects as follows:

- ***Level 1: Awareness of BIM.*** This level focuses on identifying project design team awareness of BIM. The project design team understand its direction in future project and tendency to achieve success with BIM implementation in project design stage. At this level, the project design team

identify level of BIM knowledge and readiness to use BIM in project design stage of their projects.

- ***Level 2: Develop Strategy of BIM.*** This level focuses on developing BIM activities. At this level, project design team is required to invest on internal and external resources in order to facilitate them to create or develop BIM activities in project design stage.
- ***Level 3: Implement BIM.*** This level requires managing BIM in project design stage of construction projects. At this level, all plans, strategies and activities made for BIM will be implemented by project design team in pilot project. At this level, pilot project is required to measure capability of project design team in managing project using BIM.
- ***Level 4: Evaluate BIM.*** This level is characterised by assessing BIM process, improving action of BIM and project design team action on BIM implementation in project design stage.
- ***Level 5: Sustainability BIM Implementation.*** This level focus on sustaining BIM implementation in project design stage for other construction projects. This will be a way to increase the implementation of BIM in project design stage.

4 Conclusion

This paper has revealed that BIM implementation in project design stage could improve construction projects effectiveness by reducing construction problems. It also gives benefits to construction projects in term of project duration, construction cost and quality of end product. In order to increase BIM implementation in project design stage, a model has been created to assist project design team to implement BIM in project design stage. The model is called as *BIM Implementation Model for Project Design Team*. Maturity models concept has been adopted to build the model. The model is developed to assist project design team a place to start and follow several elements in each level of the model. Each element in each level of the model needs to be fulfilled by project design team in order to increase their performance in managing project design stage.

Further research will be conducted to evaluate the capability of the model in assisting project design team to implement BIM in project design stage. The evaluation will be conducted with several evaluators, which have experiences in managing project using BIM. The evaluation result will shows either the model is capable to assist project design team to implement BIM in a right way or not. The results is good in order to improve the model.

Acknowledgement

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Web-Based Communication Model Between Teacher and Student in Foreign Language Software

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Abstact The needs for communication with the world community requires people to be able to master some kind of foreign language well. In the world of education in Indonesia, one of the foreign languages most widely taught in English. To support that, several schools and university in Indonesia are required to have a language lab that can be used as a means of learning a foreign language. But to build a language lab certainly require no small cost. On the other side, today almost all schools and colleges already have computer labs. So it is possible for the computer is functioning laboratories such as language laboratories, in particular by implementing a system of foreign language learning software.

To make the language learning software system becomes interactive and as realtime communication media between teacher and student, then it should be implemented chatting features on it. Chatting feature can be used in group mode or private mode. Chatting feature can be used in group mode or private mode. And just like the learning media feature that require of data transportation model effective, likewise with the chatting features. Chatting features have to be running in realtime with a minimal time delay possible. On this research will be discussed about the data communication model between computers (servers) teacher with student computer (client) in supporting streaming feature of learning video data and teacher's live video, as well as in supporting the chatting features between teachers and students. Audio and video streaming technology is more relevant to implement, because this time computer technology, multimedia and internet are growing up. Delay time which firstly became an issue in the process of audio and video streaming, has recently been reduced and minimized. The Use of LAMPP stack, Node.js, NPM and VLC on the server side, the use of RTSP as the protocol to send video/audio data from the server to the client and the VLC plugin embedded in the client browser, have been able to collaborate optimally to make audio/video streaming system.

Keywords language learning, communication media, RTSP, audio, video, streaming

1 Introduction

Globalization requires every citizen to be able to compete in the international arena. The needs for communication with the world community requires people to be able to master some kind of foreign language well. In the world of education in Indonesia, one of the foreign languages most widely taught in English. Although there are several other foreign languages that be taught in some schools in Indonesia, but the English still number one as a foreign language that must be mastered by the citizens in Indonesia. Moreover, English began to be given to students in grade 1 primary school level. It aims to support Indonesia in preparing the HR community in the era of globalization and competition at ASEAN regional level. To support that, several schools and university in Indonesia are required to have a language lab that can be used as a means of learning a foreign language.

But to build a language lab certainly require no small cost. On the other side, today almost all schools and colleges already have computer labs. So it is possible for the computer is functioning laboratories such as language laboratories, in particular by implementing a system of foreign language learning software. Among the features that must be provided by a software system that is learning a foreign language is (Syaifudin,et.al, 2015):

- Learning media feature
- Group discussion feature

- Quiz feature
- Attendance list feature

By applying information technology for implementing foreign language learning software, it is expected (can) reduce the cost of procurement language laboratory, can maximize the computer lab usage, and can ultimately provide a new atmosphere in learning foreign languages and can improve learning outcomes (Asri, et.al., 2015). One of the key features in language learning software is a feature of learning media. This feature makes it possible to display a various of media, both text and multimedia media. Included in the multimedia-based teaching materials is a video tutorial / learning materials and live video when teacher delivering they materials. Size large of multimedia teaching materials to be delivered from the teacher's computer to computer students, necessitates a mechanism for effective streaming multimedia data which can minimize delay and maintain the quality of the data.

Besides feature of learning media, to make the language learning software system becomes interactive and as realtime communication media between teacher and student, then it should be implemented chatting features on it. Chatting feature can be used in group mode or private mode. And just like the learning media feature that require of data transportation model effective, likewise with the chatting features. Chatting features have to be running in realtime with a minimal time delay possible.

On this research will be discussed about the data communication model between computers (servers) teacher with student computer (client) in supporting streaming feature of learning video data and teacher's live video, as well as in supporting the chatting features between teachers and students.

2 Literature Review

2.1 Literature Review

Some previous research have been implemented to apply information technology in the learning process. In 2005 Dolzani develop Steraming Video system via the Internet network to support the learning process called LODE system (Dolzani, 2005). In applying, 66 % students have accessed and used that system in the learning process. In 2013, Rozi did research to implement VoD *(Video on Demand)* to support the process of long distance education at the Politeknik Negeri Malang (Rozi, 2013). The system can organize and manage instructional video data, user data and provide services to users in the form of instructional video display in accordance with the request of the user.

In a different research, Hartsell and Yuen, in 2006 did the research about usage of video streaming on online learning process (Hartsell et al 2006). There are several things to notice in streaming video technology, such as, (1) making a video in the right format (2) the availability of server streaming media (3) enough bandwidth to download and upload video files. Streamed video generally has real media format, Windows Media, Quick Time. All of them support the protocol RTSP (Real Time Streaming Protocol) which can do streaming in real time. MPEG-2 and MPEG-4 are new formats which can also be used for streamed video.

Syaifudin in 2015 has made the design of software for learning a foreign language is one of its main features is to streaming video and live video learning from teacher to student (Syaifudin, et.al., 2015). Also in the design of the software also has features to recap student attendance, quiz, question bank, and other learning data management features. The design of foreign language learning software is oriented on improving the effectiveness of the process of learning a foreign language. In addition, the drafting is also intended to improve the efficiency of the use of the computer lab, which has been at the school, as well as a language lab (Asri, 2015). That is, simply by installing the software in the computer lab, then the school can function as a computer lab and language lab at once.

2.2 Video Streaming

Along with the development of computer technology, multimedia and networking, the educators saw the opportunity to create a more productive learning environment. One product of collaboration from

third technologies is video streaming. Video streaming can be used as a facility for delivering on instructional material in audio and video format. The term is commonly used streaming video to show the process of compression and buffering the video, so that video content can be viewed in real time by the user through the Internet. Streaming video service users can see the video you that they want by downloading some parts of the video and pass on other parts to see next. This method is more effective than download all the video section in the same time and see it later. In the video streaming process, the program will download the video file to be displayed in a small packet buffer. If the packet buffers that have been downloaded are sufficient to display, then the program will start showing. And the download process for the next part started back. In other words, the process of streaming media can be defined as the transfer of digital media (such as video, audio and data) that take place simultaneously with the application server that can be displayed in the client application in real time (Hartsell, et.al., 2006). If the streaming process has been completed and the file has been displayed, the file is no longer available in the user's computer (Reed, 2003).

Special for the educator, streaming video technology offers the advantage of creating a virtualized instructional material that more could attract the attention of students. In addition, good streaming video management system will help educator to manage instructional video content into a database that is easy to find time (Hartsell, et.al., 2006).

And of course this technology can expand the dimensions of time and space to do learning process. If during this time we can only meet a lecturer in a classroom on a specific schedule, then by streaming video, visualization of the teacher can be presented in a video format and can be accessed by students wherever and whenever they want.

2.3 RTSP (Real Time Streaming Protocol)

RTSP is one of protocol that is frequently used to do streaming digital media, such as audio or video in real time. The use of RSTP can allow live viewing video from the direct source (such as encoder or camera) using the standard media player and compatible with the protocol. What is meant by standard in this case is it has already implemented RTSP standard that has been listed in RFC2326 (Simon, 2010). Some examples of media player which have implemented standard RTSP, are VLC, Quicktime Vide LAN Client and there are many other media players that have implemented it.

RTSP set and control either one or several time-synchronized streams of a continuous media such as audio and video. It does not typically deliver the continuous streams itself, although interleaving of the continuous media stream with the control stream is possible. In other words, RTSP acts as a "network remote control" for multimedia servers. Some operations supported by RTSP protocol are:

a. **Retrieval of media from media server:** The client can request a presentation description via HTTP or some other method. If the presentation is being multicast, the presentation description contains the multicast addresses and ports to be used for the continuous media. If the presentation is to be sent only to the client via unicast, the client provides the destination for security reasons.
b. **Invitation of a media server to a conference:** A media server can be “invited” to join an existing conference, either to play back media into the presentation or to record all or a subset of the media in a presentation. This mode is useful for distributed teaching applications. Several parties in the confer-ence may take turns “pushing the remote control buttons”.
c. **Addition of media to an existing presentation:** Particularly for live presentations, it is useful if the server can tell the client about additional media becoming available.

RTSP has some of the same functionality as same as HTTP protocol. Nevertheless, basically have differences in the data transmission process. HTTP is an asymmetric protocol, where the client can leave request, and the server will respond to the request behind. In RTSP, both the client and server can leave request. Also RTSP requests are not stateless; they may set parameters and continue to control a media stream long after the request has been acknowledged.

2.4 Node.js

NodeJS included in one of the latest software tools for developing web-based applications The systemsoftware is written using language NodeJS Javascript, using the base of events and asynchronous I / O. If most Javascript applications is run by a web browser, Node.js executed as an application server (McLaughlin, 2011). Node.js uses non-blocking technique to execute the process. It is means, Node.js will execute independently. Node.js will make the execution of an operation without waiting for another operation finishes. It is believed to create web applications that are built by using Node.js can run faster and more efficiently. Node.js has Node Package Manager (NPM) which can allow the developers to build and use the modules required to support Node.js. Popularity of Node.js more readily apparent, when several major IT players such as Google and Microsoft use it to build the application. Some examples of platforms that use Node is LinkedIn and Azzure. In addition to developing a web application, Node.js can also be used to develop network applications and cloud. Request processing model on Node.js is shown in Figure 1.

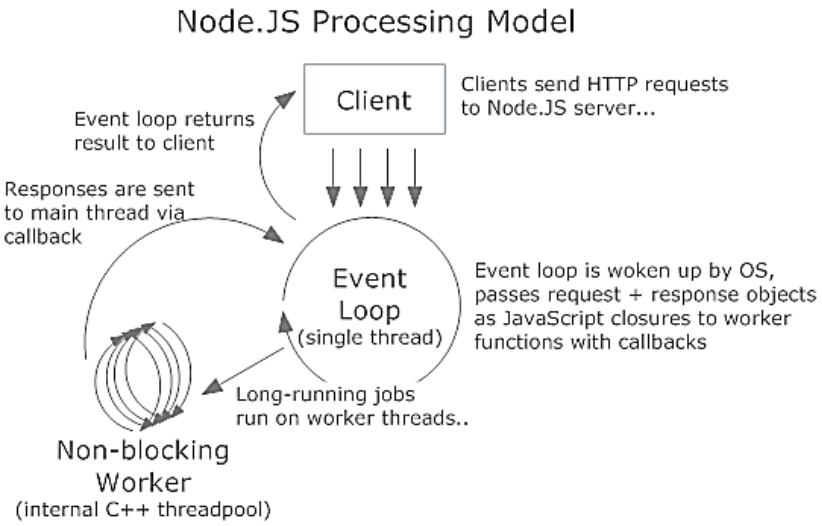

Figure 1. Node.js Processing Model

2.5 VLC Plugin

VideoLAN is a project to provide streaming video solution. It developed by students of the Ecole Centrale Paris and developers from all over the world, under the GNU General Public License (GPL). VideoLAN is designed to stream MPEG videos on high bandwidth networks. Figure 2 , shows a thorough solution provided by VideoLAN. The VideoLAN solution includes (Fallon, 2003):

a. VLS (VideoLAN Server), which can stream MPEG–1, MPEG–2 and MPEG–4 files, DVDs, digital satellite channels, digital terrestial television channels and live videos on the network in unicast or multicast,
b. VLC (initially VideoLAN Client), which can be used as a server to stream MPEG–1, MPEG–2 and MPEG–4 files, DVDs and live videos on the network in unicast or multicast ; or used as a client to receive, decode and display MPEG streams under multiple operating systems.

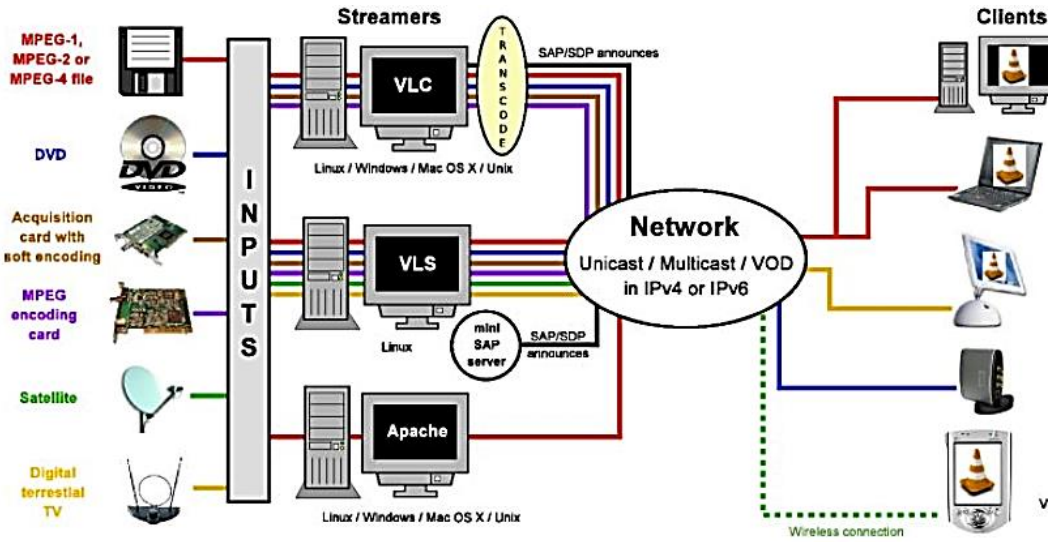

Figure 2. VideoLAN Solution Architecture

Recognizing that the current highly developed web application, then VideoLAN provide the VLC plugin. So that the browser has been installed VLC plugin in it, can take advantage of VLC player that supports various formats of video in the browser.

3 Architectural Design Streaming

The system's software architecture is illustrated in Figure 3, which consists of resource management needs, streaming media, group discussion and examination.

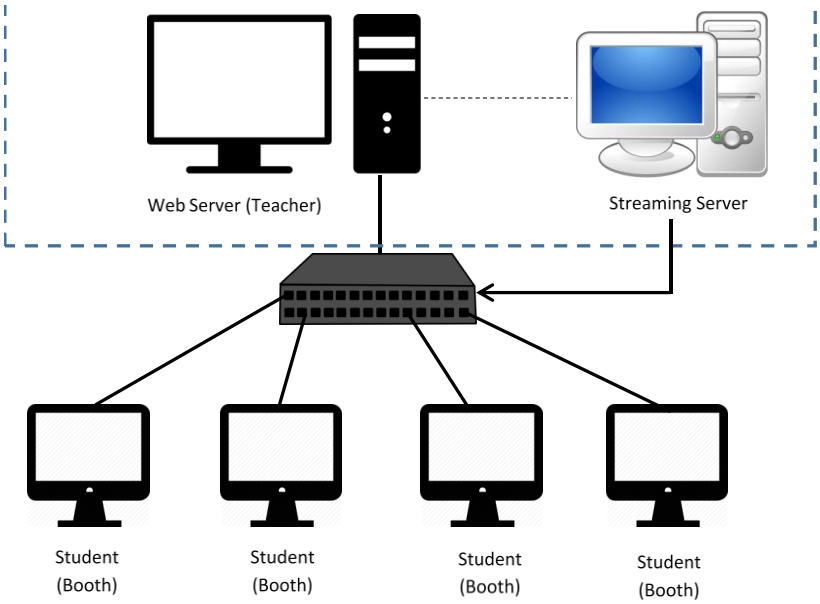

Figure 3. Architecture of Streaming

On the streaming features above, there are two types of user-level they are the control panel (Teacher) and booth (Students). In Figure 3 the teacher acts as a control panel. teachers have a role or duty to control the activities of teaching and learning in language laboratory such as giving streaming video to students who have been determined and have the permission to access such material, sending a message to students through group chat or private chat and starting video chat to all the students in the lab, the teacher also has the role to supervise or ask one of the students with private video chat.

While the definition of booth is student, the students have a role to receive learning activities. Like watching material in the form of streaming video or document, besides students can also contact teachers through video chat or chatting text through private chat or even through a video chat. Each booth has a single IP and student. Teaching and learning activities in this system uses the LAN network, where the LAN network is the connector between teachers and students, this means that when the teacher will conduct teaching activities in the language laboratory, the teacher will go to the system and use the interactive learning media facilities where the learning material will be distributed or shared to all the students that are in the language lab through LAN network. All the students in the lab will be able to access the learning media and the learning media contains a file of learning in the the form of audio or video stored on media server

4 Implementation

From architectural design shown in Figure 3, an outline of the software system will be implemented on the sis server and client. Hardware and software specifications of each server and client that has been used by researchers in implementing foreign language learning software is shown in Table 1.

Table 1. Software and Harware Specification

Server			**Client**	
Software		**Hardware**	**Software**	**Hardware**
-VLC		-Computer/Server intel core i3	-VLC	-Computer intel core i3
-VLC Browser Plugin	-RAM 1gb	-VLC Web plugins	-RAM 1gb	
-NodeJS	-HDD 2gb	-Firefox	-webcam	
-NPM	-webcam		-headset	
-Firefox	-headset		-RAM 1gb	
-LAMP Stack			-HDD 2gb	

After the software system has complete implemented, the display of the video streaming process is shown in Figure 4. As Figure 5 shows the process to see streaming audio.

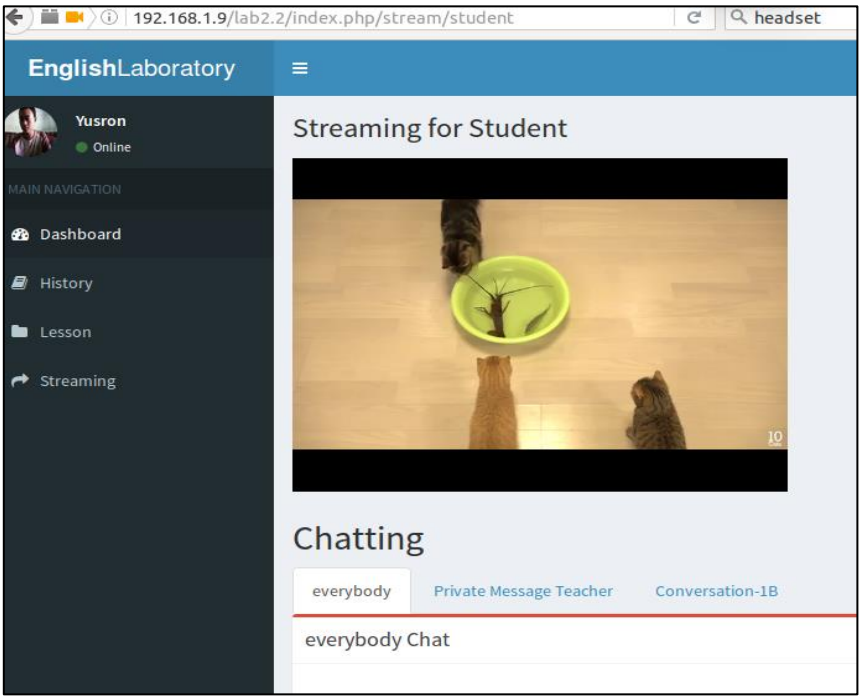

Figure 4. Display of Straming Video and Chatting

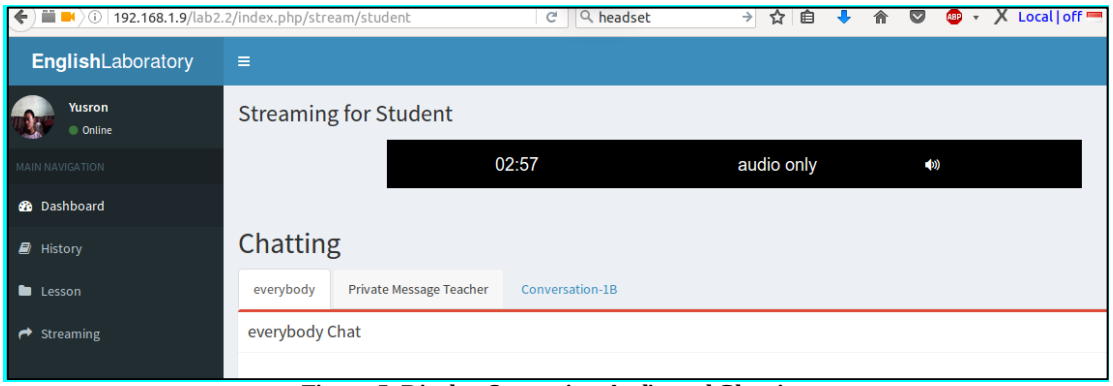

Figure 5. Display Streaming Audio and Chatting

Next, there must be a testing process to know the big influence of streamed file and the influence of the number of clients who do streaming at the same time. The test is aimed to know the delay that may appear when a video file of a certain size is streamed or seen by some clients. The test is intended to determine the delay that may appear when a video file with a specific size streamed or viewed by some client.

The experiment is based on the size of the video:

1. 3 Mb-> the first time the play occurs delay for 5 seconds when streaming but there is no delay
2. 10Mb-> the first time the play occurs delay for 5 seconds when streaming but there is no delay

3. 15Mb-> the first time the play occurs delay for 5 seconds when streaming but there is no delay
4. 20Mb-> the first time the play occurs delay for 5 seconds when streaming but there is no delay
5. 50Mb-> the first time the play occurs delay for 5 seconds when streaming but there is no delay

The experiment is based on the size of the audio:

1. 3 Mb-> the first time the play occurs delay for 2 seconds when streaming but there is no delay
2. 10Mb-> the first time the play occurs delay for 2 seconds when streaming but there is no delay
3. 15Mb-> the first time the play occurs delay for 2 seconds when streaming but there is no delay
4. 20Mb-> the first time the play occurs delay for 2 seconds when streaming but there is no delay
5. 50Mb-> the first time the play occurs delay for 2 seconds when streaming but there is no delay

The experiment is based on the amount of time video streaming client:

1. 1 client-> the first time the play occurs delay for 5 seconds when streaming but there is no delay
2. 2 client-> the first time the play occurs delay for 5 seconds when streaming but there is no delay
3. 3 client-> the first time the play occurs delay for 5 seconds when streaming but there is no delay

The experiment is based on the amount of time audio streaming client:

1. 1 client-> the first time the play occurs delay for 2 seconds when streaming but there is no delay
2. 2 client-> the first time the play occurs delay for 2 seconds when streaming but there is no delay
3. 3 client-> the first time the play occurs delay for 2 seconds when streaming but there is no delay

From the test results, it visible that the delay only occurs at the beginning of the video file when it is run. And after the video file successfully executed, until the completion delay hardly noticeable at all. This shows that the combination of architecture and technology used to build the streaming system in this study has been able to minimize the delay premises more efficiently.

5 Conclusion

The use of streaming audio and video technology in the process of learning offers an opportunity to make the learning process more interesting for students and the process of content management is more effective for teachers. Audio and video streaming technology is more relevant to implement, because this time computer technology, multimedia and internet are growing up. Delay time which firstly became an issue in the process of audio and video streaming, has recently been reduced and minimized. The Use of LAMPP stack, Node.js, NPM and VLC on the server side, the use of RTSP as the protocol to send video/audio data from the server to the client and the VLC plugin embedded in the client browser, have been able to collaborate optimally to make audio / video streaming system

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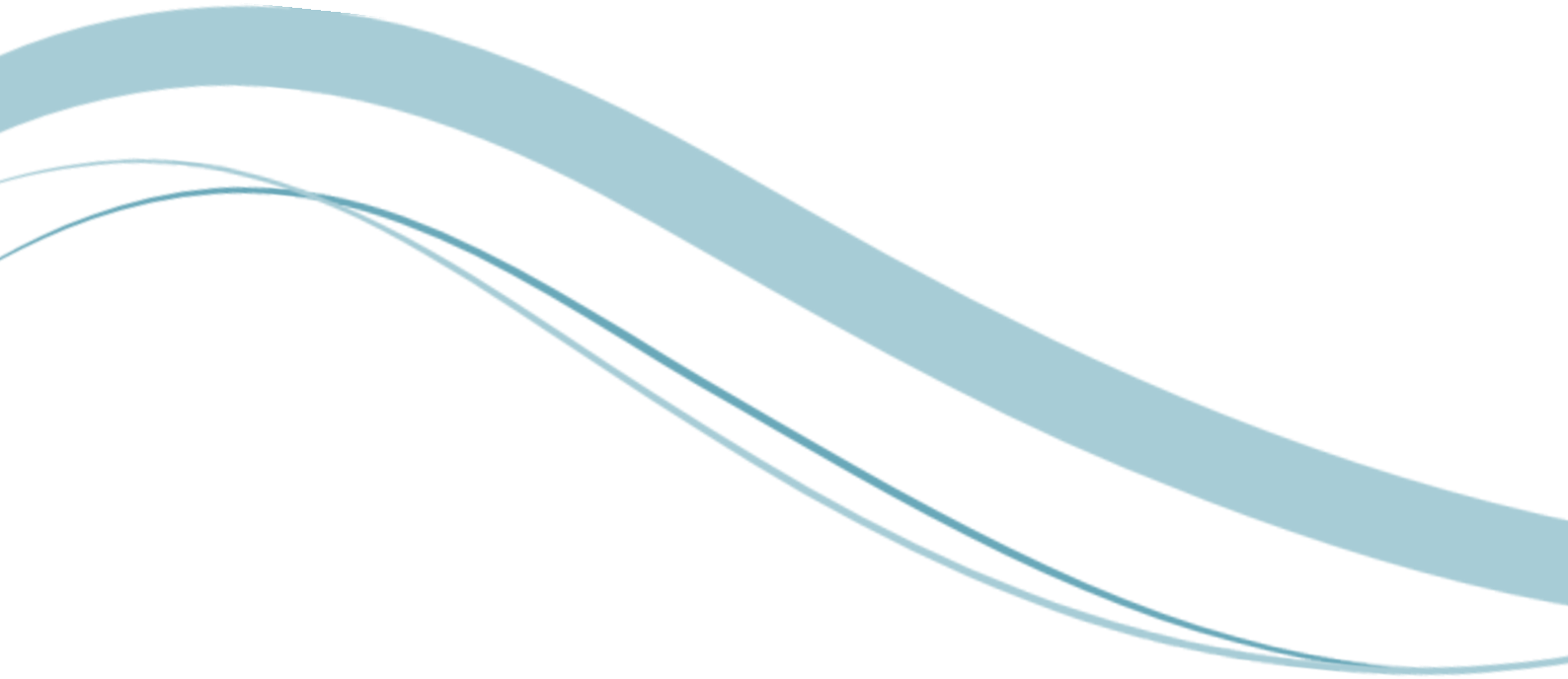
Theme 2:

Environmental Innovation and Sustainable Development



The Suitability, Feasibility and Acceptability (SFA) Model for OTEC Transformation Project

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Abstract The success or failure of any new projects depends on its fitness with the location. This concept paper will highlight the importance of the socioeconomic indicators adapted from the SFA Model for OTEC (Ocean Thermal Energy Conversion) Transformation Project (OTEC TP). Based on the literature reviews, this paper will propose the research framework that enables to investigate the relationship between three main variables which are; the Suitability, Feasibility and Acceptability of the project by the local communities. It will enable further research on how and to what extent the proposed economic activities will affect and be shaped by the social processes.
Keywords OTEC, SFA Model, Suitability, Feasibility and Acceptability.

1 Introduction

OTEC stand for Ocean Thermal Energy Conversion that works by using the temperature gradients found in large bodies of water, where the temperature of water found on the surface is significantly higher than the cold water found deeper down. In gaining the technology development momentum, the largest experimental OTEC was planted 1000 meters below the surface in Hawaiian (Makai's Plant) near freezing water by using the warm ocean water to pull from the surface and fed into a heat exchanger, where it vaporizes a low-boiling- point liquid such as ammonia. Apparently, the vapor causes a turbine to create electricity and the cold ocean water is drawn from the deep. Then it is used to condense the ammonia back into liquid to complete the loop cycle [2]. Basically, OTEC Transformation Project (OTEC TP) has been acknowledged by the Malaysian Government as one of the priority growth areas. Based on the current scarcity issues of energy supply that relies on coal and natural gas, Malaysia need a new renewable energy to support the future demand of power energy.

Since OTEC has never been exist in Malaysia, this research is significant because it can demonstrate the linkage of the project's spill over impact to the local communities. Johnson, G. et al. [1], suggested that the evaluation of the critical success areas is crucial to ensure that the success or failure of any new projects; that are highly depends on its fitness with the location. Government policies plays a vital role to stimulate innovation in energy efficient technology development and implementation. Grubb, M. et al. [3], found out that excellent policies are not enough to induce greater innovation. The effect of the energy policies will apparent only in the long run in a complex environment, that requires learning-by-doing process for the firms to understand the scope and potential for new energy-efficient technology.

2 Research Problems and Objectives

The purpose of OTEC is to provide a new alternative solution for a country to redesign its renewable energy supply by looking into the latest available power technologies. Nevertheless, it will be a big waste for a country if its end up with failure prior to, during or after it has been implemented. The most crucial part is to ensure that even if before the new project start, the detail analysis should be conducted to investigate the potential success of the new technologies.

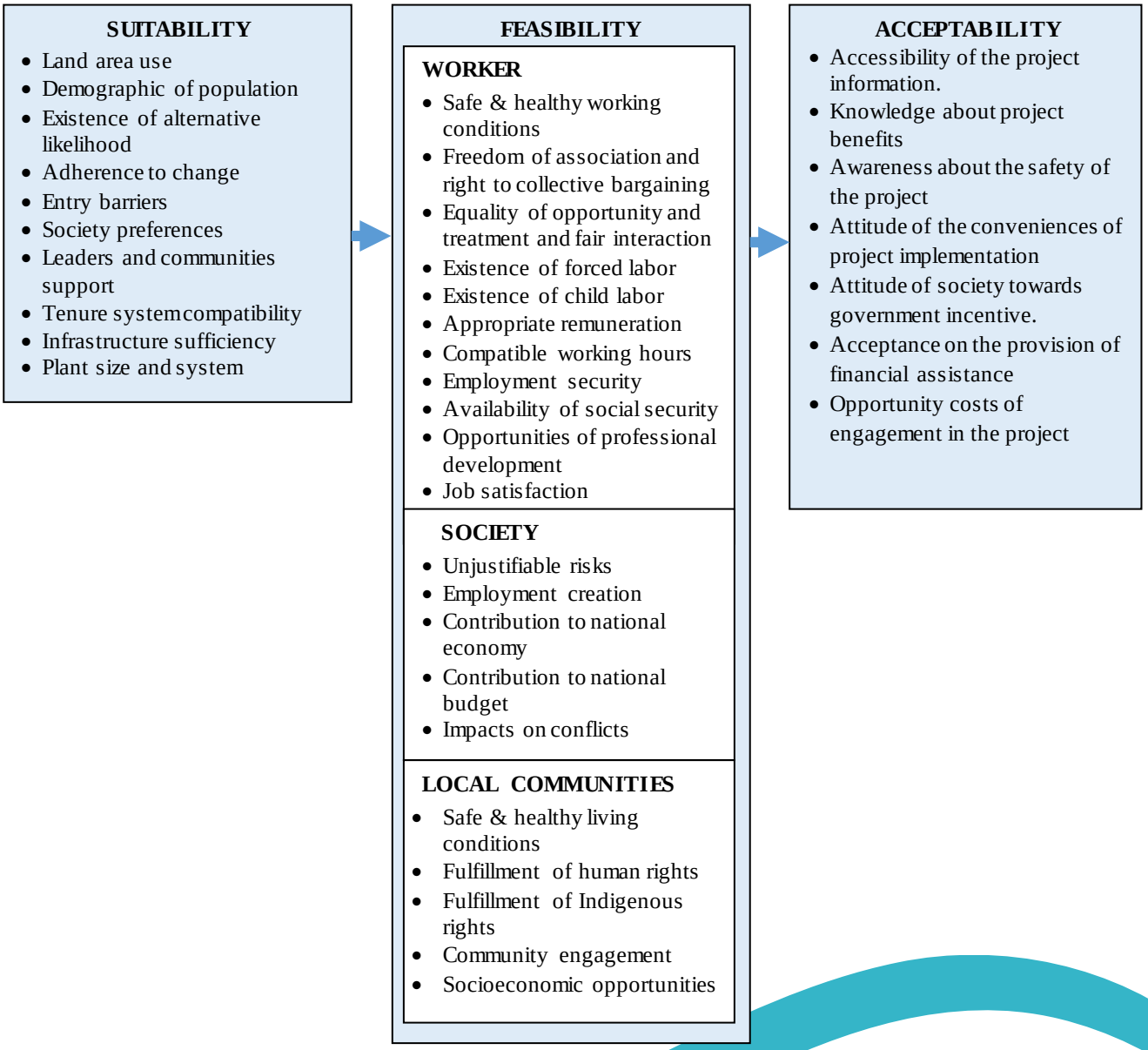
Therefore, this paper is meant to provide a conceptual framework that consists of three important indicators in evaluating the potential success or failure of new projects. Those indicators are known as the Feasibility, Suitability and Acceptability that will contribute to the potential development of OTEC Transformation Project (OTEC TP).

3 Research Theoretical Framework

Research theoretical framework in Diagram 1 is based on the SFA Model by [1] that consist of the Suitability, Feasibility and Acceptability that can be used to evaluate a new potential even before the project started. This will enable the stakeholders to understand the potential outcomes of their investment on the projects; especially if the project is ready to kick start as plan.

Table 1: Research Theoretical Framework for Socioeconomic Study of the Suitability, Feasibility and Acceptability of OTEC Transformation Project (OTEC TP)

[Adapted from: Namudu, M. T.& Pickering, T. D. (2006); Lingjun, Luo Zong, HeYan, Hu, (2008); Prakash, Siddharth, (2010); Barthwal, Sunil Chandola-Barthwal, Shivani Goyal, Hemant Nirmani, Bhanu Awasthi, Bhawana, 2014; Wu, T,(2010)]



4 Literature Review

According to Johnson and Scholes [4] it is very important to investigate on the suitability, feasibility and acceptability of any decision made by companies when dealing with any project management. Therefore, for the OTEC TP in Malaysia, there is a need to study on these three important aspects to ensure the success of the project for the local society and the nation as a whole. For purposes of this research, the conceptual framework based on the SFA Model by [1] that already incorporate the previous scholars' theories.

4.1 Suitability

Suitability is concern about the circumstances in which the new projects operate. When any new project is in the pipeline, first and foremost, the investigation is compulsory to look into the suitability; that is if the project if compatible with the location selected and socioeconomic situation of the people. Based on Lingjun, L. et al. [5] Indicate that suitability of lands usage and infrastructure system in the various industries can become the trade-off for development of society and the global environment

Suitability means that the thorough understanding on the aspects of suitability of land area use, demographic of population in the project area that includes age, gender, income and others, the existence of alternative likelihood towards the new project, society adherence to change, any entry barriers in engaging in the project, society preferences on the types of project, leaders and communities support, tenure system compatibility in relation to the project, infrastructure sufficiency such as roads and transportation and also the plant size and system us by the new plants under the project [6][5].

Previous study on technology and demographic of population indicates that countries that has lower rates of adult population growth tend to quickly adopt new capital related technologies quicker for better output per adult [7]. Major technologies producers such as China exports large shares of the country's renewable energy to high income countries. The exporters gain tax incentives and demand side support from the government renewable energy policies [8]. Therefore, the suitability aspects of the OTEC project is critical to ensure that the new project will operate in conducive situation.

4.2 Feasibility

Feasibility is concern on whether the project can strategically works in practice. Feasibility evaluation will covers on how the project will generate any positive impact on the socioeconomics such as income, safety and life conditions of the people and many more through the investment. According to Prakash. S [9], feasibility study must covers three components of the socioeconomics aspects. Firstly, for the workers, the important indicators are the safe & healthy working conditions, freedom of association and right to collective bargaining, equality of opportunity and treatment and fair interaction, existence of forced labour, existence of child labour, appropriate remuneration, compatible working hours, employment security, availability of social security, opportunities of professional development and job satisfaction.

Secondly, for the society, the important indicators are unjustifiable risks, employment creation, contribution to national economy, contribution to national budget and also impacts on conflicts that occur due to new project.

Thirdly, for the local communities, the important indicators are; safe and healthy living conditions, fulfilment of human rights, fulfilment of Indigenous rights, community engagement and socioeconomic opportunities that occurs from the new project. As a result, the analysis on OTEC feasibility will enable the success of its future implementation.

4.3 Acceptability

Acceptability is concern about the project risks and performance outcomes that are highly related to the expectations of all project stakeholders. Any new project must consider the acceptability especially from the local community to ensure the success of the project. Acceptability means that the people and all parties are able to access the project information, have the knowledge about project benefits, aware about the safety of the project, have positive attitude of the conveniences of project implementation and

government incentive, have good acceptance on the provision of financial assistance and alert on the opportunity costs of engagement directly or indirectly in the project itself [10]. Hence, the high acceptability of new OTEC project will reduce the risks of its investments.

5 Conclusion

To conclude, a new power technology project such as OTEC that requires huge investment by a country's government and other stakeholders need to be carefully evaluated to ensure that it will be successful. The Suitability of the new projects will indicate its appropriateness with the selected location; the Feasibility will access the success of its implementation; while the Acceptability will indicate the risks of the project investments. All these information is crucial to enable the effective design of successful strategic planning for the new project.

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An Environmental Accounting Impact towards Corporate Innovation: Review

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Abstract This study focus on the Environmental Management Accounting (EMA) impact towards the innovation in the corporate practice. From the perspective of the accounting the EMA had improved the efficiency of corporate planning and strategy, however from the perspective of corporate innovation and creativity it indicates different outcome and performance. This paper evaluates the impact of the EMA towards organization innovations.
Keywords Environmental Management Accounting, Innovation, Performance, Strategy, Planning.

1 Introduction

As a developing zone of research, environmental management accounting (EMA) need accepted generally minimal consideration starting with accounting analysts. There need been a percentage case- based analyze that examines those significance and reductions from actualizing EMA frameworks clinched alongside a particular organizations in the nation alternately industry[1] [2] [3][4]. Furthermore on outlining a general natural management framework that can a chance to be utilized toward organizations [5]. However, there may be set academic look into that endeavors on whichever investigate EMA observationally concentrate on its possibility impacts on inner procedures and decisions inside organizations, for example, such that those improvements about innovations. With a developing attention to natural issues, principally concerning illustration an item of the right way by acknowledged worldwide warming phenomenon, there may be a need to this sort of research which help organizations previously, connection to asset allotment and decision making.

Innovation is essential to vast majority organizations. Same time the reductions emerging from innovations might be well documented, those part of sustainability related bookkeeping frameworks such similarly as EMA. A driver for innovations inside organizations remains generally unexplored. This consider both item and methodology innovations would recognize organizational powers behind EMA utilize speaks to in the hole on accounting research specifically the part of organizational technique. Therefore, two research inquiries are addressed: “Does EMA use prompt innovations inside organizations?” and, second, “What will be the part of method for connection to EMA use and innovation?” A prospector-type system may be likewise found to need an impact for transform improvement through those duties about assets to innovative work (R&D). However, no such impact is discovered in result of improvement. Investigation indicates that technique is not a precursor for EMA use, which will be found to be fundamentally determined toward industry. This contemplate includes of the expositive expression toward giving work to cross-sectional confirmation of the organizations between strategy, EMA use and innovation. An extra commitment of the current ponder may be will measure observationally which profits of EMA used which observed on making a large portion noteworthy for

organizations, consequently accepting the observed commitments from claiming EMA towards different organizational decision.

2 Environmental Management Accounting

Sustainability accounting could make showed for organizations through improvement of routine accounting systems, including oversee economy accounting frameworks [6]. EMA is a prime instance of a later improvement done management bookkeeping that speaks to this improvement. Reasonable advancement need progressively ended up and only the destinations from claiming a large number organizations, prompting more excellent reception and utilization of EMA frameworks [7]. EMA constitutes a critical piece about manageability bookkeeping [6]. Also will be a critical instrument flying for organizations that point "to minimize the downright costs or ecological expenses and relieve the natural effect for their activities, results and services" [8].

Past investigations have defined EMA is a system that generates, analyses, employments both financial and non-financial information on enhance the environmental and budgetary execution of a company and contributes towards an economic benefits of the business [2][9]. EMA might assistance organizations face their natural responsibilities and could prompt the ID number for joint natural and budgetary reductions from corporate exercises [5][10]. Furthermore, EMA expects to furnish physical majority of the data on the utilization of materials, vitality and fiscal data ahead environment-related costs, income and reserve funds [11][9][12][13][14]. Different physical parts for EMA incorporate item life-cycle assessment, item change analysis, result stock investigation and ascertaining the carbon foot shaped impression about an organizations. IFAC (2005) [13] reports that organizations utilizing EMA would probable with behavior more broad examination and outline exercises for handling naturally cordial results and creating strategies to upsetting of the surroundings. It will be additionally liable that the individuals in organizations will use item life-cycle systems, which push the ID number of opportunities to get natural upgrades [12].

In looking for accomplish manageable polishes and eco-efficiency, organizations are headed to create new results and should move forward existing forms within request to decrease their utilization of assets and the natural harm initiated eventually perusing their exercises. Previously, different words, organizations would oblige on advance. Innovation may be viewed as a chance to be a paramount part for a large portion organizations as it might prompt an aggressive preference [15]. Proof reveals that organizations for more terrific accentuation with respect to a business model. In light of innovation have faster working edge growth and higher bargains growth [16][17]. Ferrari and Parker (2006)[16] also figure out that manufacturing organizations, procedure improvement assumes a paramount part clinched alongside looking after focused advantage. Likewise it will be large way calculate in securing long haul gainful growth. Innovations could be conceptualized to different ways and both result including methodology innovations would be recognized. At the same time, result improvement might fuse critical transforms to existing results alternately those formations about new products, procedure improvement acknowledges noteworthy progressions of the inside preparation forms.

Organizations that seek after an analyzer system would hostility over the individuals pursing a Miller's technique in any case need aid. The more combative over the individuals pursing a shield system on item innovation. They keep up a stable build for items and administrations also move specifically under new regions of the showcase for exhibited guarantee. Finally, organizations seeking after a reactor strategy need a reliable strategy-structure relationship, changing their operations and methodologies when there will be a weight starting with the outer surroundings on the need to recognized will have a chance to be a flimsy type of organization [18][19].

2.1 Benefits of EMA

There are a few possibilities connected with EMA utilization. These incorporate cost reductions, improved product pricing, fascination of human resource and reputational upgrades [9][5][20][21][12]. Investigations also note that the utilization for EMA in organizations will be benefited with different data for decision making [22][9][5]. Such data might uncovered hidden opportunities, for example, such that better waste management process, energy reduction and material utilization or chances for material recycle. From the ecological viewpoint this data might be used within the improvement towards innovation. Furthermore, prompt improvement instance, Hansen and Mowen (2005) [12] reporting those financial reductions reveled in perusing organizations, for example Baxter global and interface incorporations from EMA utilize created reserve funds about roughly $14 million and $12 million for every year, separately.

There may be a proof that an environmental costs could make 20 percentage alternately a greater amount of organization's aggregate operating cost [23][24]. Besides, accepted accounting systems, environmental cost generally concealed in manufacturing overhead costs [5], which makes it challenging to administrators to see the genuine natural costs identified with their specific exercises. Under EMA systems, these costs need to identified, arranged and allocated, permitting for driven expenses analysis and could reasonably be expected expenses degenerations will happen [9][21]. Hence, investment profits are prone will stream from better information in decision making. Adams (2002) [25] figures that organizations with social information (i.e manageability reports) have the ability to create better inside control systems and prompt better decision making. Additionally, recommends that cost-savings need probable will happen over these organizations, bringing on continuous improvement.

Improved corporate image and better relations with stakeholders encountered by organizations utilizing EMA [22]. The changes imposed in organizational standing might emerge starting with citizenship towards producing environmental friendly products. Organizations might additionally lessen the dangers of purchaser boycotts eventually perusing giving understanding on social and environmental issues [25]. Environmental data empowers stakeholders to assess the ecological accomplishment with chances for the organizations practice. Recognizing couple of organizations give acceptable such information, the individuals that do have a tendency on experience upgrades for their reputation, which will be interpret under progressed competitive advantage [25][26].

3 EMA and Corporate Innovation

3.1Strategy and EMA use

EMA utilization over an organization should be liable a chance to be impacted by its business strategy. Management control systems (MCS) guarantee that supervisors utilize the accessible assets successfully and proficiently in the quest for the destinations of the organization [27]. Thus, MCS that would outline with meeting the necessities of the organization help towards accomplishing extraordinary execution [28][29][29]. Benefits of the business strategies, distinguish those methods by which the organization means should accomplish organizational goals, otherwise it is determinants in the setup of the MCS [30][30][31]. However, EMA is a procedure that emphasizes effectiveness on what's more adequacy in the utilization of assets and the extensive of MCS. After all, though methodology may be a determinant about MCS, it may be inclined which impact from EMA. Gosselin (1997) [32] figures that a prospector strategy may be connected with the activity management. He claiming on method taken after by an organization determines the advancement with views of activity management. Furthermore, observes organizations that seek after a prospector strategy have a tendency implementing accounting innovations. Those generally promptly stage for selection also execution of EMA and the certainty, it will be reasonably late phenomenon and

helps the perspective from claiming EMA concerning illustration a sample of an accounting innovation. Thus, the utilization of EMA is likely on be more terrific on organizations seeking after a prospector strategy similarly as it might help them for their point about being inventive [32].

3.2 EMA use and innovation

Due to those determined returns of EMA use, organizations would likely to seek after this technique, likewise not only the MCS also concerning method for looking after or upgrading their focal point. It can be attained through Innovation. Innovation is a chance to be characterized similarly as the reception for new systems, policies, programs, processes, products or services, which could make internally or externally produced [33][34][35]. Towards claiming those refinements between product and process innovation, Utterback and Abernathy (1975) [36], recommend that, the rates about reception for product also transform innovations will be different throughout different phases for benefits of the business improvement. Product and process improvement regularly adjunct one another embraced alongside serving organizations on expanding the profitability [37]. Additionally, product and process elasticity capability on modifications of product and production methods impact organizational expenses. As an outcome of financing, there may be frequently an exchange-off between methodology and item adaptability that rebuts the assumption, ventures in both item and transform adaptability. [38][39]. Studies highlights that organizations with better social and environmental compliance develop better control frameworks thereby bringing on excellent judgment making processes [22]. The new fresh input sways improvement for new products, that's only the tip of the iceberg propelled innovative strife and moved forward expense structures. For other words, EMA utilization is inclined on a chance to be connected with both result and methodology innovation and might subsequently move forward those focused position of organizations. Those after effect may be comparable to that noted for activity-based costing, a techniques on giving a board to oversee the economy for extra and more exact costing data [40] that can be prompt an increment in the number for process improvement [41].

3.3 Strategy and innovation

Organisational strategy commonly determines those different pressure that organizations spot on item and transformation innovations done accomplishing their focused preference [42]. Cozzarin and Percival (2006)[43] find that advancement complements numerous organizational strategies, same time others note that methodology is a precursor of the stress that organizations looking into result and procedure improvement [42]. A few investigations find organization the middle of way components for method and business surroundings [44][45]. Miller (1988) [46] figures organization a capricious and a changing on natural domain and advancement methodology. When natural ground may generally determined toward evolving customer requests and level for market fascination there may be more astonishing for organizations to create a plan that puts the customer needs intact, such as the inventing of new products [47][48]. Organisations that take after an approach to be the pioneer in the market, indeed with full exertions not all would be lasting with great [18]. These organisation also will react quickly on signs from business sector necessities. Therefore, the more excellent those accentuations to be pioneered in the market, the higher expected of product innovation.

4 Conclusion

EMA utilization improving organization with perceive those environmental impacts of their operational exercises. A few instance investigations framework that the profits identified with EMA utilize [9][49][20][21][12]. This study engages cross-sectional information which examine the impact for EMA use on both product and process innovation. Those part of system is explored and incorporates those regulate impacts about system with respect to EMA utilize and regulate.

Furthermore, indirect impacts of method with respect to advancement are not similarly as solid as expected. Probable that EMA use need a certain impact on innovation. Hence the outcomes infer that innovation is a possible emerging from EMA used could change the degree which an organization enchants over innovation. The effects likewise recommended that EMA use is not driven by organizational size, and hint at that organizations starting with chemical, mining and smelting commercial enterprises are less averse on be clients for EMA over every last bit and different organizations acknowledged in the study. Instead, an impact about technique ahead process innovation may be uncovered through the promise with R&D activities.

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Theme 3:

Internet of Things, Big Data and Business Analytics

Decision Support Systems (DSS) Capabilities and Competencies Impact on Firm Performance: A Mediating Role of Absorptive Capacity

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Abstract The study provides an in-depth analysis of the management information systems and how it affects performance. The paper highlights the position of Decision support systems (DSS) for performance of corporations. The outcomes of the current paper provide different managerial outcomes for practitioners, business people and executives. Based on the fully accepted hypothesis of the study, it can be stated that DSS can play important role in supporting the role of various capabilities. Namely, there is a positive impact of DSS Support for Market-Access Competency on absorptive capacity. There is a positive impact of DSS Support for Market-Access Competency on absorptive capacity. There is a positive impact of DSS Support for Integrity-Related Competency on absorptive capacity. There is a positive impact of DSS Support for Functionality-Related Competency on absorptive capacity. There is a positive impact of absorptive capacity on operating firm performance. There is a positive impact of absorptive capacity on market-based firm performance. From these supported relationships, we can discover the critical importance of absorptive capacity and how it can be used to improve firm performance in relation to DSS capabilities.

Keywords Decision support systems (DSS), decision support system capabilities, firm performance, firm absorptive capacity

1 Introduction

Decision support system is regarded as computer- based information system that supports business or organizational decision-making activities. The practices of Decision support systems can be observed in different business spheres including in sales trends, to identify actual and planned sales and measuring employee productivity. Focusing on the benefits of DSS, it can be mentioned that due to the reduced time spent on the decision-making process, employee productivity can be significantly improved. Usage of DSS also enhances the quality of decisions made by business managers. Another great benefit of DSS is that can serve as an important competitive advantage for the firm, hotel or travel agency, which cannot be easy, copied by competitors due to its complex integration with information system capabilities. Decision support system is also regarded to be useful in maintaining increased organizational control, which provides on time information (Jorgenson, 1989). Corporate operations and decision-making in firm is widely based on information that has been provided or generated by individual and specific IT systems. Such systems are used to collect, harvest, organize, and generate an output that would back up fast and sound business decision. Firms adopt new management techniques and systems with the purpose of enhancing the decision-making processes, improve results and minimize output costs (Henry and Mayle, 2003; AlMaryani and Sadik, 2012). Consequently, this is a way to enhance company operation effectiveness. In this research, we postulate a question whether DSS implementation affects corporate performance and how. To answer these questions, we utilize present theories that enable us to connect DSS concept to corporate performance. We discuss current studies and use existing methods to elaborate this relationship. The aim of this study is to investigate the current DSS and develop the most practical and useable management information systems. In this study, we posit following questions: Does DSS implementation impact corporate performance? How does DSS use impact corporate performance? To

answer these questions, we utilize present theories that enable us to connect the DSS concept to corporate performance.

2 Literature Review

Modern companies and the majority of business activities are strongly dependent on technology use and information systems (IS). According to Prahalad and Hamel (2006), companies can be more open and integrated to different markets by help of operating systems. Bharadwaj (2000) suggested that there is a positive impact of information systems on companies performance, financial results, supply-chain management, and customer satisfaction. Despite the fact that not all companies are utilizing IS, in foreseeable future, the integration and collaboration of decision-making processes are likely to be combined with the modern technologies, such as Decision Support Systems (DSS). Referring to Leonardi and Bailey (2008), DSS can be considered as formal systems for the provision of timely and suitable information to managers to take important decisions. Moreover, DSS can provide and collect information inside and outside the enterprise (Baccarini, 1999). According to Gray (2000), DSS has the main purpose – timely provision of correct and useful information to executives or managers. Eierman et al. (1995) stated that DSS capability was approved to be one the most important predictors of the performance. DSS or MIS are used as a basis for making important decisions and plans (Jorgenson, 1989). Management information systems take care of planning and control (Leonardi and Bailey, 2008). Each company or organization, to function properly, must be able to execute particular operations, "whether it is a wholesaler or car manufacturer or who has to provide water to its area of jurisdiction" (Wu and Lee, 2007). MIS changes the bigger amount of data into compiled form and thereby avoids the possible ambiguity that may arise when managers are swamped with detailed facts (Ryals, 2005). According to Bousset et al. (2007), the operating of any enterprise is based on the strategies and orders of managers as well as the institutional infrastructures. MIS is successfully used for measuring company performance and making a necessary change in the organizational plans and procedures (Pfeffer and Sutton, 2000). Moreover, according to the study conducted by (Naranjo-Gil 2009), DSS has an influence on flexibility-based strategic performance and cost-based strategic performance, taking into account the decentralization of responsibilities, updating customer knowledge and customer participation in management, the cooperation with other units with the scope of increasing the firm budget, and actualization and use of management information (Slotegraaf and Pauwels, 2008). Referring to Dopuch (1993), systems for decision-making should provide appropriate information to managers for taking right decisions and thus, improving the firm's financial performance. Moreover, referring to Cooper and Kaplan (1992), the main goal of DSS should be to enhance overall financial performance, but not to obtain more precise costs. Firms utilize innovation to obtain advantages that indirectly or directly impact economic performance indicators (Cagwin and Bouwman, 2002); or the primary objective of management information systems is to improve and enhance the potential role of the system in improving the firm's overall financial performance (Ranganathan and Kannabiran, 2004). Cohen and Olsen (2013), emphasized information systems and human resources contribute to firm performance.

3 Research model development

3.1 DSS functional capabilities

In our research, DSS capability is defined as the ability to receive positive results in getting firm and profit performance by help of DSS. Ravichandran and Lertwongsatien (2002) proposed that IS functional capabilities play the important role to reach high firm performance since core competencies are directly related to IT development. Thus, in our study, we also use core competencies, described by Hamel. Core competencies were implemented in the research model. We considered the capabilities of DSS to support main capabilities of companies. Therefore, relationships were expressed with three

particular hypotheses:
H1.1: There is a positive impact of DSS functional capabilities on DSS Support for Market-Access Competency
H1.2: There is a positive impact of DSS functional capabilities on. DSS Support for Integrity-Related Competency
H1.3: There is a positive impact of DSS functional capabilities on DSS Support for Functionality-Related Competency

3.2 IS resources

The current research reveals DSS resources as the basis for DSS capability development. This relationship has been understood in the definition of capabilities which involves organizations ability to arrange and make efficient use of resources. The relationship between resources and capabilities can be clearly seen in active capabilities viewpoint, positions of the asset are found to have an influence on the development of capability. Based on these arguments, the study proposed a direct positive relationship between IS resources and IS capabilities. IS literature provides three important categories of resources including human, technological and relationship resources.

3.3 Absorptive capacity

Cohen and Levinthal (1990) revealed a new concept, named absorptive capacity, which emphasizes the importance of information and its usage during the process of planning.
H2.1. There is a positive impact of DSS Support for Market-Access Competency on absorptive capacity
H2.2. There is a positive impact of DSS Support for Integrity-Related Competency on absorptive capacity
H2.3. There is a positive impact of DSS Support for Functionality-Related Competency on absorptive capacity

3.4 Firm performance

Tallon and Pinsonneault (2011) together with Bharadwaj (2000) used the combine indicator consisting mostly of financial metrics. In our study, firm performance includes several components: operating performance and market-based performance. According to Bharadwaj (2000) operating performance depends on some characteristics of the company: the industry in which the firm is operating plays a crucial role.
H3.1: There is a positive impact of absorptive capacity on operating firm performance.
H3.2: There is a positive impact of absorptive capacity on market-based firm performance**.**
H4.1: The relationship between DSS support for core competencies and operating firm performance is mediated by absorptive capacity.
H4.2: The relationship between DSS support for core competencies and market-based firm performance is mediated by absorptive capacity.

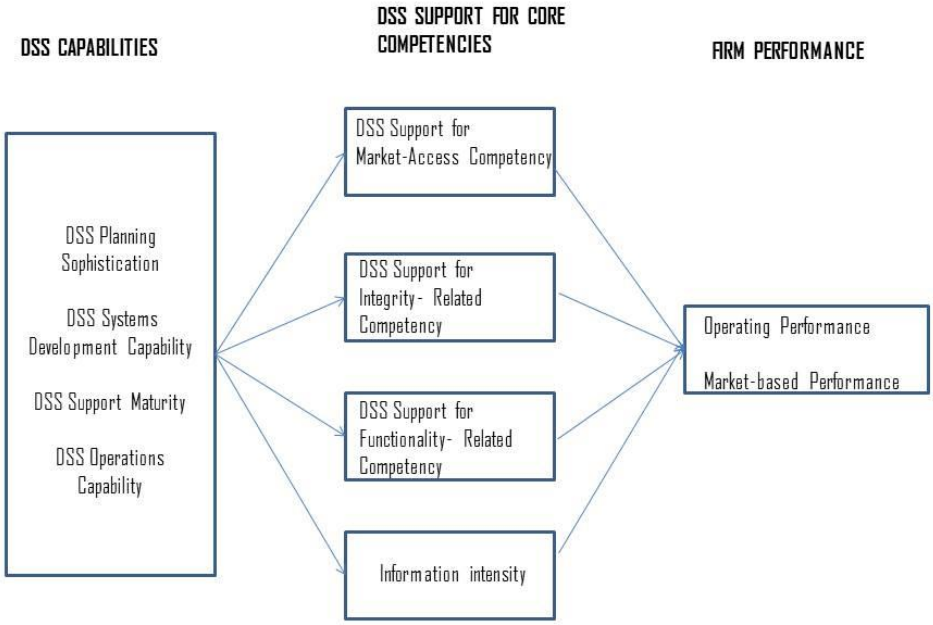

Figure 1 DSS capabilities – firm performance research model

4 Research methodology and results

An empirical study was conducted on a sample of 174 DSS users and experts from various companies across different industries. All the scales were adopted from prior studies. The data were collected using via online questionnaire and analyzed with SPSS statistical package. Multiple regression analysis was performed and the relationships between the variables of the model were tested. The analysis has shown that DSS planning sophistication is positively correlated with other variables. It has a strong positive associations with Market based performance, Operating performance and DSS support for market access competencies, R-value of these relationships is more than 0.45. There is a positive uphill linear relationship between DSS planning sophistication and Absorptive capacity (R=0.59). Positive uphill linear relationships of absorptive capability and Operating performances together with Market based performance are supported with corresponding correlation coefficients R=0.65 and 0.7. The difference between R-values, which demonstrates a strong positive correlation between Absorptive capacity and DSS support maturity along with System operation capability is only 0.02 (R=0.65 and R=0.67 respectively). Moreover, Market based performance is positively associated with Operating performance, which was chosen as the second measure for Firm performance. Thus, both Firm performance indicators are strongly correlated (R=0.8) Summarizing, all the correlations are significant and positive, which gives a good reason to proceed with further investigation of the relationships between chosen variables. In order to approve our theoretical assumption, we input our variables into regression models. In the first regression model in AMOS, we tested the relationship of DSS functional capabilities and DSS support for different competencies. Critical value of Systems development capability is 2.25 with p-value 0.03 and regression

weight 0.24. While System operation capability's one is even more (C.R.=3.83 and p=0.000). In the relationship between DSS functional capabilities and DSS support for integrity related competencies, only DSS planning sophistication do not influence on the dependent variable. According to the data received, Systems operations capability and Systems development capability significantly impact on DSS support for functionality related competencies. P-value of both of them is less than 0.005, while B=0.31 and 0.51. Interestingly, that DSS planning sophistication is the only variable, which did not prove to be a regressor of DSS support competencies. Due to the fact that we study the relationship between Absorptive capacity and Firm performance, which is presented with two variables, there are only regression relationships. According to the table 38-39, Absorptive capacity is a significant predictor in both cases. The ability to utilize new information has significant influence on Operating performance (B=0.72). This can be clearly seen by help of p-value (0.000) and critical ratio (11.1). Meanwhile, these indicators (p=0.000, B=0.86) also demonstrates the impact of Absorptive capacity on Market based performance.

Table 1 The mediating effect of absorptive capacity

			Estimate	S.E.	C.R.
Absorptive_capacity	<---	DSS_support_for_marketaccess_competencies	.251***	.065	3.838
Absorptive_capacity	<---	DSS_support_for_integrity_related_competencies	.295***	.075	3.965
Absorptive_capacity	<---	DSS_support_for_functionality_related_competencies	.165*	.070	2.363
Operating_performance	<---	Absorptive_capacity	.723***	.065	11.101
Market_based_performance	<---	Absorptive_capacity	.860***	.066	12.972

* $p<.05$
** $p<.01$
*** $p<.001$

5 Discussion and implications of the study

The critical role of DSS and its implications cannot exist and develop without proper progress of information technologies. The current research found positive relationship between the impacts of DSS support for market access competencies on absorptive capacity. Absorptive capacity is considered as the ability of recognizing the value of necessary information and sharing it with others, or disseminating it. This in turn indicates that high absorptive capacity or in other words, higher education, employee development and development of innovation is the key to success of the high firm performance. Integrity related competency is mainly considered with organization environment of the company. Precisely, the internal environment of the company can be considered as a base of absorptive capacity. When the operation of the human resource department, information technology and marketing departments are supported by the DSS, firm is expected to achieve high performance. Therefore, due to the difficulty and crucially of the decision making process, it is important to mention the necessity of the computer technologies which play important role in simplifying the process of decision making process. Judging

from the results obtained during the examination of the relationship between DSS and firm performance, key elements of these relationships can be used to explain a research model for current study. The results of the study were in the line with findings of other authors Brdesee et al. (2013), Eierman et al. (1995), Ravichandran et al. (2005), supporting the theory that DSS capabilities are considered as the system capacities that are used to maintain the individual or group work productivity. Following the path of research done by Inmyxai and Takahashi (2010), we found out that company's ability to use DSS to improve the core competencies is mainly related to the functional software capabilities. The strategic value of IS functional capabilities should also be paid a considerable amount of attention. Most of the researchers like Ravichandran (2002) propose that main IS activities should be done with the focus on cost reduction. In this regard, organizations using IT mainly believed to succeed in IT development in building these capabilities. Relatively slow implementation of modern DSS in Saudi Arabia can be explained by unclear results after DSS adoption. According to the study done by Webber and Gretzel (2000), sometimes, the complexity of the tasks and unclear usage of DSS can be the main obstacle for using DSS. As it was mentioned by Rahimi et al. (2016) companies which are using IS are not the only ones which are harvesting from this cooperation. Considering DSS capabilities, it is necessary to mention that many authors like Ravichandran et al. (2005), Eierman et al. (1995) and Feeny and Willcocks (1998) tried to describe the constructs and capabilities of DSS capabilities. During the analysis of relationship between DSS functional capabilities and DSS Support for company competencies, it was revealed that DSS planning sophistication is the only variable, which did not approve to be a predictor in the relationship with DSS Support form company competencies. Planning is tightly related to the strategy and business goals of the company. Taking the strategy as a basis, the company can formulate further steps in form of written strategic plan. In this regard, referring Cooper and Kaplan (1992), DSS planning is important, however according to the results of our study, DSS planning sophistication should be considered together with the strategy of the company. Ping, G. (2011) also emphasized the role of DSS accordance with the strategy and goals of the company. However, he also mentioned that strategic planning in DSS is only developing in Saudi Arabia. Despite that majority of organizations are trying to enhance their firm performance, managers can undertake different risks; adjust the goals of the company at certain stage of its development (Wijewardena et al., 2004). As a result, DSS planning sophistication is not always oriented to the improve firm performance. Nowadays, synthesis between IT and business is the necessity to follow the trends and changes in the world market as well as local. However, referring to Rahimi et al. (2016), human management and employees and managers involvement is not of less importance. Thus, managers as well as other representatives of human resource of the enterprise are the most important figures, which understand the complete mission of the company. According to Kivijärvi and Saarinen (1995) the type of strategies has crucial importance for financial performance of a company. The influence of DSS support maturity was also unstable. DSS support maturity is an indicator describing the sensibility of DSS to any adjustments in the planning. Owing to the fact that the development of DSS is only at the early stage in Saudi Arabia, it is possible that DSS support maturity is lagging behind. The disparity of DSS functional capabilities and DSS support for companies competencies can result in low significance of DSS support maturity. Furthermore, due to the fact current study is mostly focusing on the developing country – Saudi Arabia, the modest integration can be explained by the economic environment of the country. Peng et al. (2016) emphasized that companies in economically stable countries with high-level of life are tend to use the advantages of the IT in business. In addition, referring to Cerpa and Verner (1998), this indicator is highly correlated with the strategy of the company. Hence, similarly with DSS planning sophistication, the revealing of primary goals as well as concrete strategic plan is essential. The relationship between DSS support for core competencies and Absorptive capacity, all three hypotheses were supported with the empirical evidence. In virtue of the main feature of Absorptive capacity is the ability to use the data, the utility of data is dependent on its importance. The higher importance, the more better it can be utilized or adopted. Based on the results obtained during testing the influence of Absorptive

capacity on the firm performance, we can state that Absorptive capacity is one of the most essential attribute of the company. Moreover, as the firm performance was presented by two elements – Market based and Operating firm performances, absorptive capacity is a significant regressor in both cases. Judging from the results obtained by Rai et al. (2015), IT is the key component for an interfirm integration capability of the company.

6 Conclusion

Current paper provides useful insights into the concepts of MIS and particularly DSS. The in depth analysis of MIS and DSS were provided in order to identify their significance in relation to organizational outcomes. Moreover, the current research outlined the importance of different firm related competencies and capabilities that should be differentiated. The findings of the study can be considered even more important in the period where the most of the companies are making the best use of IT and management information systems. The information contained in DSS is considered to be secure and reliable. Decision support systems is analysed in three different dimensions whereas most of the previous studies used only the one dimension in order to analyze it. Furthermore, the last but not the least, positive impact of DSS support for functionality related competency on absorptive capacity have been found. Future studies may focus on drawback research as well as on the empirical study of DSS benefits, which have a huge influence and role

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Theme 4:

Banking and Islamic Finance, Corporate Finance

Islamic Finance in Australia: Require Level Playing Field

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Abstract This research paper assesses current taxation treatment of Islamic Finance products in Australia. The key difference between conventional and Islamic finance products is that it is demanded that the latter are free of riba or interest. In addition, there are numerous other credentials that should be fulfilled before an Islamic finance product is regarded as Sharia compliant. But Australia needs to introduce regulatory simplicity and to guarantee a level playing field to convert it into a lucrative Islamic financial investment hub in this part of world. Although the local investment banks have been assertive in the feasibility of an Islamic wholesale market, additional progress depends on the wider political atmosphere, more professional opinions from relevant scholars, including Islamic finance researchers and not just the willingness of Australian regulatory officials. More knowledgeable responses on the efforts of Australian government, like 'Johnson Report' as well as the discussion paper of the Board of Taxation, should be scrutinized to construct a feasible level playing field for Islamic financial sector in near future.
Keywords Islamic finance; Regulatory framework; Australian tax

1 Introduction

In recent years Islamic finance has been experiencing exponential growth and it is considered as one of the fastest growing segments of the global financial services industry. This industry has been growing at over 10 per cent per annum over the last 10 years and this trend is expected to continue in the coming days. The current size of the Islamic finance market ranges from $1.66 Trillion to $2.1 Trillion with expectations of market size to be $3.4 Trillion by end of 2018. O'Brien (2012) cites a 2011 Ernst & Young (EY) statement which remarks that Islamic finance offers capital prospects, claims that the basis for the growth of Islamic finance is comparatively direct. It says: "Islamic instruments have been more resilient than many conventional instruments during the global financial crisis, and they are likely to see growing demand from an increasingly wealthy group of Muslim investors".

Currently, the Middle East and South East Asia are the primary locations for Islamic capital. In particular, the United Arab Emirates, Bahrain and Malaysia are seen as the main centres of Islamic finance, with significant activity also taking place in the United Kingdom and more recently in Europe, Africa and Indonesia. Importantly, the demand for Islamic finance is not evident only in Muslim countries. Countries with minority Muslims also exhibit demand for Islamic finance products, especially for home loan and saving deposits.

Islamic finance has been available for last 1400 years. However, it was not practised explicitly even in the Muslim world because of lack of demand and awareness. In the modern world, Islamic finance has been emerged in 1970s and since then experienced phenomenal results and was established itself as an alternative to the conventional finance. Currently, Islamic finance is not only available in Muslim world; it has significance presence in non-Muslim countries. As Islamic finance has fundamental differences compared to traditional finance, it faces obstacles in the non-Muslim countries. For example, mortgage products under Islamic finance face double taxation problem. As many Islamic banking and financial contracts are treated as buying and selling properties and hence are taxed twice. It obviously creates disadvantage to Islamic finance products and therefore; it remains uncompetitive. Ahmad (2007) asserts that required Shariah law for the establishment of Islamic finance offers its own structure for the successful implementation of financial transactions and contracts. It is obvious that non-Muslim countries cannot directly arrange this Shariah-complaint framework to facilitate the implementation of Islamic finance.

However, these non-Muslim countries can organise required changes in their existing regulatory framework since Islamic finance receives equal treatment and as a result can be competitive. As Sain, Rahman and Khanam(2013) suggest that legal and regulatory framework is the basic elements for the establishment and successful operation of any financial system. Therefore, it has paramount importance for Australia to arrange appropriate regulatory framework if it needs to implement and sustain Islamic finance.

Australian Financial Centre Forum (2009) released its first report, called 'Johnson report', in November, 2009, commissioned by the Australian Government. The report identifies that Australia needs to remove some regulatory barriers to remain efficient and competitive financial sector in the Asia-Pacific region. The commission recognises the importance of the Islamic Finance in Australian context and acknowledges that Australia need to create level playing for Islamic Finance. The first Johnson Report makes two proposals on Islamic finance; the removal of regulatory barriers to the development of Islamic finance products, and a call for an inquiry by the Board of Taxation into whether Australian tax law needs to be amended to ensure that Islamic financial products have parity of treatment with conventional products. In 2010 the assistant Treasurer advised the Board of Taxation to identify the impediments in current Australian tax laws, to examine the tax policy response to the development of Islamic financial products in other countries and to make recommendations to Commonwealth and State tax laws. In this regard the Board develops some basic principles to create level playing field for Islamic finance: a) the tax treatment of Islamic financial products should be based on their economic substance rather than their form b) where an Islamic financial product is economically equivalent to a conventional product, the tax treatment of the two products should be the same and c) the Board should consider whether adjustments can be made to existing tax frameworks rather than the development of specific provisions directed solely at Islamic financial products. To complete the study, the Board of Taxation invited discussion papers from individuals and organizations. The Board has received 14 discussions papers and it made 13 submissions available to the public. In this research, we will evaluate these 13 submissions to understand the impediments in the current structure for the success of the Islamic finance in Australia and to identify the common recommendations. This research article will also address the available approaches to legal framework and will recommend the suitable one in Australian context.

The organization of the article is as follows: Section 2 addresses the situation of Islamic finance in Australia; Section 3 identifies available approaches to legal framework; Section 4 discusses on common impediments and recommendation to create level playing field for Islamic finance and Section 5 concludes the study.

2 Islamic Finance in Australia

Ahmad and Hassan (2009) mentions that Australia is making small inroads into this fast-growing segment in comprehensive finance, and with a rising Muslim population which makes up less than 2 percent of the population, it has the probability to become a major centre for Islamic banking and finance. The demand has been growing rapidly as Muslim population increases at a relatively higher rate. Moreover, Australia is in close proximity to a region where more than 60 percent of the world's Muslim population-with growing need for Islamic finance-resides. The potential for the Islamic finance industry is immense. Islamic banks are expected to manage about 40% to 50% of total savings of the Muslim population in eight to ten years. In spite of this opportunity and growing need for Islamic finance, there is little market response from the supply side. One of the main reasons would be to high borrowing costs. It is reported that one of the key aspects of Australia's economy is to reliance on foreign capital. In this case, various financial organizations can channel the off-shore funds to Australia by borrowing from oversees and lending to business and individuals. As Gulf region has access funds, there is immense opportunity for the Sariah compliant financial institutions to these funds to Australia. This would ultimately lower the

cost of capital. To ensure this funding, it has significant importance to create appropriate system and environment.

Australia's experience with Islamic financing has been relatively recent. The first attempt to introduce Islamic financing products in Australia was made by the Muslim Community Co-operative Australia (MCCA) (Ahmad, Osmani, & Karim, 2010). Currently, there are some organizations offer Shariah compliant products in Australia. However, their operations are at small scale and they offer very limited number of products. It is apparent that there is unmatched demand of Islamic finance, as few small scale organizations engage in supply side. As a result, the market is not competitive and many borrowers find the borrowing cost is significantly higher compared to the conventional financing. Lack of source of fund due to regulatory impediments is one of main factors for high borrowing cost.

3 Approaches to legal framework

An appropriate legal and regulatory framework is a basic requirement for establishing and operating a sound financial institutions and markets. Similar to the Common law and Civil law systems the *Shariah* offers its own framework for the implementation of commercial and financial contracts and transactions (Ahmad, 2007). However, Australia like many other countries do not have the appropriate financial, commercial and company laws to facilitate the implementation of Islamic finance and financial contracts. Without having appropriate legal framework, the Islamic finance industry would not be able to flourish. As Ghouse (2010) mentions, there are numerous significant aspects that are backing to a rising interest in Islamic finance, both within the business community and the government sector. Some of these contain the possible sourcing of capital from the Gulf Cooperation Council (GCC) and the welfares arising from the speedy progression in Islamic finance which is the fastest growing area in the global financial structure.

3.1. Total absorption approach

In a total absorption approach, a country can completely islamise its banking system. Under this approach, conventional banking will be replaced by Islamic banking system and therefore, shariah commercial law will replace conventional finance law. The main intention of this system is to abolish interest based system completely. Sudan and Iran have adopted this approach to islamise their banking system. It is obvious Australia cannot adopt this system because of its secular nature and also for economic and political reasons.

3.2. A Dual model approach

A dual model approach allows the operation of conventional banking and Islamic banking side by side. This approach recognises the integrative duality of financial systems in which finance exists parallel with conventional finance. The dual model approach represents a special case whereby a government regulated framework allows both conventional and Islamic banking systems to co-exist on an equal basis while competing and complementing each other at the same time. As total absorption approach requires complete departure from conventional banking system, it might not seem plausible for some countries to adopt this model. Malaysia sets an excellent example of embracing dual model approach allowing the existence of both systems simultaneously. Malaysia enacted Islamic Banking Act in 1983 for the establishment of its first Islamic bank (Bank Islam Malaysia Berhad). In regard to the success of adopting dual approach, Yackop (2003) states that Malaysia has taken the lead in championing dual banking to promote Islamic banking. This approach also might not feasible in Australia as only 2.5% of its population is Muslim and therefore; the market for Islamic banking would not be big enough for the success of the dual approach.

3.3. An integrative approach

An integrative approach is the minimal approach for the success of the operation of the Islamic banking alongside with conventional banking. As Islamic banking requires level playing field for making this system as productive and competitive as conventional banking, tax laws and financial regulations

should not be impediment for the Islamic banking system. The integrative approach allows the Islamic banking system to have seamless integration within a conventional banking structure by changing tax and financial regulations. The United Kingdom (UK) takes approach to accommodate Islamic banking. In 2001, the UK took initiative to examine and understand the barriers to adopting Islamic banking. Ainley, Mashayekhi, Hicks, Rahman and Ravalia (2007) prepared a report for Financial Services Authority (FSA) in the UK to identify the regulatory obstacles for the development Islamic finance. The FSA decided that its approach would be 'no obstacles, but no special favours'. This approach is equivalent to integrative approach as to remove regulatory obstacles and change tax laws to make Islamic finance competitive and sustainable. As financial, demographics and regulatory systems in Australia are comparable to the systems in the UK, the integrative system is considered as the suitable model for adopting Islamic finance in Australia.

4 Discussion on impediments and recommendations

To understand the potential barriers for the development of Islamic finance and to recommend appropriate way forward suggested by the first Johnson report in September 2008, the Australian government advised the Board of Taxation to carry out a study. In regard to Islamic finance, the Johnson report notes that accessing this market "could increase the diversity of sources of capital available to Australian business and consumers" (cited in Smith, 2010).

The focus of the report of the Board of Taxation was not to give any special treatment to Islamic finance, but to make sure there is a level playing field for the development of Islamic Finance in Australia. This work was undertaken by the Board of Taxation in 2010 and to do this the Board invited interested stakeholders and parties to provide comment on the review of the taxations treatment of Islamic finance (BoT, 2010). According to Moore (2013), the report was mainly based on recommendations in the 2010 Johnson Report which offered policy options to better position Australia as a financial centre. It was about ensuring a 'fair and level playing field' according to Parliamentary Secretary Bernie Ripoll, and to ensure that Islamic financial products had parity of tax treatment with conventional products.

The Board of Taxation received 14 responses including professional organizations like Chartered Public Accountants (CPA), Ernst and Young, and Australian Financial Market Associations (AFMA) and expert individuals. Some of the responses are comprehensive and there is significant similarity in some responses.

Table 1: List of the submissions to the Board of Taxation

Name	Type
Blake Dawson	Individual
Clark, David	Individual
Condon, Paul	Individual
CPA Australia	Organization
Crescent Investment Australasia	Organization
Department od NSW Treasury	Organization
Ernst and Young	Organization
Financial Services Council	Organization
Freudenberg and Nathie	Individual
Janson, Vickie	Individual
Norton Rose	Individual
MCCA Ltd	Organization
Taxation Institute of Australia	Organization

After analysing the submitted responses, we identify that all except two is positive about the inclusion of Islamic finance into conventional finance and most of them recommend some regulatory changes in area of tax as Islamic finance can be competitive. The first proposal is by David Clark, a member of the NSW Legislative Council on behalf of the Liberal Party of Australia, and a resilient activist of 'Christian Values' and the other is by Vickie Janson, the vice-president of Q Society, a group that opposes what it describes to be the 'Islamisation' of Australia (Bhatti, 2015). In that research Bhatti (2015) cites the notes of Clark as follows:

..the Board should not be relying on the 'Islamic economic system' as a basis of the review. This is not the system that the Islamic finance operates in and in partly why Islamic financial products must replicate conventional products. As Islamic finance operates in a conventional system and Islamic finance principles adapt to accommodate this system, in substance Islamic finance principles are conventional principles. Thus, the assumption that Islamic finance products are based on Islamic finance principles, operating in an Islamic economic system has no worth in a practical exercise to determine the appropriate tax treatment of Islamic finance products.

Bhatti (2015) mentions the comment of Clark as inconsistent as the Board does not depend on the Islamic economic structure as the foundation of its assessment. The proposal of Janson is identified as similar as Clark, but more confronting approach by Bhatti (2015):

..I would strongly recommend that the government reassess this commitment to sharia finance with its connections to Islamic groups, it's [sic] theological foundations and it's [sic] undermining of both western values and economy… It appears support for sharia finance is support for Islamic ideologies rather than the moderates who utilise conventional banking.

Janson also claims that the leaders in the Islamic finance industry, such as Usmani, have jihadist views. She is more concerned about the impact that Sharia products will have on 'Australian values' than with the provision of space for Islamic finance products in Australia (Bhatti, 2015).

According to Bhatti (2015), the Board of Taxation's discussion paper was published in late 2010 and no supplementary tax reforms have taken place since the issue of the Discussion Paper, while judicial modifications were made to accommodate for Islamic finance products in the United Kingdom as early as 2003.

In the following discussion, we explore the most common recommendations put forwarded by the professional bodies and individuals to create level playing field for the Islamic finance.

4.1 Economic vs legal interpretation in tax law

In developing tax law, there are two choices: economic substance approach and legal substance approach. To achieve neutrality in taxation law for Islamic finance, all the submissions to the Board of Taxation recommend using economic substance approach instead of legal substance approach. Although legal substance approach is simpler to use, it leads to anomalies and unexpected complexities. Importantly, legal substance approach would be disadvantages to develop appropriate tax laws for Islamic financial products. On the other hand, the economic substance approach is relatively complex to use, however; it can lead to greater tax neutrality. Under this approach, similar financial transactions are considered the same. For example, in Islamic finance, home loan is organised in different manner compared to traditional system. Current tax law considers arrangement of Islamic home loan not as a one transaction but as multiple transactions. As a result, taxes incurred multiple times for one event. This makes home loan under Islamic finance unattractive. To achieve greater neutrality in this type of situation, economic substance approach is considered suitable.

4.2 Double stamp taxation

As stated in the previous section, home products in Islamic finance face double stamp duty problem because of the nature of the transaction. The majority of submissions express the view that the States and Territories should address stamp duty through a targeted exemption approach. Targeted consultations further revealed that Islamic finance products involving dutiable assets would be unlikely to be provided without appropriate stamp duty relief. Importantly the Board of Taxation considers that addressing this issue is a priority in terms of achieving neutrality in tax treatment. Among all the states, Victorian stamp duty laws in 2004 have eliminated distinctions in treatment between Islamic and conventional finance products.

4.3 Debt-equity rules

Broadly, the debt/equity rules are important as they govern if the return on the finance instrument may be deductible to the issuer. The return is deductible in the case of debt interest and non-deductible in the case of equity interest. The outcome can have further implications under the thin capitalisation and withholding tax rules. Broadly, an instrument will be a debt interest where the issuer has an effectively non-contingent obligation to return at least the issue price of the instrument to the holder. Equity interests include ordinary shares and other instruments that provide an element of contingency on the issuer's obligation to return funds to the holder. For example, an instrument may be an equity interest if it carries a right to a return, which is in substance or effect contingent on the economic performance of the company.

4.4 Uncertainty of income tax issues

The uncertainty issue to the treatment of income tax of financial products in Islamic finance is disadvantageous. However, this issue is not identified by the most of the responses given to the Board of Taxation. However, we think in line with Australian Financial Market Association that there is clearly uncertainty as to the precise income tax treatment under current law of the various Shariah compliant financing techniques. Where uncertainty exists, it can reasonably be assumed to be a disincentive to Shariah compliant investments being made. It may be possible to resolve those uncertainties by seeking rulings from the Australian Taxation Office (ATO). Accordingly, the Professional Bodies consider that some legislative change is required to both remove uncertainty and to achieve parity of income tax treatment. The Professional Bodies consider it reasonable to expect that the Australian demand for capital provided via Shariah compliant financing techniques would be driven by financial sector and other large

business entities. These entities would be expected to already be subject to Division 230 of the ITAA 1997.

5 Conclusion

Islamic finance system can ensure an ethical financial arrangement available through the process as former Australian senator Nick Sherry says that these service companies are not allowed to charge interest rates and do not invest in gambling or alcohol because of shari'ah law. But he aptly doubts that the unlike ways of conducting business can sometimes put the Islamic finance centre at a disadvantage under Western tax code (BBC, 2010). This reality is explicable after observing the existing regulatory set-up of banking and finance in Australia. But as Farrar (2011) sates that this has not stopped the emergence of local operators who, by and large, have successfully navigated the existing system notwithstanding the penalising impact and effect of some of those regulations, especially in the area of taxation. Even in the nonexistence of any governmental or organizational modifications, local Islamic financial developers will remain to construct their financial products in such a way as to maximise their yields as well as to secure a halal return.

Progresses over a decade, however, show that thrust is emerging to accommodate Islamic Financial institutions through Australia. As Farrar (2011) states the legal proposal from various organisations and individual experts is particularly European in origin, similar to 'level playing field' approach of United kingdom. This may demonstrate to be an error in the long term as Australia is likely to become more dependent on the Asian economies. It should be obvious that Australia should do more than promote its natural assets and level the playing field if considerable influxes of Islamic foreign investment are to materialise.

But Australia needs to go a long way to make this happen and needs to do more to alter the understanding of some of the critics like Muehlenberg (2010) who mentions that all over the Western world, governments are bending over backwards to accommodate sharia finance. Therefore, regulatory simplicity, guaranteeing a level playing field and sketching an outline of incentives are required for attracting foreign Islamic investment funds. Although the local investment banks have been assertive in the feasibility of an Islamic wholesale market, additional progress depends on the wider political atmosphere, more professional opinions from relevant scholars, including Islamic finance researchers and not just the willingness of Australian regulatory officials. More knowledgeable responses on the efforts of Australian government, like 'Johnson Report', should be scrutinized to construct a feasible level playing field for Islamic financial sector in near future.

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A Review on the Board of Directors

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Abstract Theories of the Board of Directors has been developed since 1970's. Board of Directors has important roles on a firm. According to scholars, some functions of the Board are controlling, monitoring, coordinating, and maintenance. This paper provides the overview on the Board of Directors, including its theories and roles.

Keywords Board of Directors, Corporate Governance, Managerial-Hegemony Theory, Resource Dependence Theory, Agency Theory, Stewardship Theory

1 Introduction

Among the elements of Corporate Governance, there is the Board of Directors which, in recent years, has gained considerably high attention from the scholars. Board of Directors is considered as a vital part of the firm, some scholars said they are needed to protect the interests of shareholders (Fama & Jensen, 1983).

Researchers have been examining Board of Directors. Theories has been coming out from the reknown scholars, namely (L. Donaldson & Davis, 1991; Fama & Jensen, 1983; A. J. W. Hillman, 2009). Other scholars have also made their reviews over the roles of the Board. Even though scholars agree with the importance of Board of Directors, their description over the Board ultimate roles is still vary due to the different perspectives used in examining them (Jonsson, 2008).

The objective of this paper is to provide a basic overview regarding to the Board of Directors in which the content can be a starting point for other researcher of Corporate Governance issues. Accordingly, this study is divided into some sections: Definition, Composition of the Boad of Directors, Theories of The Board of Directors, The Roles of The Board of Directors, and Conclusion.

2 Definition

Baysinger & Butler (1985) defined Board of Directors as a specialized governance structure that economizes transaction costs for this particular set of manager-shareholder contracts. The Board of Directors is a center of Corporate Governance mechanism and a primary means for the shareholders to exercise control on the top management, which makes it important to be studied (John & Senbet, 1998). Discussion on the Board of Directors was started by (Fama, 1980) who claimed that there is a conflict of interest between managers and shareholders. The Board of Directors are formed to resolve the potential conflicts by doing a monitoring function towards managers in the organization (Fama, 1980). During the same decade, (Zahra & Pearce II, 1989) made a review over the impacts of Board on a firm's financial performance. It was concluded that there is direct and indirect link between Board attributes and the firm's performance.

The attributes of the Board, according to (Zahra & Pearce II, 1989) are: composition, characteristics, structure, and proccess. Composition refers to the share of different type of directors in one Board, as well as the size of the Board. Characteristics refers to the directors' characters which will influence their task performance, such as functional background, working experience, and stock ownership. Structure refers to the Board organization and labor division. Process refers to the Board activities, including the decision making. In their study, (Zahra & Pearce II, 1989) proposed an integrative model which linked these attributes with the Board functions.

Among the main functions of the Board of Directors are monitoring and providing resources (A. J. Hillman & Dalziel, 2003; Jonsson, 2008; Zahra & Pearce II, 1989). The first function refers to the responsibility of monitoring managers on behalf of shareholders, while the latter refers to the Board ability to provide resources to the firm. Resources are interpreted as the strength as well as weakness of the organization (A. J. Hillman & Dalziel, 2003). What is more, Board of Directors are also responsible for achieving the target profit and preventing conflict of interests as well as balancing the corporate's demands (Maher & Andersson, 1999).

Due to its functions, Board of Directors have given many significant impacts to the firm in achieving organizational goals. Scholars mentioned the important relationship between board of directors and firms' wealth (Abidin, Kamal, & Jusoff, 2009) .

A lot of theories on the Board of Directors has come up from many scholars, even though there is no ultimate theory that is applied as the main framework in research on this area (Jonsson, 2008). These theories have different perspectives in which their explanations on Board roles have also become different. For instance, in the Agency theory, it is stated that Board of Directors have monitoring function (Fama, 1980). While the Stewardship theory believes in the Board of Directors as as a function of independent decisions of the board and joint decisions with management (Jonsson, 2008).

This has led to different approaches taken by scholars to examine Board of Directors. (Jonsson, 2008) has found two approaches which mostly have been used by researchers : structural based and process based. The structural based approach takes the composition of Board of Directors as a measurement function. Related variables moslty found throughout the studies are the board independence, CEO duality, and board size (Jonsson, 2008). Proccess- based approach

3 The Composition of the Board of Directors

In the field of corporate governance, some scholars has taken another perspective in which their focus is on the composition of the board of directors. this focus has been called the structural-based perspective of the board (Jonsson, 2008). Composition of the board has also become the usual suspects, referring to how this has been the classic variables in corporate governance research (Jonsson, 2008). According to (Li & Harrison, 2008), Board composition reflects the type of ownership of a firm. It also a mirror of the country's culture and characteristics. It can be seen that firms with concentrated ownership in countries like Japan and Sweden incline to focus more on the long-term stakeholder relationships. On the other hand, the outside directors of Anglo-Saxon countries' firms do not have substantial capital or other commercial stake in the company, even though they have more expertise (Li & Harrison, 2008).

Board composition gives various impacts to the firms. Daily & Dalton (1994) stated that board composition is related with bankruptcy. It also indicates the operation level of the company (Germain, Galy, & Lee, 2012). Wealth of the company is also influenced by BoD composition (John & Senbet, 1998). A study by Rosenstein & Wyatt (1997) has shown that in certain level of the insider's domination, the stock price will be affected by the announcement of inside directors. When the insiders own less than 5% of the common stock, the announcement will bring a negative effect to the stock price. In contrast, it will give a positive effect when the insiders have more than 5% of the common stock. Interestingly, Rosenstein & Wyatt (1997) suggested that an old CEO would appoint inside directors in order to protect him from pressures which come from the outsiders during his remaining years of leading. It is led by the negative relationship found in stock price with the age of CEO.

In this study, Board composition refers to the number of independent and non independent as well as executive and non executive among the directors. Theories differ in viewing the Board composition. The Agency perspective put the director independence as the pivotal key to function the control role of the Board (Johnson, Daily, & Elllstrand, 1996).

Scholars' arguments on the ideal composition of BoD on firms are still going on. Kumar & Singh (2012) stated that the inside directors have a positive moderating effect on the performance of non-

executive non-independent outside directors, which leads to a better performance of the company. While non-executive non-independent outsiders have their own interests in which the incentives are parallel with the greater ownership of inside directors. When the insiders have greater ownership, it boosts the work of the non-executive non-independent directors. This gives good effects to the firm value (Kumar & Singh, 2012).

3.1 Inside Directors

Inside directors are directors who are also the firm's employees (Johnson et al., 1996). In the Stewardship Theory, firms are encouraged to give more authority to their managers. Stewardship theorist believe that the conflicts between shareholders and managers are unlikely to happen. It is safe to say that this theory believes that there should be more inside directors on the Board (Muth & Donaldson, 1998).

3.2 Outside Directors

The board independency is assumed by the number of outside directors. Past literatures show that most agency theorists believe it is important to have more outside directors. This is because the higher percentage of outsider, the Board will be more independent (John & Senbet, 1998). Board independency is necessary to make Board of Directors works effectively (John & Senbet, 1998; Maher & Andersson, 1999; MAtthew, Golden, & Hillman, 2003). This is because when the Directors have any relationship with the CEO, their control will be less effective (Baysinger & Butler, 1985).

4 Theories of the Board of Directors

In this section, the theories of corporate governance are going to be discussed. This will be the theoretical backgrounds of the Board of Directors.

4.1 Managerial-Hegemony Theory

Managerial Theory perceives Board of Directors as a "rubber stamp" for managerial decision (Jonsson, 2008). This theory believes that Board members are chosen by the CEO who is also the chairman, hence the power is held by management. CEO has a higher authority than the Board (Zahra & Pearce II, 1989).

This theory considers CEO as the center of control and decision making in which their roles are the roles of the Board emphasized by other theories. Accordingly, a literature review by (Jonsson, 2008) illustrate some CEO roles: nominating Board members, controlling remuneration, and dual role as CEO and chairman. Yet, negative impacts are following those kind of authority. The CEO tends to choose friends and relatives as the Board members, also to dismiss the viable sucessor and candidates (Jonsson, 2008).

Instead of the Board of Directors, CEO plays the role as a key link between Board and managers, where the information from both sides is passing through. Due to this, CEO has the influence towards the flow of information (Jonsson, 2008). The Board is only involved in decision making when the firm is facing crisis. Overall, it can be concluded that in Managerial-Hegemony Theory, the functions of Board of Directors depend on CEO.

4.2 Resource Dependence Theory

In accordance with (A. J. W. Hillman, 2009), Resource Dependence Theory was proposed by Jeffrey Pfeffer, Gerald R. Salancik in 1978. It says that an organization is a network, and it cannot work alone. There is an interdependency among organizations, which becomes a survival constraint. As the result, a constant success of an organization is uncertain (A. J. W. Hillman, 2009).

In practice, Resource Dependence Theory put the Board of Directors as the resource provider for the firm. Board's existence becomes necessary as they will reduce the organization's dependence towards the others. According to (A. J. W. Hillman, 2009), these are the roles of Board of Director in a firm:

- Information in the form of advice and counsel
- Access to channels of information between the firm and environmental contingencies

- Preferential access to resources
- Legitimacy

Daily & Dalton (1994) took the perspective of Resource Dependence Theory in describing the cause of bankruptcy. Their result suggested that the Board role as the resource provider have especially become critical since during the crisis firms tend to get less of resources. Likewise, this resource provider role is linked to firm's to performance. When the Board exists, it helps to reduce the dependency towards other organizations and hence the uncertainty becomes lower (A. J. Hillman & Dalziel, 2003; A. J. W. Hillman, 2009). This way, firm will perform better.

4.3 Agency Theory

The agency theory believes that there should be a separation between ownership and control (Fama & Jensen, 1983). The firm's goal is to maximize shareholders' value. Principal-agent refers to a condition where the shareholders (the agents) entrust the task of running the company to managers (the principals) who are in effective control of the company (L. Donaldson & Davis, 1991; Eisenhardt, 1989; Warsi & Nisa, 2008). Hence, the directors are **outsiders**. Compared to the insiders, the outside directors tend to be more independent and neutral in monitoring the company (Fama, 1980). Warsi & Nisa (2008) depicted that the main feature of this model is the separation of control from ownership arising from widely dispersed equity ownership among large number of institutional and innumerable small shareholders. Consequently, outsiders are needed to run the monitoring function in the company.

According to Eisenhardt (1989), this theory has been developed into two approaches: principal-agent and positivist. The positivist agency theory is said to describe the governance mechanism for conflict resolution between agent and principal (Eisenhardt, 1989). This sub theory offered two propositions :

i. When the contract between the principal and agent is outcome based, the agent is more likely to behave in the interests of the principal.
ii. When the principal has information to verify agent behavior, the agent is more likely to behave in the interests of the principal.

Maher & Andersson (1999) elaborated that this system encourages open information and innovation. It also enhances better risk diversification possibilities to the investors. However, problems caused by the principal-agent model sometimes cannot be avoided. Pacces (2012) strongly stated that agency problem is the core problem of corporate governance. Issues found in the agency problem is mostly about the conflict of interest between shareholders and manager due to various reasons (John & Senbet, 1998; Maher & Andersson, 1999; Pacces, 2012). The agency problem as explained by Maher & Andersson (1999) is that the shareholders are less motivated to control the board because of the less benefits gained. This is due to the full risk that have to be born by each shareholders, while the benefits are divided equally between them. Davies (2000) argued that the problems arise are between shareholders as a class and the mangement of the company that in any situation, it would be difficult for the shareholders to control the company's management. (Abidin et al., 2009) stated that under the separation between shareholder (ownership) and managers (control), the managers will try to achieve their own goals using shareholder's expenses. Additionally, the managers might increase their compensation if they want.

Scholars have claimed some factors which trigger the agency problem: information assymmetry between principal and agents, bounded rationality between principal and agents, conflict of interests between principal and agents, and the principal cannot determine whether the agent behaves properly (Eisenhardt, 1989; Jonsson, 2008; Maher & Andersson, 1999). The Agency theory argues that Board of Directors are the solution of agency problem (L. Donaldson & Davis, 1991; Fama, 1980).

According to Agency Theory, the main function of Board of Directors as explained by (Fama & Jensen, 1983) is to be the control systemof organizations, in which decision agents do not bear a major share of the wealth effects of their decision. The monitoring function is very important, especially in the outsider system (Guest, 2008; John & Senbet, 1998; Maher & Andersson, 1999). The directors, who are not shareholders (outsider managers) control the key decisions of the company. Hence the board of directors

is to do the monitoring function on behalf of shareholders (A. J. Hillman & Dalziel, 2003; John & Senbet, 1998). Some countries like Germany has put this monitoring function as a major role of the board (Gantenbein & Volonté, 2012).

This monitoring function is also specifically emphasized by (Agrawal & Knoeber, 1996) who proposed seven mechanisms to control the agency problem. The mechanisms are differentiated by the source of monitoring, in which three of them are related to the board of directors:

1. Capital market to monitor the use of debt
2. Prospective employers to monitor the market managers
3. Prospective acquirers to moniter the market for corporate control
4. Inside owners to control insider shareholdings
5. Institutional owners to control institutional shareholdings
6. Large outside owners to control the block holding
7. The board members to control the outsiders on the board

In this theory, function of the board is to be a communication bridge between shareholders and managers (Davis, Schoorman, & Donaldson, 1997). Other than that, Board of Directors is expected to be a complete information system in which the information will be used to assess the behavior of the top executives (Eisenhardt, 1989). The executives is the compensated according to the assessment. In accordance with (Eisenhardt, 1989), the executives' actions will more likely be conferred to the shareholders' interests when they are being monitored.

4.4 Stakeholder Theory

Under Stakeholder Theory perspective, the Board's responsibility is not only to the shareholders but also towards all the firm's stakeholder. This theory argues all related entities should be under the Board's consideration in making decisions (T. Donaldson & Preston, 1995).

In accordance with T. Donaldson & Preston (1995), the main task of Board of Directors is to fulfill the stakeholder interests. The Board should focus on the interaction between stakeholder,Board, and management in order to achieve organization goals (Jonsson, 2008).

Consequently, Jonsson (2008) explained that the concept causes two implications towards the Board functions:

- Not only they have to monitor the managers activities, but also the Board needs to be the example for ethical as well as environmental standards which are not directly based on the shareholder interests.
- Board needs to be a bridge between managers and shareholder interest, not only give a one-sided support towards either shareholder or managers.

This theory is relatively different with other theories since the focus is not only on the shareholder, but also the organization environment.

4.5 Stewardship Theory

Conferring to Davis et al., (1997), this theory assumed that manager is a "steward" in which his behavior is pro organizational and collectivistic such that the utility is higher than individualistic behavior. Stewardship theory was derived from the perspective of human psychology and sociology, it is used to examine the situation when the executives act according to the principals' interest.

A steward in a corporate means that when there is choice between self-serving interest and pro-organizational behavior, this person would choose the one that is inherent with the organization's goals. The steward will not depart from the interests of their organization. In the case of conflict between principal's interests and theirs, they would go for the corporation's choice. By doing this, the steward gain higher utility (Davis et al., 1997).

Scholars said that stewardship theory is a counter theory of the agency theory (L. Donaldson & Davis, 1991; Jonsson, 2008; Muth & Donaldson, 1998). It offers an opposing prediction about the structure of an effective board (Muth & Donaldson, 1998).

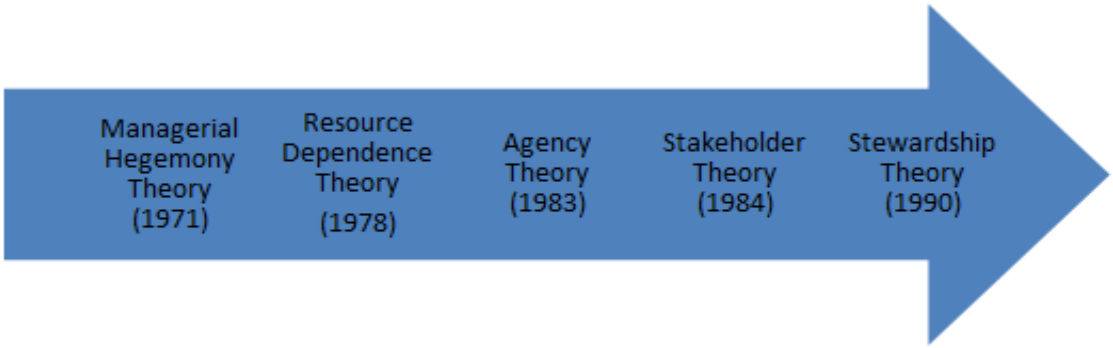
According to stewardship theory, a manager should have wide range of motives as well as behavior beyond self interests. These motives are the non-financial in which will give higher utility if they are achieved. Thus, other than their own selfs interests, managers also have the motivation to gain achievements and recognition, as well as respect for authority. It becomes a part of human needs to acquire those things. Such behavior is considered as collective because it pursues the organization goals, such us maximizing profit (L. Donaldson & Davis, 1991).

In corporate governance practices, the managers are good stewards of the corporate assets (Jonsson, 2008). When the managers get to hold the corporate control, it can be a positive development toward managing the complexity of modern corporation (Muth & Donaldson, 1998). Stewardship theory postulated that acquiring corporate control might be a positive motivation for managers to perform better. While agency theory argues that managers tend to utilize their power of corporate control to pursue their own goals, stewardship theory believes this power will instead encourage them to act to the benefit of shareholders and thus, they will achieve high performance (L. Donaldson & Davis, 1991).

Since this theory believes in putting a trust on managers, the monitoring function of the Board of Directors is no longer the focus. Rather than control roles, Board is projected to do strategic roles (Jonsson, 2008). Based on stewardship theory, the ultimate role of the Board as mentioned by (Muth & Donaldson, 1998) is to empower managers in maximizing wealth. It is measured by the activities done to achieve corporate mission and objectives (Jonsson, 2008).

To increase performance, blanket control for managers is not the exact solution (Muth & Donaldson, 1998). Stewardship theory agrees that giving an authority to managers will encourage them to achieve higher. By having the power, directors and executives will consolidate to govern the company and hence create value to the shareholders (Davis et al., 1997; Jonsson, 2008).

Figure 1 Theories of the Board of Directors



5 Roles of The Board of Directors

The different point of view between corporate governance theories has led to different conclusions on the roles of board of directors in corporate governance. These conclusions were derived by (Hung, 1998) into a typology of Board roles. Accordingly, (Hung, 1998) postulated six major roles of the Board:

- Linking – Resource Dependence Theory
- Coordinating – Stakeholder Theory
- Control – Agency Theory
- Strategic – Stewardship Theory

- Maintenance – Institutional Theory
- Support – Managerial Hegemony

The perspectives used by Hung in formulating the typology are the institutional and strategic choice perspectives. The institutional perspective focuses on the social influence and norms towards organizational actions in which the effects are beyond the control of organization (Hung, 1998). While the strategic choice perspective concerns with the actions of the members of organization in order to adapt with their enviroments. Typology of Board roles was formulated accordingly.

Meanwhile, another typology created by Zahra & Pearce II (1989) who proposed that three ultimate functions of Board are service, strategy, and control. These roles of the Board need to be linked with four elements: Board composition, Board characteristics, Board stuctures, and Board proccess. The review was made over several perspectives:

- The Legalistic Perspective
- The Resource Dependence
- Class Hegemony
- The Agency Theory

The classifications made by Hung and Zahra have been used by many scholars, in which some of them proposed a combination of both (Jonsson, 2008).

Table 1 Board Roles Classification

Theories and Roles		Authority		
Theory	Roles	CEO	Owners/Board	Society
Managerial Hegemony	Support Role	X		
Resource Dependency	Linking Role	X		
Agency	Control Role		X	
Stewardship	Strategic Role		X	
Stakeholder	Coordinating Role			X

Adopted from Jonsson (2008)

These classifications are useful for other researchers to investigate the Board influence towards the firm performance.

6 Conclusion

This paper aims to display a basic overview regarding to the existence of Board of Directors, and why it has become an important object of study. Regardless of the various roles they offer, all theories have concluded that Board of Directors is a vital part of a firm.

Apart from that, it is safe to say the Agency Theory is the dominant framework of Board studies. A lot of studies has been done by the Agency theorist, yet a little studies were found to explore other theories, particularly Managerial-Hegemony and Stakeholder Theory. This has led into a dominant belief that Board's ultimate role is to monitor the firm's management and protect the interest of shareholder. More investigation is necessary towards other Board theories in order to widen the mindset over the roles of Board and thus the Board functions can be fully enhanced.

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Analysis of Some Factors Affecting the Return Credit on SMEs Center Members in Semarang Regency

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Abstract The aims of this research was to look the influence of some factors that may affected to the return of credit made by SME center members in Semarang Regency. Members of SMEs centers required greater capital to expand its business but the number and owned capital limited so they made loans to the financial institutions. However, there were some factors that influence the rate of loan repayment namely level of education, number of dependents, business experience, income, amount of loan and repayment period. This research was an event study conducted of 65 SMEs that belong to members of SME Center in Semarang regency. The data used was primary data obtained from members of SME Center in Semarang regency, then test conducted with logistic test. Based on the result by regression analysis statistical test and logistic regression analysis, it could be concluded that the variable income, loan size, and repayment period affected to the delinquent loan payments. While the variables education level, number of dependents, and business experience did not effect on the arrear of loan payments.
Keywords SMEs, Return Credit, loans

1 Introduction

Indonesian economic system has improved significally, one through Small Medium Enterprises (SMEs) that have an important role in improving the economy of Indonesia. In addition, as an alternative new jobs, SMEs also has a role in stimulating economic growth after the financial crisis in 1998. At the time of the big companies have difficulty in developing their business. Until now, SMEs have contributed a great deal to the local income and national income of Indonesia (Central Bureau of Statistics, 2010). SME is a form of small business community conducted by human initiative. Enterprises with a very limited scale include various business sectors, including agriculture, industry, trade, services, and so on. So it can be said that the advancement of SMEs contribute to the growth of various sectors. Therefore, this business unit should receive special attention in the development and progress since its role is very important for the economy (Central Bureau of Statistics, 2010). The development and progress of SMEs is largely determined by the owners of SMEs, but the support of external parties remain an important role, because of their limited capacity and the ability of other factors that influence to existency and continuity. The results of empirical research by Demirbag et la., (2006) in Ardiansari, et al (2014: 1) concluded that the success of small and medium enterprises have a direct impact on economic development in both the developed and developing countries. According to data from the central bureau and the Ministry of Cooperatives and Small Medium Micro Enterprises in 2010 showed that SMEs remain be business actor units or 99.9% of businesses in Indonesia. A growing number of SMEs are able to absorb 97.04% of the available productive workers. According to Ardiansari, et al (2014: 29) in her study stated 90.5% of SMEs Semarang regency use their own capital at the beginning of establishment of their company. However, there are still 9.5% of the SME did not release its own funds as capital. This means that from the beginning the company was established, these SMEs used loan capital.The research also obtained the result that 100% of SMEs Semarang regency used the loan capital as the sample in research.Through the results of interviews conducted, SMEs in semarang regency require a greater capital to expand its business. While the number and owned limited, so they made loans to financial institutions. SME Center is one group of SMEs in Semarang regency. it conducted six years ago and constantly increasing of group members every year. Until 2016, the SME Center has 186 members scattered in various districts in Semarang. The

industrial sector members of the SME Center, namely footwear, home furnishings, handicrafts, building materials, food, convection, beverages, printing herbs, fertilizers, services, handbags and wallets, processing of agricultural products, plastics, and so on. One of the financial institution that able to help SME is bank. It can support productivity process of its activity. Capital assistance in credit expected to be used as best as possible to increase the productivity of SMEs. The increasing of productivity reflects that the aid loans can be utilized for productive purposes as good as possible. One of indicator to measure the growth of productivity is the higher of total revenue of SME Producen. It also can determine of how big the role and contribution of credit to SMEs revenue. After financing the program goes well, the problem then arises in the financing program. The problem is meant credit repayment carried out by SMEs are not always smooth. Many cases of delays in repayment of credit such as arrears of credit installment payments. This is contradict to the bank orientation or financial institution, which is oriented to obtain profits from the money loaned.

According to Pradita (2013: 6) there are some factors that affect the rate of return credit such as education level, number of dependents, business experience, income, loan amount and repayment period. According to Thoha (2000) in Arinta (2011: 5), higher education is a factor expected to affect the level of fluency loan installment since these factors can influence the characteristics of the debtor. The education level can influence the maturity mindset and perceptions. The higher education of customers, the wider horizons of thought and the greater ability to do business are the aspect that can determine they can manage the business. Kashmir (2014: 101) said the level of education will affect the maturity mindset and perceptions in influencing the characteristics of a debtor. The low of education level will result in absorption of SMEs to information and markets slowed, so that the efforts that lead to increased production and incomes will move slowly. Conversely, the higher education level is easier to accept and develop knowledge and technology, thereby increasing productivity, which will increase revenue, and installment credit will be smooth. Research conducted by Dwi Yanti Arinta (2011), Anggri Nastiti (2003), and Ikka Widayanthi Luh (2010), concluded that the level of education had no significant effect on the smooth return of credit. Meanwhile, according to Wahyu Bima Pradita Dandy (2013), concluded that the level of education a significant and negative effect on the smooth return of credit.

The influence of dependents numbers can be viewed from several perspectives. One of them is an opinion in the research Grootaert in Pradita (2013: 9), which would have revealed that each additional head of a household would increase per capita household expenditure by 1.5 percent. The number of each family members will also increase the burden of life that must be met due to greater consumer spending. So the higer number of dependents in the family, the greater spending to comply the needs of families, so most of revenue will be allocated to these needs not to comply the obligation to pay loan installments. Research conducted by Dwi Yanti Arinta (2011) concluded that the number of family dependents has no significant effect on the smooth return of credit. While Anggri Nastiti (2003), Wahyu Bima Pradita Dandy (2013), and Ikka Widayanthi Luh (2010), concluded that the number of family dependents has a positive significant effect on the smooth return of credit. According to Pradita (2013: 9), Old business is closely related to the experience that can support business activities. The longer of business experience will affect a person's ability to manage a business and avoid the risk of causing the failure. Business experience will affect the skills of SME owners in carrying out some tasks also makes the work more efficient. With business experience who already owned one can detect some errors, understand mistakes, and seek the causes of these errors.Therefore, the debtor's business long has a positive effect on the smooth repayment of credit due to the longer business experience can enhance their understanding and ability to manage the developing of their business. The success of SMEs owned will provide a source of living expenses and provide opportunities in credit repayment capability seamlessly. Research conducted by Anggri Nastiti (2003), Luh Ikka Widayanthi (2010), concluded that the business experience has no significant effect on the level of fluency loan repayment, while research conducted by Dwi Yanti Arinta (2011) concluded that the business experience has a significant and positive impact on the the smooth return of credit. According

to Pradita (2013: 9), business income is the average income of borrowers per month and can also be added from join income earned from their business income as measured in rupiah. The higher of Operating revenues will boost people to be more active in developing their business. Operating revenues in this study is calculated monthly. Research conducted by Wahyu Bima Pradita Dandy (2013) concluded revenues did not significantly affect the smooth repayment of credit. While the research conducted by Dwi Yanti Arinta (2011), Anggri Nastiti (2003), Ikka Widayanthi Luh (2010) concluded that the variable revenues had a significant and positive impact on the smooth return of credit.

According to Pradita (2013: 9), the amount of loans granted by the bank to the maximum limit depends on the number of requests and the payment ability of a debtor assessment. The greater number of bank loans it can cause greater expense of debtor in repayment. Therefore, the high number of granting loan cause a risk of delays in loan repayment by the debtor. Research conducted by Wajhyu Bima Pradita Dandy (2013), Ikka Widayanthi Luh (2010) concluded that the amount of loan has no significant effect. While the research conducted by Dwi Yanti Arinta (2011), Anggri Nastiti (2003) concluded that the variable amount of loan has significant and positive impact on the smooth return of credit. The repayment period is a time to maturity of a debtor to pay the entire value of loans including interest payments on the loan. The loan period may reflect the size of the installments to be paid by debtors to the bank every month. According to Pradita (2013: 9), the longer of loan period can effect the smooth of loan installment every month. On the other hand, the longer in term of this loan repayment period will reduce the level of cash flow and liquidity of banks so that the banks will carry out a full consideration in determining the payback period. Research conducted by Wahyu Bima Pradita Dandy (2013), Dwi Yanti Arinta (2011) concluded it had no significant effect on the smooth return of credit. While Ikka Widayanthi Luh (2010) concluded that the payback period variable had significant and negative effect on the smooth return of credit.

2 Data and Methodology

The object of this research is SMEs in Semarang regency by using quantitative research. Collecting data in this study aimed to obtain materials that are relevant and accurate. While the data used in this study are primary data and secondary data. The population and the sample must be clearly defined since the results of statistical analysis is highly dependent on the scope and characteristics possessed by the population and the sample. According to Ferdinand (2011: 215), a population or universe is a combination of all the event elements such as things or people who have similar characteristics that became the center of attention of the researchers because it is seen as a natural universe. The population in this study is a group of SMEs Semarang regency, namely the SME Center Semarang regency. According to Sanusi (2011: 87), the sample is defined as a part of the population. The study, using a sample can be quickly resolved because the sample method is only conducted research on the majority of objects. Therefore, Data collection, data processing can save time.

The method used in this research is the probability sampling. According to Sugiyono (2009: 60), probability sampling is a sampling techniques that provides equal opportunity for each element of the population to be elected as members of the sample. The number of samples obtained through Slovin formula as follows:

$$\boldsymbol{n = \frac{N}{(N.e^2) + 1}}$$

Where :

n = number of samples (sample size)
N = the number of population
e = error rate that can still be tolerated (10%)

Total population (N) in this study was 186 and an error rate of 10% so the result n is 65.034. Because behind the comma is less than 5 then rounded to 65 respondents. Data collection methods used in this study was a questionnaire method. According to Ferdinand (2011: 30), the method questionnaire is a list of questions which covers all statements and questions that will be used to obtain the data, whether made by telephone, mail, or face to face. A list of written questions which will be filled by respondents consisted of questions about some of the things on credit undertaken by SMEs. Analysis of the data used in this research is Descriptive Statistics. According to Sanusi (2011: 76), descriptive analysis is shown in the analysis of development and growth of a state and only provide a description of a particular situation by describing the nature of the research object. Hypothesis Testing according to Ghozali (2009: 261) in this study using logit regression as the dependent variable in a dummy variable (non-metric) and the independent variable is a combination of metric and non-metric, and does not require the assumption of normality data on the independent variables. So this regression is used if multivariate normal distribution assumption is not comply. Equation regression model may help researchers as measurenment to address the conditions that lead to non-payment of loans made. Data analysis was carried out by assessing overall model fit.

The equation logit or logistic regression model used in this study are (Ghozali, 2009: 264):

$$Ln\,[0dds\,(S|\,X_1,X_2,...X_k)] = b_0 b_1\,X_1 + b_2\,X_2 + b_3\,X_3 + b_4\,X_4 + b_5\,X_5 + b_6\,X_6 + e$$

or :

$$Ln\,\frac{Y}{1-Y} = b_0 + b_1\,X_1 + b_2\,X_2 + b_3\,X_3 + b_4\,X_4 + b_5\,X_5 + b_6\,X_6 + e$$

where:

$$0dds\,(S|\,X_1,X_2,...X_6) = \frac{Y}{1-Y}$$

Information :

Y = Category 1 refers to SMEs with loan payments on time, a category 0 is an SME with ever experienced payment arrears in paying credit.
b0 = Constant
b1-b6 = Coefficient
X1 = Education level
X2 = the number of dependents
X3 = business experience
X4 = revenues
X5 = loan amount
X6 = repayment period
e = Factor Disruptors

This is the Steps in logit regression analysis according to Ghozali (2009: 268):

a. Assessing Model Fit

The output data from logistic regression was then analyzed using assessment model fit. The first step is to assess the overall fit model to the data. Hypotheses to assess model fit is:

H_0: hypothesized model fit to the data

H_a: Model hypothesized does not fit with the data

From this hypothesis it is clear that we would not reject the null hypothesis that the model fit to the data, so that the statistics used, based on the L Likelihood. Likelihood function of the model is the probability that the hypothesized model that describes the input data. To test hypothesis null and alternative hypotheses, L transformed into -2LogL. Statistics -2LogL called the likelihood ratio statistics c^2, where c^2 distribution with a degree of freedom n-q. Q is the number of parameters in the model. SPSS output provides two grades -2Log L namely for one model that only enter one constant is equal to 33.271055 and has c^2 distribution with df 6 (65-1), although it does not appear in the SPSS output value of 33 271 -2 Log L, significant at alpha 5% and the null hypothesis rejected, which means that the model only with constants and just do not fit with the data.

b. Cox and Snell's R Square and Negelkerke's R Square

Cox and Snell's R Square is a measure that seeks to imitate the size of R^2 on a multiple regression based on likelihood estimation techniques with a maximum value of less than 1 so it is difficult to interpret. Nagelkerke's R-square is a modification of the coefficient Cox and Snell to ensure that the value varies from 0 to 1. This is done by dividing the Cox and Snell's R^2 with maximum value. R^2 Nagelkerke's value can be interpreted as R^2 in multiple regression. Judging from SPSS output value of Cox and Snell's R^2 of 0591 and Nagelkerke's R^2 value is 0.789, which means the variability of the dependent variable that can be explained by the variability of the independent variable at 78.9%.

c. Hosmer and Lemeshow's Goodness of Fit Test

Hosmer and Lemeshow's Goodness of Fit Test to test the null hypothesis that empirical data fit the models. If the value of Statistics Hosmer and Lemeshow's Goodness of Fit Test is equal to or less than 0.05, then the null hypothesis is rejected, which means there are significant differences between the models with observations that the value of Goodness fit model is not good because the model can not predict the value of observations. If the value of Statistics Hosmer and Lemeshow's Goodness of Fit is greater than 0.05, then the null hypothesis can be rejected and mean model is able to predict the value of observation, or it can be said the model is acceptable because it fits with the data observations. SPSS output display shows that the value of statistics Hosmer and Lemeshow's Goodness of Fit amounted to 10.4492 0.2349 with a significance probability value above 0:05, so it can be concluded that the model is acceptable.

d. Classification table

2x2 classification table calculates the estimated value of the correct and incorrect. In the column are two predicted value of the dependent variable and in this case are not in arrears (0) and arrears (1), while on the line shows actual observed values of the dependent variable is not in arrears (0) and arrears (1). In a perfect model, all cases will be on the diagonal with forecasting accuracy rate of 100%. If the logistic model has homoscedasticity, the percentage of correct will be the same for both rows.

e. Parameter Estimation and its interpretation

To assess the results of our regression analysis using the equation models that include all the components of the independent variables that can be seen from the Variable in the Equation. Logistic regression can be stated as follows:

$$Ln\frac{Y}{1-Y} = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$$

Wald statistic to test the significance of logistic regression coefficient of each predictor, with the formulation of statistical hypothesis as follows:

H0: r = 0
Ha: r ≠ 0
Where r = 1, 2, 3, ..., n
criteria:
If Sig. > A, then H0 accepted
If Sig. <A, then H0

f. Hypothesis testing

Hypothesis testing of this analysis is to determine the effect of independent variables on the dependent variable. Hypothesis testing is done by comparing the value of probability (sig). If the numbers significantly smaller than 0.05, then the regression coefficient is significant at the 5% level would mean H0 rejected and Ha accepted, which means that the independent variables significantly influence the dependent variable.Vice versa, if the number of significance greater than 0.05 it means that H0 is accepted and Ha rejected, which means that the independent variables did not significantly affect the dependent variable.

3 Results

3.1 Logistic Regression Analysis

Based on the analysis by SPSS 16 program for Windows obtained multiple regression results as summarized in the following table:

Table 1. Regression Analysis

Variable in the Equation						
		B	S.E.	Wald	df	Sig.
Step 1	X1	-0.822	0.782	1.103	1	0.294
	X2	0.167	0.614	0.074	1	0.785
	X3	1.643	0.856	3.681	1	0.055
	X4	-2.153	0.875	6.052	1	0.014
	X5	1.897	0.793	5.719	1	0.017
	X6	1.602	0.73	4.808	1	0.028
	Constant	-6.843	5.556	1.517	1	0.218
a. Variable(s) entered on step 1: X1, X2, X3, X4, X5, X6.						

3.1.1. Regression Equations

According to the table one obtained the multiple regression equation as follows:

$$Y = \frac{e^{-0,822X1+0,167X2+1,643X3-2,153X4+1,897X5+1,602X6-6,843}}{1+e^{-0,822X1+0,167X2+1,643X3-2,153X4+1,897X5+1,602X6-6,843}}$$

The regression equation have the following meanings:

1. The coefficient X1 = -0.822

If the variable educational level increased by one point, while dependents, income, loan size, and a fixed payment period, it will decrease the probability of a person delinquent in paying loan installments amounting to 0.822.

2. Coefficient X2 = 0.167

If the variable dependents increased by one point, while education level,business mss maturity, income, loan size, and a fixed payment period, it will lead to an increased probability of a person delinquent in paying loan installments amounting to 0.167

3. Coefficient X3 = 1.643

If the variable business maturity increased by one point, while education level, dependents, income, loan size, and a fixed payment period, it will lead to an increased probability of a person delinquent in paying loan installments amounting to 1.643.

4. X4 coefficient = -2.153

If the variable income increased one point, while education level, family responsibility, business maturity, commercial loans and credit repayment period fixed, it will decrease the probability of a person delinquent in paying loan installments amounting to 2,153.

5. X5 coefficient = 1.897

If the big variable loan increased by one point, while education level, family responsibility, business maturity, income and payment period fixed, it will lead to an increased probability of a person delinquent in paying loan installments amounting to 1,897.

6. Coefficient X6 = 1.602

If the variable payment period increased by one point, while education level, family responsibility, business maturity, income, and large fixed loan, it will lead to an increased probability of a person delinquent in paying loan installments amounting to 1.602.

3.1.2. Logistic Regression Test Prerequisites

1) Model Fit test

Assessment model fit in essence used to assess the overal fit model to the data. In this case the test is used Hosmer and Lemeshow Test. Here is a table model fit assessment.

Table 2. Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig
1	6.117	7	0.526

The hypothesis used in this study are as follows.
hypothesis:

$H_0 : \beta = 0$ = hypothesized model fit to the data.

$H_1 : \beta \neq 0$ = hypothesized model does not fit with the data.

Decision-making:
Ho accepted if sig ≥ 5%.
Ho is rejected if sig <5%.
The test results obtained significant value in Hosmer and Lemeshow test, Test = 0.526 ≥ 0.05 hypothesized that the data model fit to the data.

2) Overall Model Fit

Overall model fit was conducted to test whether the entry of independent variables in the regression model is able to fix the regression model or not. Assessment of fit model is done by comparing the difference in value -2log likelihood likelihood -2log constants and variables, with a value X_{tabel} on df = 5 obtained X_{tabel} = 9.488. The test results overall fit model can be seen in the table below.

Table 3. Test Model Fit

model fit test				
Stop 0 (L0)	Step 1(L1)	range (L0-L1)	X^2_{tabel}	Criteria
81.792	19.124	62.668	11.071	Fit Model

Calculation shows that (L0 - L1) ≥ $X_{tabel.}$ = 62.67. So we can conclude that the independent variable are education level, family responsibility, maturity, income, loan size and loan repayment period can improve the logistic regression model.

3) Accuracy Classification Regression Model testing.

To test the accuracy of the classification seberapabesar regression model can be seen in the table below classification models.

Table 4. Accuracy of Prediction Test

Classfication table a					
	Observed		Predicted		
			Y		Percentage Correct
			Not arrears	Arrears	
Step 1	Y	Not arrears	20	1	95.2
		Arrears	2	42	95.5
	Overall Percentage				95.4

From the table above according to the predictions obtained information that there are 21 respondents who have arrears while the results of observation there were 20 respondents who have arrears so the accuracy of the classification = (20/21 = 95.2%). According to the predictions there were 44 respondents who have no arrears while the results of observation there are 42 respondents who have no overdue so the accuracy of the classification = 42/44 = 95.5%. The overall accuracy of the classification

obtained in this regression model amounted to 95.4%, in the logistic regression analysis showed greater improvements in the accuracy of the classification regression model to be used.

Hypothesis testing

1) Partial test

Hypothesis testing is done to test the effect of independent variables on the status of delinquent respondents. Partial assay results, are as follows

Tabel 5. Parsial test

Variables in the Equation					
		B	S.E.	Wald	Sig.
	X1	-0.822	0.782	1.103	0.294
	X2	0.167	0.614	0.074	0.785
	X3	1.643	0.856	3.681	0.055
	X4	-2.153	0.875	6.052	0.014
	X5	1.897	0.793	5.719	0.017
	X6	1.602	0.73	4.808	0.028
	Constant	-6.843	5.556	1.517	0.218

hypothesis:

$H_0 : \beta = 0$ = independent variable has no effect on the dependent variable

$H_1 : \beta \neq 0$ = independent variables affect the dependent variable.

Decision making:

Ho accepted if sig ≥ 5%

Ho is rejected if sig <5%

Statistical tests with SPSS variable (X_1) acquired the education level sig = 0.294 = 29.4% ≥ 5% so Ho accepted. This means that the variable educatio level did not significantly affect the amount of arrears in paying the loan installments. In variable (X2) dependents obtained sig = 0.785 = 78.5% ≥ 5% so Ho accepted. This means that the variable dependents has no significant effect on the amount of arrears in paying the loan installments. In variable (X3) business maturity acquired sig = 0.055 = 5.5% ≥ 5% so Ho accepted. it means the business maturity has no significant effect on the amount of arrears in paying the loan installments. In variable (X4) income is derived values sig = 0.014 = 1.4% <5% so Ho rejected. it means that the income variable significant effect on arrears in paying the loan installments. In variable (X5) of the loans obtained sig = 0.017 = 1.7% <5% so Ho rejected. it means big variables significantly influence the loan arrears in paying the loan installments. In variable (X6) payment period is obtained sig = 0.028 = 2.8% <5% so Ho rejected. It means that the variable payment period significant effect on arrears in paying the loan installments.

4) Coefficient of Determination

The coefficient of determination used to measure how far the ability of the model to the independent variable were education level, family responsibility, business maturity, income, loan size and loan repayment period together in explaining the dependent variable in paying the loan installments.

Tabel 6. Coefficient of Determinant

Model Summary			
Step	-2 loglikehood	Cok and Snell R Square	Nagelkerke R Square
1	19.124[a]	0.619	0.864
a. Estimated terminated at iteration number 8 because parameter estimates changed by less than 0.001			

In the table above obtained Nagelkerke values R2 = 86.4% = it means the education level, family responsibility, business maturity, income, loan size and repayment period credit in simultaneously paying loan installments amounting to 86.4%. In the table above values obtained Nagelkerke R2 = 86.4%. it means the education level, family responsibility, business maturity, income, loan size and repayment period credit simultaneously paying loan installments amounting to 86.4%.

4 Conclusion

The conclusions of this research indicated that the factors affected to the ability of SME Center members in repaying the credit namely income, loan amount and repayment period. While the education level factors, the number of dependents, and business experience did not affect the ability of the SME Center members in paying credit. Suggestions for the lender is expected to be more selective in deciding which potential borrowers will receive loans by considering various things, especially revenue-owned prospective borrowers and frequency or intensity in obtaining loans. In addition debtor business conditions in the future should be predictable because there is a possibility of success or failure of their business in future and it affects the value of revenues being one benchmark loan repayment capacity. The suggestions for the SMEs should consider the ability of their business prior to repay the loan amount as seen from factors monthly income, loan amount and repayment period because the greater and the longer in term of repayment of loan it cause the greater potential impact on small business owners do arrears. While suggestions for further research are expected to use the results of this study as a reference and referral for further research. In addition, it is expected for further research to be able to find a solution to the SME credit recipients can restore their credit better so it will create good cooperation between banks and SMEs.

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Theme 5:

Business Strategy, Change Management and Risk Management

Technological Superiority as the Main Success Factor in Implementing High Technology Marketing Strategy: A Pseudo Tale for Emerging Renewable Energy

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Abstract Technological innovation has always played the vital role in economics. Researchers and innovators who are mostly engineers have long been involved with business development and helped figuring out returns of investment from the emerging technology. However, the advanced product that is often seen as the most potential for future growth of the modern globalized scenario, could not even reach its targeted mainstream market even in the early market entry, what more in an emerging industries. The evolvement of the high technology marketing innovation and its implementation strategy has been a failure for many emerging companies. Different technological teams and personnel work in silo and many departments operated independently. Marketing portfolios were largely a collection of separate tools, rather than parts of a single engine that worked together. The lack of common business goals contributed to the 'cracks' for technological superiority. This paper will briefly discuss the 'revised' Technology Adoption Life Cycle Model by Geoffrey Moore and look at the 'crack' during the market entry. There are still disparities in implementing the emerging high technology marketing that had long being typically using the "research, development and commercialization" business model and it is not able to be the greatest solution to save the world facing future energy sources depletion. Recognizably, data gathered from primary interviewing of researchers, producers and manufacturers of OTEC industries, the standard model was swapped and able to reduce the 'crack' based on real expansive encounters during its' inceptions. Aiming to adopt the best framework for strategic high tech marketing, it suggested a new route of 'story-tale experiences' and coupled with other strategies for the route to successful integrated marketing implementation strategy for new emerging industries specifically in new economies. Giving us a greater point of view that technological superiority still remain as 'tales' and it is not the main success factor in the implementation of high technology marketing.

Keywords Emerging industries, emerging high technology marketing, 'revised' Technology Adoption Life Cycle Model, Renewable Energy Technology, OTEC case study

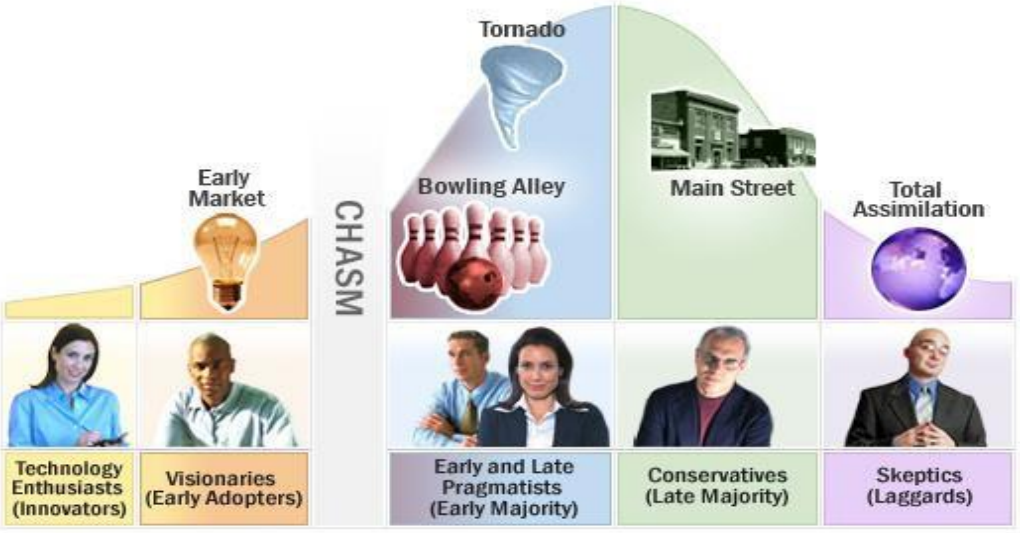
1 Introduction

Technological innovation has always played the vital role in economics and often seen as the most potential for future growth of the modern globalized scenario. New technology will re-shape the future for better living. A diverse range of breakthrough technologies, including batteries capable of providing power to whole villages, "socially aware" artificial intelligence and new generation solar panels, could soon be playing a role in tackling the world's most pressing challenges, according to the World Economic Forum 2015. Emerging industries are newly formed or re-formed industries that have been created by technological innovations, shifts in relative cost relationships, emergence of new consumer needs or other economic and sociological changes that elevate a new product or service to the level of a potentially viable business opportunity [1]. The world is facing robust modernization with the existence of mushrooming technological innovations in various industries – existing or emerging. However, the advanced product that is often seen as the most potential for future growth of the modern globalized scenario, could not even reach its targeted mainstream market even in the early market entry,

what more in an emerging industries. The evolvement of the high technology marketing innovation and its implementation strategy has been a failure for many emerging companies. Researchers found that 60% of all new high tech product development efforts are stopped before they are commercialized and 40% of the remaining products are withdrawn from the market and their findings also suggested that 55% of surveyed companies stated that the problems are related to marketing [2]. In this case study, the marketing renewable energy technology [RET] is not an exception [3]. Even if the renewable energy technologies are highly advanced in technical sophistication, it may face, that it may yet to generate any measurable returns if it fails to 'show and tell' innovative marketing strategy, pursuing irrelevant messages at the wrong time.

In order to successfully develop and market as well as commercialize the technology innovations, researchers mentioned that does not only firms need to conceptualize and develop the innovation in the first stage, it must also be reaching more than a niche market of innovators – early adopters as what has discussed in the great books of innovations the *innovator's dilemma*, Christensen's and Moore's *crossing the chasm*, both that are related the to the underlying skills in marketing strategy. His latest edition unveiled that the point of greatest peril lie in the transition from an early market and this has resulted a disassociation in the 'revised' version of 2013 Technology Adoption Life Cycle (TALC) components of innovators, early adopters, early majority, late majority and laggards as per Table 1. Each of the gaps representing an opportunity for marketing to lose momentum [3]. The vast chasm between the early adopters and early majority needs further improvements. Through the lens of this revised high tech marketing model, it will look at the 'chasm' where the Early Market is the phase in which a discontinuous innovation can grow from merely a technology with promise to a novel new product idea. It would not create engagement but exasperation. This is the 'crack' that is going to be discussed in this paper will study on the scope of renewable energy technology (RET).

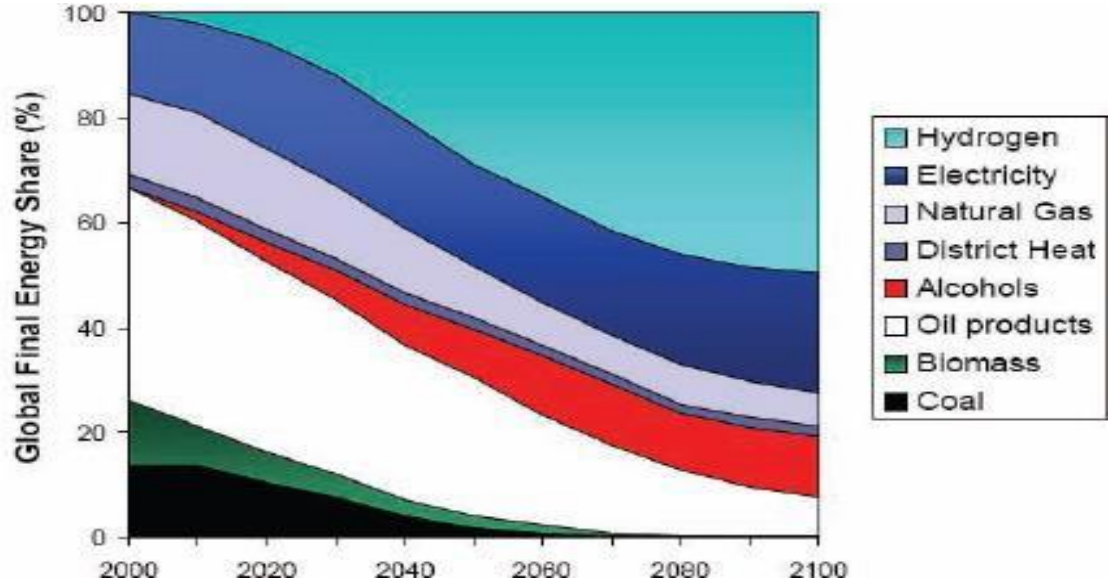
Table 1: 'Revised' Technology Adoption Life Cycle



2 The Tight Spot in RET

The widespread adoption of RET that includes, hydroelectric power, geothermal, solar, biomass and the latest OTEC, not only help to prevent the negative environmental and societal effects associated with the conventional (i.e. fossil fuel) energies, but also has the potential to create superfluous socioeconomics benefits such as reducing local air pollution and safety risks to name a few. The advancement in RET has showed positive growth prospects for emerging economies – option for reducing carbon emissions while simultaneously meeting humanity's ongoing need for energy provision [4]. Nonetheless, there are not many literatures in marketing issues for high tech industry especially in renewable energy as it is less reached yet increasingly important phenomenon [5]. There are other issues which require further research in order to facilitate the penetration of this technology into the global energy market [6]. Certainly its technological superiority does not stand alone and a new construct will be discussed further in narrowing the marketing high tech gaps.

Michael Porter, a well-known marketing Guru in his recent research had outlined that although emerging industries can differ a great deal in their structures, there are a common structural factors that seem to characterize in many industries in the stage of development which are technological uncertainty, strategic uncertainty, high initial costs but steep cost reduction, embryonic companies and spin-offs, first-time buyers, short time horizon and subsidy [7]. Suffice to mention that as the researchers discussed in the arena of the future renewable energy network, The world is forced to embrace the new renewable technological innovations when it comes to the reality of depleting sources of energy in the next 21st Century [8]. What will be the most dominant energy carrier?



Innovative technology solutions are needed to prepare for the projected growth in energy consumption and to ensure a sustainable future [9]. An exploration, development and promotion of alternative energies is needed, with declining fossil fuel reserves [10]. In deriving to the findings of this paper as in Table 1, energy is thr the questions are 1. What are the key elements that play a major role in ensuring the successful synergistic marketing planning, implementation, execution and monitoring of the

OTEC ecosystem? 2. What would be the feasible synergistic marketing strategy to be adopted for the development of OTEC industry in Malaysia as emerging economy?

3 OTEC through the years

The long neglected in development, the technological advancements in other fields and integration of crosscutting industry technology solutions now provide more feasible opportunities for the OTEC industry. First discovered in 1870, today it renascent as one of the fast evolving technological innovation. Ocean Thermal Energy Conversion (OTEC) is conversions of the heat trapped in the surface of the ocean at temperate regions and transforms it into energy at a designated temperature. It harnesses the heat from the Sun stored in the oceans and the adjacent deep seas wherever there is a significance temperature differential over 20 degree Celcius.

There is great potential for OTEC to act as the enabling technology for a low carbon economy. Renewable energy integration, electrified transportation, and independent distributed power production are just some ways that the OTEC may fundamentally reshape the future energy landscape [12]. The mother earth may have quality, cleaner air. OTEC has the highest potential (about 300 exajoules (EJ) per year or, 90% of the global ocean energy potential) when comparing all ocean energy technologies. A total of 98 nations including Malaysia and territories are deemed geographically suitable for OTEC development [13]. Technically, its system makes use of the regular occurring differential temperature (of about 20°C) between the warm surface seawater and the deep ocean water to generate electricity achieved through (the process of) evaporating and condensing a working fluid to power a turbine, much like the system of refrigerator [14].

The OTEC systems may be differentiated into the 3 types of cycles. This includes the open cycle, the closed cycle, and the hybrid cycle. The OTEC open cycle utilizes the ocean water as its working fluid, whereas an OTEC closed cycle typically uses ammonia. The OTEC hybrid cycle, on the other hand uses a mixture of ammonia and water. Various researchers are studying the alternative working fluids or refrigerants, as this may improve the cost and efficiency of the OTEC cycle and differentiated is by the type of platform used. This may be floating platforms, land based platforms, or moored to the sea platforms [15]. Therefore, the world needs a super techno-solutions to sustain in the future. The promotion or the information-sharing for the mass pubic captures interests as the community are majority techno driven. Could the superiority in the technological energy related issue?

4 OTEC Case Studies: The Marketing Experience Perplexity

Power disturbance from the commercial power grids happen everywhere. Studies suggest that the total worldwide power generation capacity could be supplied by OTEC [16]. The power generation Yet, similar to other RET, the technological aspects OTEC are characterized as costly, complex and inertia, resulted from lengthy decision-making and financial intricacy [15]. Why this case study was chosen because it focused on another angle on how to penetrate the market during it embryonic stage. It is the challenges for researchers and marketers have to combat the probable bugs and glitches of the phase.

In this qualitative case study, the marketing strategy for emerging technology is scaled towards technology that is new to the world, new to the country and new to the organizations related to and it must be analyzed as a single process [11]. Quoting Creswell there were three factors that the researcher should be involved in: preliminary considerations at the commencement of the assignment, the steps to be engaged in and finally the flow in getting the findings [12]. This case study research involves the written report of a sheath within a real-life, contemporary context or setting [13]. The areas discussed are based on the RET's market entry phase in new economy and the marketing strategy used by the technology providers/experts of the emerging OTEC from USA, Japan, Korea and Netherlands during

the 3rd OTEC International Symposium 2015 held in Kuala Lumpur. Aiming to develop the best framework for high tech marketing , the semi-structured interviews with the renowned OTEC experts encompassed the inception stage that discussed 1) market penetration business model 2) marketing plan and activities 3) marketing challenges for OTEC 4) Integrated marketing mix used for price, place, people and promotion.

During the initial phase in OTEC development, the experts were asked on what was their market penetration business model. Since marketing is part of commercialization, development and research are segmented to see the platforms of each encounters and the results as in Table 2.

Table 2 Stages on Commercialisation=>Development=>Research VS Research=> Development=>Commercialisation

Source : Adapted from Bakar (2014)

Table 3: OTEC Marketing Experiences During Early Stage

Technology Providers/Experts	Organization	Experience	Result
Professor Dato Abu Bakar	UTMOTEC	CDR	4 Special Purpose Vehicles in 2 years
Professor Luis Vega	Hawaii	RCD	Research and Pre-commercial Plant
Ms. Anne-Sophie Colleaux	DCNS	CDR	Growing demand from customers
Professor Yasuyuki Ikegami	Saga University	RDC	Demonstration d Test - Inertia
Dr Hyeon Ju Kim	Korean Research Institution of Ship	RDC	Research and Development - Inertia

The marketing plan/activities during OTEC initial stage from five technology experts are illustrated as per Table 3.

Table 4: OTEC Marketing Activities During Early Stage

Technology Providers/Experts	Organization	Activities
Professor Dato Abu Bakar	UTMOTEC	Active face-to-face meetings with government and private agencies
Professor Luis Vega	Hawaii	Long research and experiments since 1930s
Ms. Anne-Sophie Colleaux	DCNS	Vigorous face-to-face marketing presentations at numerous sites
Professor Yasuyuki Ikeaami	Saga Universitv	Extensive research since 1970s
Dr Hyeon Ju Kim	Korean Research Institution of Ship	Research and demonstration in education and private sectors

Looking ahead, the shared persistent difficulties yet grows miracles in the OTEC early marketing development when experiences are synergized with technological expertise- bear positive results in reaching the target audience (Table 5).

Table 5: OTEC Marketing Challenges During Early Stage

Technology Providers/Experts	Organization	Challenges
Professor Dato Abu Bakar	UTMOTEC	Costs, financial complexity and concerted efforts within agencies
Professor Luis Vega	Hawaii	Costs and financial complexity
Ms. Anne-Sophie Colleaux	DCNS	Almost Nil – due to self-funded and vigorous face-to-face
Professor Yasuyuki Ikegami	Saga University	interactions activities.
		Research tasks by government
Dr Hyeon Ju Kim	Korean Research Institution of Ship	R&D was concentrated on tidal barrage power plant as mandated by the government

Adopting the instrumental marketing mix perspective (which is often categorized into the classic marketing instruments of product, price, promotion, and place, "4 p's" the experts also saw the inclusion of activities and plans that are integrated and carried out in the form of face-to-face presentation.

Table 6: OTEC Integrated Marketing Mix During Early Stage

Technology Providers/Experts	Organization	Price	Place	People	Promotion
Professor Dato Abu Bakar	UTMOTEC	Price Instrument	Government Private NGOs GLCs	Technologist Strategist	Social Media Printed Media Face-to-Face Roadshows
Professor Luis Vega	Hawaii	Price Instrument	Government	Technologists	NIL
Ms. Anne-Sophie Colleaux	DCNS	Self-funded	Global	Strategist Highly educated	Face-to-face Tradeshows Conferences
Professor Yasuyuki Ikegami	Saga University				Business Presentatins
		Concealed	Educational Public	Researchers	Academia Conferences
Dr Hyeon Ju Kim	Korean Research Institution of Ship	Concealed	Government	Researcher	Academia Conferences

During the market entry stage, the issues on complexity, cost, technological readiness and market uncertainties are the typical areas raised. Positive results and the increased number of special project vehicles (spv) are the benchmark for the technology providers (Table 6). When asked about the marketing tactic used, both Professor Bakar and Ms Anne Sophie evidently relate experiences as one of the key elements in the story-line of their business presentations.

5 OTEC Case Study: The Magnitude of Technological Innovation Story-telling of the CDR Model (Commercialisation, Development, Research)

In designing a suitable marketing framework for OTEC business model, the story-telling criteria integrates the OTEC significance technological success story with the real experiences encountered during the early stage of market penetration. Sharing the corporate story-board and business model of Kumejima Island, techno-preneurs and scientists are able to associate with the development of OTEC at a remarkable technology transferate as shared by Professor Abu Bakar. While Ms Anne Sophie, aspiringly talked about the corporate profile of DCNS – the industry builders for decades and has a hugh promising track record on technology and knowledge transfer in an experiential presentations that are engaging..

OTEC's unique selling propositions that are able to 'catch' the hearts and minds of the audience. Characterized by clean energy as it uses only seawater as energy resource. It is inexhaustible and applicable in 98 countries around the globe. It supplies energy at a constant rate stably day and night throughout the year and obviously, its killer finding – zero-carbon emission.

6 More Discoveries in OTEC-development spins-products

The phenomenal development of OTEC spins –off products from Japan, Korea, Hawaii and are abundance. Many discoveries derived from the spins-of OTEC technology such as;

1. OTEC Electric-Power, Freshwater Supply, and H2 Fuel Production, and Sale of Cold Deep Sea Water to OTEC Spin-off Companies;
2. Development of OTEC-Techno-Park for the following OTEC Spin-Off Industries:

- Production of Temperate Produce
- Marine Culture of High Value Fish, Prawns, Lobsters, Abalone, Oysters, etc
- Culture of Seaweeds: Umi Budou, Ogu
- "Takumi" Fish-Aggregation
- Production of Micro-algae for Jet-Fuel
- District Cooling
- Lithium Production for Batteries
- Mineral Water Production

3. Hydrogen Fuel Cell for SmartGrid for Localised Distribution of Renewable Electricity

The OTEC spins-off industries derived from the multi-function OTEC plant is foresee to generate and broaden world economy, OTEC not only cross-cutting technology, but addressing all sustainability issues like biodiversity, environment, & climate change; security of water, foods, and energy; commodities, health care; transport and urbanisation.

7 Conclusions

Technological superiority in energy industries is hyped and foreseen to be the factor for successful EHT marketing even if it is risky and costly [14]. The tales once told by the marketers in energy industry with identified 'cracks' across the chasm are repeated. But this tale needs to be addressed as energy is the cornerstone of societal needs and economic growth[15]. But how and where to start with? The tales began to slowly unleashed from different angles from the gathering of experts and technologists at the 3rd OTEC International Conference held in Kuala Lumpur.

The experiential marketing (EM) for this highly advanced eco-system should be choreographed to engage hearts and minds of the targeted audience. [16] It would be the core feature of the Strategic Technological Expansive Marketing (STEM) from the branch of EM. Featuring as a complex infrastructure, and taking effort and money but if considering the real costs of fossil fuels--pollution and its effects, international tensions over gas and oil supplies, and climate change. [17]. It would be wise to

market its development right from the market entry through the corporate experiential high tech marketing that integrates with the traditional marketing blueprint used for decades with a strategic approach in the context of fast-moving technology transitions and instant information sharing. [18] A comprehensive marketing strategy for a wide OTEC audience, from prospects and customers to investors and financial partners, as well as specialized media, combining human, technology and manufacturing assets, would fosters closer relationships across the OTEC value chain to meet the challenges of the industry in an efficient and sustainable way. [19].

As for Malaysia, nevertheless it is a common knowledge that many government or its linked-companies still continue in the old RET even though the new ones are more cost-effective in terms of its reliability, through days and nights [20]. For futures research, there should be a more comprehensive strategies that comprised of technologies and marketing communication model that should also be embedded for early penetration of the early market.

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Theme 6:

Operation Management, Logistics, Supply-Chain Management

Selection of Integrators in Malaysia's local broiler industry: Prioritization of critical factors based on Growers' perspectives

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Abstract The Malaysian broiler industry is an integral component of the agriculture sector that generate sustainable food supplies to almost 30 million populations in the country. The industry comprises of conventional and commercial farms for which the latter is more sustainable with contract farming schemes and involvement of major integrators and growers. The survival of local growers as one of the important players within broiler's supply chain hierarchy is largely depending on the integrators. Hence, this study aims to identify critical factors that local growers consider when selecting their integrators. Specifically, the objective is to prioritize integrators' selection factors and to determine the critical ranking of each factor. Analytical Hierarchy Process (AHP) approach is employed to evaluate and rank the importance of the said factors based on inputs from selected broilers' representatives. Five main criteria are identified and considered in the AHP analysis that include relationships, reliability, logistics, input and price. The result indicates that reliability had been given the highest priority, followed by pricing factor, input criteria, relationships with the integrator, and finally the logistics facility. For overall sub-criteria, supplied quantity had been ranked number one, followed by price of raw materials, availability of day-old chick, quality conformance, technology sharing, and in-house logistics facility. In the end, how this study impacted local broiler industry is explained. Certain issues and future direction of this study are also discussed.

Keywords Broiler industry, supply chain, Analytical Hierarchy Process (AHP), pairwise comparison, contract farming

1 Introduction

The Malaysian broiler industry is an important part of the agriculture sector providing employment and producing useful animal protein food for the population, estimated at 25 million people and also to about 4 million people in Singapore. According to [1], Malaysia has one of the highest per capita consumption of chicken in the world. Broiler industry in Malaysia comprises of commercial farms and conventional farms; commercial farms that run business on contract farming basis with integrator and conventional farms that belong to independent entrepreneurs. According to [2], the contracting scheme is therefore more likely to sustain. In 2009 there were 3,300 farms in operation carrying a standing population of nearly 186 million broiler chickens. Of these farms, 22.9% are large farms with more than 50,000 broilers per cycle. According to [3], the states of Johor, Sarawak and Perak were the major producers of broiler which constituted 52% of total national production. In the industry, broiler contracting involves the use of improved technology and production practices. Main players normally have a vertically integrated supply chain and operating as an integrated producer. There are two parties in a typical contract farming arrangement: the grower and the company (Integrator). Integrators recruit large farms (growers) to rear broiler chickens for meat according to contractual guidelines. Farming contracts can also help growers mitigate risks posed by fluctuations of input prices and provide a secure market outlet for their product. Most integrators in Malaysia participated contract farming with growers for broiler production. Consequently, the integrators are always involved in every stage of production. While the important role of integrators is well documented, empirical evidence suggesting which factor to consider when selecting integrators remain limited and inconclusive. The need to identify and to prioritize

integrators' selection factors is timely to both growers and integrators. It is a high time for relevant parties such as the integrators to understand the 'survival' need of the growers and to seek further improvement. Hence, the objective of this study is to determine factors that are critical when selecting potential integrators. In particular, the study aims to prioritize and rank the criteria (selection factors) using the Analytical Hierarchy Process (AHP) method. The remaining part of this paper is organized as follows: Section 2 discusses the AHP method followed by determination of the main criteria and sub-criteria in Section 3. Section 4 discloses the computational works in which the results and sensitivity analysis are discussed. Finally, Section 5 concludes the paper with discussion and recommendation of the study.

2 The AHP method

The Analytical Hierarchy Process (AHP) is a multi-criteria decision making method developed by Thomas L. Saaty in 1970s. One can refer to many of his previous studies on hierarchies, prioritization of decision making factors and the AHP method [4],[5],[6],[7] and [8]. The method has been used extensively in many different sectors such as government, manufacturing, services, engineering and management [9]. According to [10], AHP has been widely employed to decision making in areas such as resource allocation planning. It was also pointed out by [11] that manufacturing sector had been the biggest user of the AHP method. The applications of AHP method in agribusiness was illustrated by [12] in which the method had been used to rank the commodities in terms of the feasibility prospects with the intention of introducing milk futures contracts in Brazil. Study by [13] investigated the usage of AHP for selecting the most suitable bedding material for broiler production in Brazil. In Indonesia, [14] had examined supply chain competitiveness in local food industry using a combination of the AHP and ANP methods. In the meantime, [15] had used AHP method to determine importance ratings and overall index of sustainability of food supply chains. Hitherto, there had been very limited applications of the AHP-related methods in livestock or poultry industry. The AHP method is based on three key steps in which are (1) decomposition, (2) comparative judgement, and (3) synthesis of priorities [16]. This research utilized both primary and secondary data collection methods to get insight into the broiler industry. Primary data were gathered from interviews with four key senior officers from local growers with positions ranging from Managing director to chief business officer. The pairwise comparisons were developed based on key information in the secondary data and input from an experienced chief business officer of a local grower. Special briefing to all selected respondents had been conducted prior to the fulfillment of the questionnaire.

3 Determination of main and sub-criteria

Two approaches had been employed to determine main and sub-criteria that growers consider when selecting local integrators. First, secondary data gathering from relevant articles and journals were carried out in which relevant factors for selection of integrators had been identified. Then, an interview with a chief business officer from a local grower establishment had been conducted to further verify the aforementioned factors and to determine important criteria and the sub-criteria. The following Fig.1 illustrates the main and sub-criteria. Table 2 defines the operational definition for each criteria and sub-criteria. Table 1 depicts the measurement scale that is used in this study and is adopted from [7].

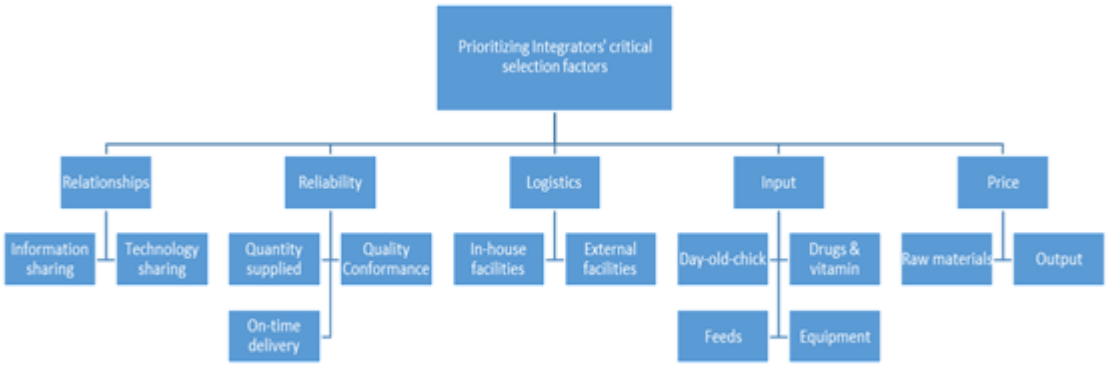

Figure 1 The hierarchy

Table 1 Measurement scales of the level of importance

Importance Level	Denotation	Definition
1	Equally preferred	Both factors in consideration are of equal importance
3	Moderately more preferred	Experience and judgement shows a slightly more preference of one factor than the other
5	Strongly more preferred	Experience and judgement strongly favour one factor over another
7	Very strongly more preferred	An activity is favoured very strongly over another; its dominance demonstrated in practice
9	Extremely more preferred	The evidence favouring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values	When compromise is needed. Judgments can reveal an evenly matched preference between the levels of importance

Source: [7]

Table 2 Definitions of the criteria and the sub-criteria

No	Criteria/Sub-criteria	Definition
1	Relationships	The extent of which integrator is willing to foster closer relationships with the grower in terms of sharing of information and technology
2	Reliability	Measured by how reliable is the integrator in terms of quality conformance, accuracy of quantity order fulfillment and on-time delivery
3	Logistics	Refer to whether Integrator has available in-house logistics facilities or external 3rd party logistics (3PL)
4	Input	Relevant input factors of which are offered in the form of chicks, drugs and vitamin, type of feeds, and equipments.
5	Price	Price of the raw materials (input from integrator) and output (buyback price)
6	Information sharing	Willingness of the integrator to share relevant information with the grower
7	Technology sharing	Willingness of the integrator to share the technology and assist the grower how to use them
8	Quantity supplied	Ability of the integrator to supply to grower's demand in terms of quantity
9	Quality conformance	Ability of the integrator to supply quality inputs based on predetermined standards
10	On-time delivery	Ability of the integrator to deliver grower's orders on-time
11	In-house facilities	Capability of the integrator to provide in-house logistics support and facilities to the grower
12	External facilities	Integrator favors the usage of a 3rd party logistics provider to deliver grower's orders
13	Day-old chick	Ability of the integrator to supply 'a day-old chick' to the grower
14	Drugs & vitamins	Types of drugs and vitamins that the integrator use to breed chicks
15	Feeds	Integrator's types of feeds given to the chicks
16	Equipment	Types of equipment and technology that integrator used to breed chicks
17	Raw materials price	The price of chicks and other relevant raw materials the grower has to pay
18	Output price	The buyback price the integrator is willing to pay to the grower

4 The Computational Works

The analysis had been conducted using decision making software, the Expert Choice. For the pairwise comparisons, input from four (4) important respondents were gathered and analyzed. Geometric means were then calculated to determine group judgement. At the end of the analysis, consistency test was carried out.

Table 3 Weights and priorities of each criteria

	Weight of each main criteria with respect to the Goal					
	P1	P2	P3	P4	average	**Rank**
Relationships	0.468	0.044	0.045	0.061	0.098	**4**
Reliability	0.222	0.458	0.441	0.358	0.406	**1**
Input	0.147	0.127	0.186	0.140	0.168	**3**
Price	0.075	0.291	0.246	0.351	0.232	**2**
Logistics	0.089	0.079	0.083	0.091	0.096	**5**

The result in Table 3 indicate that reliability had been given the highest priority, followed by pricing factor, input criteria, relationships with the integrator, and finally the logistics facility. Both reliability and pricing factors were dominantly important, accountable for 63.8% from overall weight with respect to the goal. The least important factor was the logistics. For the overall sub-criteria, Table 4 show

that reliability in terms of supplied quantity had been ranked number one, followed by price of raw materials, availability of day-old chick, quality conformance, technology sharing, and in-house logistics facility. The bottom half of the ranking saw on-time delivery made it as the seventh important sub-criteria, followed by type of feeds, buyback price, information sharing, drugs and vitamins, the equipment used, and finally the 3rd party logistics provider. The results show that reliability in terms of quantity supplied, the price of raw materials, and availability of day-old chick are the top three most important factors that growers consider when selecting integrators. Quality conformance, technology sharing and in-house logistics facility made up the next three high prioritized factors. At the other end, external 3rd party logistics provider, type of equipment used, and type of drugs and vitamins had been ranked as the three least important factors by the growers.

Table 4 Synthesized results of sub-criteria with respect to the Goal

	Synthesized results with respect to the Goal					
	P1	P2	P3	P4	Average*	**Rank**
Relationships						
• Information sharing	0.71	0.006	0.007	0.008	0.033	**10**
• Technology sharing	0.10	0.029	0.028	0.041	0.065	**5**
Reliability						
• Quantity supplied	0.296	0.305	0.277	0.239	0.271	**1**
• On-time delivery	0.080	0.067	0.053	0.046	0.058	**7**
• Quality conformance	0.055	0.116	0.121	0.104	0.092	**4**
Input						
• Availability of day-old chick	0.122	0.085	0.117	0.093	0.112	**3**
• Drugs & vitamins	0.048	0.018	0.031	0.027	0.032	**11**
• Type of feeds	0.032	0.049	0.048	0.044	0.047	**8**
• Equipment used	0.017	0.015	0.017	0.014	0.018	**12**
Price						
• Raw materials	0.169	0.194	0.155	0.234	0.154	**2**
• Output (buyback)	0.019	0.049	0.077	0.078	0.040	**9**
Logistics						
• In-house facilities	0.070	0.053	0.052	0.060	0.064	**6**
• External 3PL	0.009	0.013	0.017	0.012	0.014	**13**

**the average is calculated using geometric mean formula*

Overall inconsistency for decision maker P1 is 0.08, P2 is 0.07, P3 is 0.08, P4 is 0.09, while for the group judgement (combined geometric mean) the inconsistency is 0.05. Since all inconsistency is less than 10%, then the pairwise comparison is valid. In the meantime, sensitivity analysis had been carried out to measure how changes in certain criteria or decision maker's priority influence the prioritization of other criterion or the alternatives hierarchy. Using the Expert Choice software, both performance and dynamic sensitivity analysis had been performed. Fig.2 and Fig.3 below illustrated the hierarchy and the prioritization order. Fig 2 illustrated the weights and the prioritization order of each sub-criterion with respect to the main criterion. In Fig.3, it is highlighted that technology sharing, quantity supplied, availability of day-old chick, in-house logistics facility, and raw materials prices were given the highest

weights for each main criteria. Nonetheless, the prioritization order may change upon changes in decision makers' preferences. If closer relationships with integrator is given the highest priority (let assumes an increase of 21.3% for the weight of the relationships criteria from 9.8% to 31.1%), then technology sharing becomes a number two alternative closely behind quantity supplied but way ahead of other factors. Technology sharing will become the most important alternative if the weight of the relationships factor increases to more than 32%. Had a decision maker given more priority to the input factor, the prioritization order will change accordingly. For instance, an increase of weight for the input factor from 16.8% to 35.9% will push the availability of day-old chick into the summit of the prioritization order. Performance sensitivity analysis had indicated that when the price factor increases from 23.2% to 40%, the price of raw materials becomes the most important factor in the prioritization ranking, followed by quantity supplied and output prices. However, it is also worth noting that only with substantial changes in one criteria or decision maker's priority can affect the prioritization order.

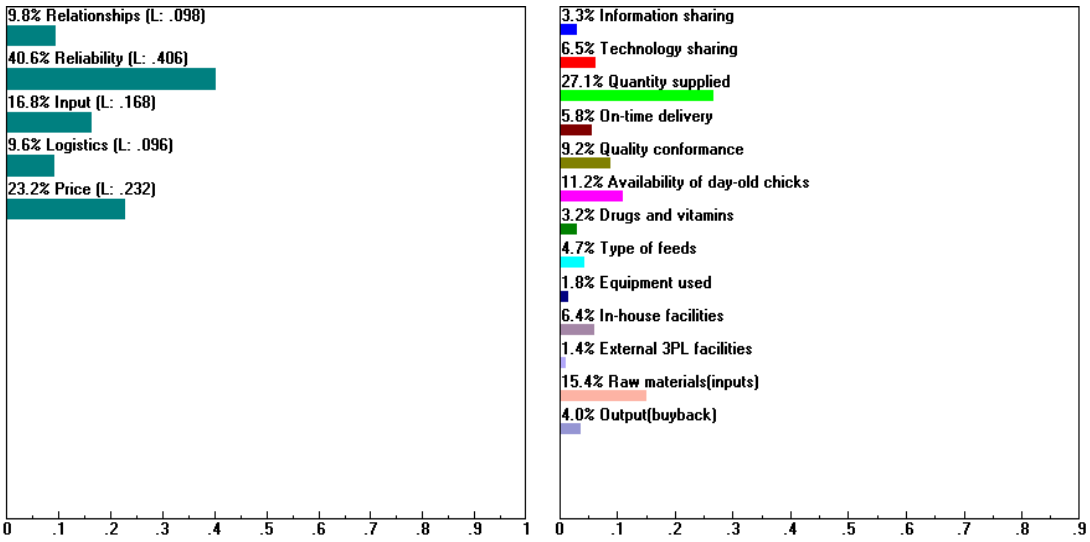

Figure 2 Dynamic sensitivity analysis for the criterion and sub-criterion

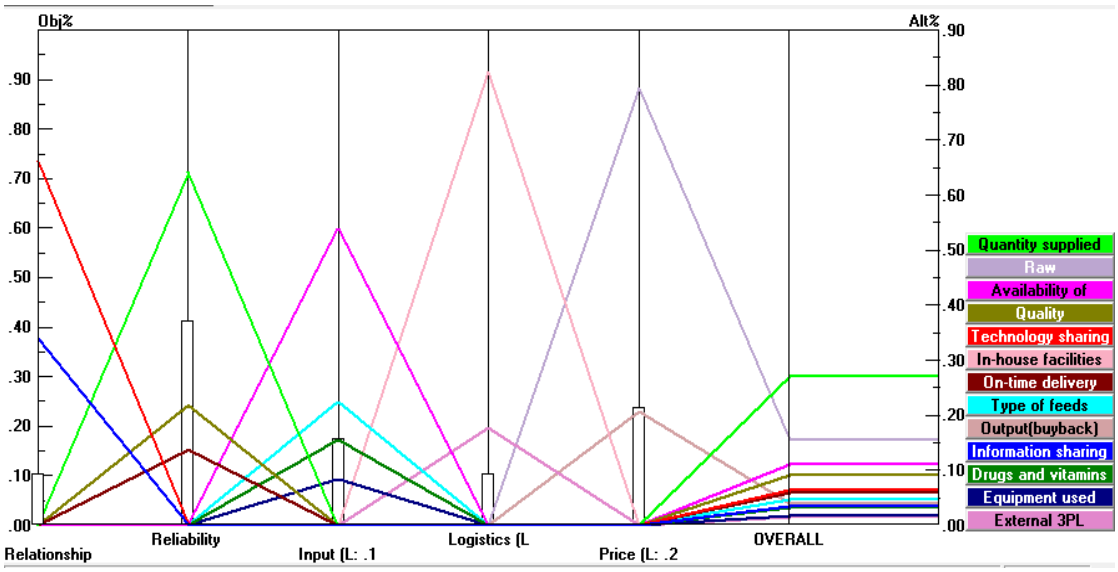

Figure 3 Performance sensitivity analysis for the criterion and sub-criterion

5 Discussion and recommendations

The study aims to facilitate local growers' selection of integrators by determining and prioritizing relevant important factors. Selecting competent and reliable integrators is crucial to the survival of growers in which one is expected to assist the latter in terms of raw materials, equipment and technology, feeding and hatchery, logistics and other support services. The findings show that reliability, followed by price had been given the highest priority when selecting potential integrators. Apparently, having reliable supplies (accuracy in terms of quantity), reasonable and competitive raw materials' prices, and consistent availability of day-old chick had been identified as the top three most important factors. The result, however, may not be generalizable due to small number of respondents. From all four selected respondents, only one stated that relationships was the most important factor when selecting potential integrator. It is therefore concluded that growers prefer a fully integrated partner that has both vertical and horizontal supply chain capabilities. Nonetheless, the extent of which a grower has actually had the luxury to 'select' reliable integrator instead of the integrator choosing its preferable grower remains debatable as the latter has more bargaining power (as well as resources). Hence, avenue for further research may include investigation over integrators' view for grower selection criteria. Potentially, it is an attempt to establish a more holistic supply chain perspectives of Malaysian local broiler industry. The study can also be generalized by getting more respondents from local broiler industry to participate in the survey. This may include key officers from both integrators and growers.

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An Overview of Procurement Methods in Building Construction Projects

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Abstract There are extensive literatures and studies been done on procurement methods. As a result, different sets of issues and analysis have been proposed by the previous researchers. However, there is still lack of studies that looks into the subject matter of key criteria strategic procurement for building construction. This review paper will re-assess the current practices of the available procurement methods for building construction in Malaysia and identify the key procurement selection criteria to develop an effective decision-making framework. There will be two parts in this paper: First, a review on the various types of procurement methods that commonly used in Malaysia building construction industry. Second, a review on key criteria influencing the selection of suitable procurement methods is accessible. As a conclusion, there is no best procurement method but the development of suitable change management strategies would allow organisations to move towards a better practice.
Keywords building construction industry, procurement, key criteria

1 Introduction

Procurement method defines the management functions of the in project execution and the process by which the finance design, construction, operation and maintenance activities of a project are executed. It also establishes the roles, responsibilities and risk allocation of the parties involved in a project and how the owner pays for the services. An appropriate procurement strategy will have great impact on project schedule, cost, quality and contract management. There are many different types of procurement methods that have been developed to overcome the weaknesses of the existing procurement method and to meet the range of service requirement. The decision makers are faced with challenges when it comes to selecting the most appropriate procurement method for a specific building as different types of procurement methods suit different types of projects. Selection of procurement method has a significant importance effects on the project performance in terms of responsibilities and liabilities [1].

Nowadays, numerous method of procurement method has been established in building construction procurement in delivering project in order to fulfill the complexity of projects. The most general types include: Traditional method also known as Design-Bid-Build (DBB), Design-Build (DB), Management Contracting, Construction Management (CM), Project Finance and Partnering. They have their own characteristic in terms of risk allocation, responsibilities, activities involved, price certainty and so on.

2 Traditional Procurement Method or Design-Bid-Build (DBB)

Traditional procurement method is name as traditional due to it had been exist for a long time in construction industry and it is only choice for clients to adopt for the past few decades [2]. [3] mentioned that traditional procurement methods are used to describe procurement which involves the appointment of design team by client to produce a full construction design before tendered by contractor for the contract [4]. Traditional procurement methods are pre-defined cost before the commencement of construction work therefore it results in maximum cost certainty but the sequential construction process required longer

time than others procurement methods. Besides that, it is also inflexible in terms of design changes which result in extra cost and project implications. The clients appointed a lead consultant to carry out the design work and prepare the contract documents and bill of quantities with assistance of quantity surveyor. A bill of quantities which had been clearly provides a clear description of item for element of building. Then the contract will enter into a tendering stage by providing a where allowing contractor to tender for the project. The presence of bill of quantities can provide certainty of price to client and protect the position of client. Bidding process is allow tenderer to submit the tender documents which prepared by professional consultant team and allow the client to select an appropriate contractor through various factor and requirement for example, pricing factor, reputation of tenderer, financial power of tenderer and etc. After tender interview and discussion with professional consultant team, a client can do a better decision making on most suitable tenderer for building contract [5]. Contractor's obligation is by taking contract to construct the project in accordance to the requirements of the client and professional consultant team. Construction stage can carry out by contractor once client pass the site possession to contractor. Contractor must act accordingly and comply with the instruction given by the consultant team (either architect or engineer).

3 Design and Build (DB)

According to [6], due to the separate of design and construct for (DBB), it prolonged the time and causes the cost overrun concurrently. Therefore, Design and Build been introduced to overcome the above-mentioned issues. Any organisation management relationship can apply to this procurement method and responsibility solely allocated to contractor. Contractors replace the design consultant liability and takes place to design the project and also construct the building according to their proposed design which previously approved by client. The design consultant team just direct report to client in order to seek for solution and this reduce a lot of time [7]. When tendering process, tenderer can submit proposed design with clear description and present it to client during tender interview. Normally, due to time constraint, client would choose to apply DB procurement method. Sometimes, client who lack of knowledge and experience also can impose this procurement method and select the most suitable tenderer as their contractor to design and construct for the building [8]. Besides that, combination of design and build stage into single process in this procurement method can significantly reduce the time required and ensure the cost can be lower [9]. This can help the client to ensure a smooth and strong financial ability to be proceed and continue contribute within project duration [10].

4 Key Criteria for Procurement Selection

[11] categorized the selection criteria into three types which are clients' requirements, project characteristics and external environment or can be classified as two groups: external and internal environment. External environment can be influenced by social culture, policy of politic, growth of economic and technology factor. Those external environment key criteria which are cannot control by the project participant. Internal environment factor are happen on project organisation which are project difficulty, client characteristic, goals that established by client, This internal environment factor can be control and adjustable by project management team. Time, cost and quality related to project are the key component that goals established by client which is client requirement. [12] had summarized the list of client requirement that might affect the selection of procurement methods on Australia construction industry. As a result, the requirements are speed, risk allocation, complexity, quality level, cost certainty, price competition, dispute and arbitration, time certainty, flexibility and responsibility. [12] also conclude that only time certainty and price certainty are definite criteria due to the completion date and price can be objectively predicted by the client at the initial stage. In contrast, the other seven criteria were regarded by the experts as subjective.

[2] categorised the criteria into 5 categories which is socio-economic consideration, client requirements, capital cost, procurement policy, and project characteristics. Socio-economic consideration consists of political consideration, public/private sector projects, market/economic conditions, and emerging technology. Client requirements consist of client's specific requirement, political interences, globalization and client's level of knowledge. Capital cost as third group only involves client's budget/cash flow. Procurement policy comprise of affirmative action/government policies and funding arrangements. Project characteristics as last major factor include influence of the life cycle of the project and size and technical complexity of project.

[13] illustrated that the procurement criteria practices by clients in Banda Aceh, Indonesia are timing, controllable variation, complexity, quality, price certainty, competition, responsibility and risk avoidance. During the consideration of procurement implementation, it can be divided into four categories which are participation, approval, supervision and contractor performances. [14] had identified the procurement methods selection criteria in Iraq construction industry with total of seventeenth criteria: quality level, speed, responsibility, flexibility for changes, price competition, project size, technology, certainty of cost, risk avoidance, complexity, accountability, familiarity, time, predictability, client involvement, availability of procurement methods in the local market, legal issues and project type.

[15] said the selection of appropriate procurement methods is a key decision in terms of achieving client's goals while an inappropriate choice could resulting into cost overrun, time overrun and potential dispute between parties. [15] had evaluated all the critical selection criteria where it could be classified into four major areas of core consideration which are: Project Technicality, Project Business Case and Financing, Project Risk Management and Public Policy requirement.

[16] reveals clients can be divided into two types which are public clients and private clients. Either one of the client tend to have different factors on the procurement selection. The criteria been identified influencing the selection procurement methods in Malaysia construction industry are identified as quality level, responsibility, price certainty, competition, time, controllable variation, price completion, government projects, complexity, risk avoidance, and familiarity of clients' on method of procurement.

Various studies have adopted the [17] as references to established the key criteria of procurement selection (e.g. [18]; [19]; [20], [21]). [17] states the criteria of procurement selection structure in order to develop requirement of client as following:

1. Speed (when design and construction stage)
2. Certainty (on price and time that contractor promise to client to complete the project)
3. Flexibility in obliging design changes
4. Quality (on contractors' reputation and confidence toward design)
5. Complexity (client may specify precise subcontractor, or constructability analysis)
6. Risk allocation/avoidance
7. Accountability (ability to complete project by time, appropriate cost with good quality)
8. Price competition (include value of money, maintenance costs and competitive bidding)
9. Arguments and arbitration

As refer to the criteria set by NEDO (2006), the researcher tried to compare with other researchers (refer to table 1)

Table 1 Summarize the criteria identified and concluded by researchers

Criteria / Author(s) (year)	Speed	Time Certainty	Price Certainty	Flexibility of Changes	Project Quality	Complexity	Risk Allocation	Accountability	Price Competition	Arguments and arbitration
Ratnasabapathy et al. (2006)	X			X	X	X	X		X	
Hashim et al (2008)			X			X	X			
Love et al (2002)	X	X	X	X		X	X		X	
Chan (2007)	-	X	X	X		X	X		X	
Masterman & Gumeson (2010)	X	X	X	X						
Hibberd & Djebarni (2010)	X									
Hussan and Sedki (2009)	X		X		X	X		X	X	
Thomas (2001)	X	X	X	X		X		X	X	X
Shafik and Martin (2006)	X	X		X	X	X		X		
Peter et al., (2008)		X		X	X	X		X		
Abu Bakar et al., (2009)			X	X	X	X		X		
Babatunde et al., (2010)				X	X	X		X		
Maizon et al., (2006)					X	X		X		
Eyitope et al., (2012)					X	X		X		
Thwala et al., (2012)						X				
Total	**7**	**6**	**7**	**9**	**8**	**13**	**4**	**8**	**4**	**1**

5 Conclusion and Way Forward

This research is important to give insights of the key criteria of procurement method selection in building construction industry. In addition, it specially highlights that some criteria which are frequently been identified by previous researchers. The selection of appropriate procurement methods has become crucial to project success. This paper does provide a reference by listing the criteria most significant as recommended by previous researchers. This review paper finds that there are extensive literature only focus on internal environment criteria which can be control by the project participants. It would be very helpful if other researchers could further investigate the external environment criteria.

Based on the previous literature, the researcher found that a construction project is a way of delivering a solution to the particular business needs of clients whether for investment, expansion or to improve efficiency. Most of clients want high quality functional building, fast for low prices. But successful outcome is achievable only where the complexity process involve are recognized and address appropriately. The development of a strategic procurement should be look into. Therefore, the

researcher will focus into this aspect by investigate and propose a strategic procurement tailored with the unique needs of client, the role of client, strategies brief project and etc in future research.

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E-Procurement and Supply Chain Performance in TM Berhad

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Abstract The research prove that the factors affecting the success of e-procurement system sharing between supply chain integration, information sharing and partner relationships. Based on the understanding those factors the research provides suggestions on how to improve e-procurement system in TM Berhad.

Keywords Interviews, Management of supply chain, Performance of Supply chain, Integration of Supply chain, E-procurement, Survey, Group Procurement TM Berhad.

1 Introduction

E-procurement system had been identified one of the medium in business process in the process of supply chain [1]. Based on previous researchers, e-procurement system basically are the IT based purchase online system and well known at the input process of the supply chain management at any organization [3]. In other words, information infrastructures like E-procurement are growth well in previous years and come together with others technology or infrastructure. This will ensure the success of business activities in the organization are growth well [4]. E-procurement need to growth in line with the changes it IT embedded in the system [2, 3]. Organizations that implement the e-procurement systems are able to generate value because it utilizes information technology resources on supply chain process [14]. The benefits of e-procurement system will ensure the effectiveness in the supply chain process in the organizations.

To ensure success TM Berhad business, e-procurement system needs further analysis and improvement.With E-procurement it will ensure the procurement manager meet the achievement of competency by really understanding the information technology impact in the business management process [8]. This research will examine the integration of supply chain, relationships of partners and sharing in information through e-procurement to ensure the effectiveness of supply chain. E-procurement system will improve supply chain management for TM and its partners

2 Definition of E-procurement

E-procurement is an electronic procurement system or online system that has information technology capabilities, and it also can be called e-business. It has the ability to improve the effectiveness of operation schedule or process in supply chain [4]. Performance for supply chain process refers to the evaluation of supply chain management that includes tangible and intangible factors [11, 12]. Activities of business through information technology can be called e-procurement. Value creation is an important factor in determining the effectiveness of supply chain to the organization [2]. Practical features of E-procurement systems will ensure organizations improve their efficiency based on supply chain value creation. Basically e-procurement has 4 characteristics of functions that are electronic design, electronic evaluation, electronic sourcing and electronic negotiation [3, 4, 6].

With e-procurement, it will be able to produce a useful function for management of supply chain and able to improve the supply chain performance [1, 10, 12]. Integration of Supply chain, relationships

partner and information are processes that connect between performance of supply chain and E-procurement systems.

3 Research Framework

Table 1 represents the research framework that will be used for this study. The DV's are performance of supply chain and integration of supply chain while the IV's is information sharing, partner relationship and e-procurement. E-procurement has divided into 4 dimensions namely electronic design, electronic sourcing, electronic negotiation and electronic sourcing. Partner relationship is divided into 2 dimensions namely reciprocity and bonding. Information sharing is divided into 2 dimensions namely information flow and information quality. Supply chain integration is divided into 2 dimensions namely coordination and integration activity. And lastly supply chain performance is divided into 2 dimensions namely tangible dimension and intangible dimension.

Table 1: Definition of Operational for IV

Variable	***Definition of operational***
Relationship of Partner	A relationship among partners and enterprise
E-Procurement	Consists of 4 functions as below: i. Electronic design ii. Electronic sourcing iii. Electronic negotiation iv. Electronic evaluation
Sharing of Information	Consists of 2 functions as below: i. Information Flow ii. Information Quality
Performance of Supply Chain	Assessment in management of supply chain includes intangible and tangible factors
Integration of Supply Chain	Involves of 2 functions as below: i. Activity integration ii. Coordination

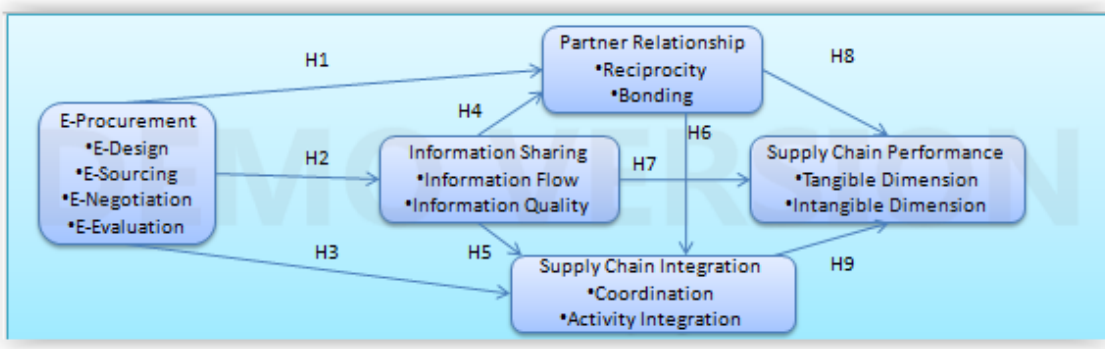

Figure 1: Research Framework

4 Research Methodology

This study used survey research method with questionnaire as the instrument for data collections. The questionnaire is based on previous studies using scale 1 for "Disagree" and 5 for "Agree". The respondents should respond based on their level of understanding and experience.

For the consistency of analysis it showed that the Cronbach Alpha for all variables is well above 0.7, symbolizing that the size used is acceptable.

Table 2: Reliability Analysis

Factor	Variable & Item	Cronbach's Alpha Value
1	Relationships of Partner and E-Procurement	.702
2	E-Procurement and Sharing of Information	.712
3	Integration of Supply Chain and E-Procurement	.709
4	Sharing of Information and Relationships of Partner	.790
5	Sharing of Information and Integration of Supply Chain	.722
6	Relationships of Partner and Integration of Supply Chain	.809
7	Sharing of Information and Performance of Supply Chain	.924
8	Relationships of Partner and Performance of Supply Chain	.765
9	Integration of Supply Chain and Performance of Supply Chain	.763

5 Findings

Out of 200 suppliers, 180 suppliers returned the questionnaire. All suppliers were directly involved doing business with TM Berhad. For table 3, the highest percentage was 1st tier for large supplier 36.6% and SME 19.7 %. Therefore, the total for 1st tier was about 56.3% out of 100%. For 2nd tier suppliers, larger enterprise suppliers were about 2.8% and SME suppliers were about 16.9%. Therefore, the totals for 2nd tier was about (19.7%) out of 100%. For dual tier suppliers, larger enterprise suppliers were about (12.7%) and SME suppliers were about 11.3%. Therefore, the total dual tiers suppliers were 23.9%. For the total amount of 180 suppliers involved for the study, it was considered on 100% completed.

Table 3: Demographic Profile of Respondents

Supplier tier	Company		Total
	SME	Large Enterprise	
1st tier	24 (19.7 %)	26 (36.6%)	50 (56.3%)
2nd tier	11 (16.9%)	2 (2.8%)	13 (19.7%)
1st and 2nd tier (dual	8 (11.3%)	9 (12.7%)	17 (23.9%)
Total	**43 (47. 8%)**	**37 (52.11%)**	**80 (100%)**

Table 4: Cross tabulation between company size and year the business was incorporated

Company Size	Year business was incorporated				Total
	1971-1980	1981-1990	1991-2000	2001-2010	
SME	0 (0%)	3 (4.2%)	18(21.1%)	22 (22.5%)	43 (47. 8%)
Large enterprise	4 (5. 6%)	8 (11.3%)	14 (19.7%)	11 (15.5%)	37 (52.1%)
Total	**4 (5. 6%)**	**11 (15.5%)**	**32 (40. 8%)**	**33 (38%)**	**80 (100%)**

The results of the descriptive analysis for supply chain performance and e-procurement and dimensions are shown in table 6. The mean value for e-procurement is well above 3.50 (where 5 = max and 1 = min), and the standard deviation is less than 1.00. The values suggest that, generally suppliers are aware that e-procurement consists of e-evaluation, e-negotiation, e-design, and e-sourcing,

Table 6: Descriptive analysis of research variables

Variable	*Standard Deviation*	*Mean*
E-procurement	0.336	3.6021
Relationships of Partner	0.240	3.3825
Sharing of Information	0.251	3.3320
Integration of Supply chain	0.343	3.4417
Performance of Supply Chain	0.385	3.3785

Table 7 show the result of the multiple regression analysis between the DV's and IV's. The results clearly display that out of the 5 independents variables, 3 variables (supply chain integration, information sharing and e-procurement) are found to affect the supply chain performance in Group Procurement, TM Berhad.

Table 7 : Coefficients of Regression Analysis

	Un standardized Coefficients		*Standard Coefficients*	*t*	*Sig.*
(Constant)	1.369	.624		2.195	.031
Sharing Information	.290	.111	.303	2.622	**.000**
Integration of Supply Chain	.036	.075	.051	.475	**.002**
Eprocurement	.216	.077	.302	2.793	.007
Performance of Supply Chain	.044	.071	.070	.617	.539
Relationships of Partner	.437	.156	.312	2.793	**.007**

6 Conclusion

This research show how E-procurement benefited has the performance of supply chain in Group Procurement, TM Berhad. E-procurement system is the high tech elements that have of the procurement system containing 4 aspects; that is electronic evaluation, electronic sourcing, electronic design, and electronic negotiation. These 3 intermediate variables play an important role to ensure the success of e-procurement and supply chain management.

This is possibly to capture basic strategies roles and the same to represent the basics of the effect of E-procurement performance in supply chain management. The findings above, shows that these factors are all essential and suitable as linkages between supply chain performance and e-procurement . Based on data analysis, supply chain integration and information sharing are 2 important factors to ensure the effectiveness of e-procurement. Hence, e-procurement system be ensure the flow of information and movement are synchronized between partners in supply chain.

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Theme 7:

Human Resource and Organization Behaviour

Management of Technology (Overcoming Maintenance Competency Deficiency) - The Aviation Maintenance Industry Perspective and Structured on Job Training (S-OJT)

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Abstract Competency (knowledge, skills and abilities) deficiency of employees in an engineering organization is a critical issue as competency deficiency leads to organizational inefficiencies and ineffectiveness. This results in financial losses and organizational failure. For individuals, competency deficiency means incapability and degraded performance. This may results in inability to meet performance targets and eventually affects one's promotion and career development. While many organization attempt to address the employees competency deficiency issues, not everyone's efforts were fruitful. This is true when an organization require specialized knowledge, skills and abilities . Besides, there could be specific issues in overcoming the deficiency that may not be fully understood. If competency deficiencies is critical to both organizations and individuals, and if the organizations and individuals experience difficulty in overcoming this issue, the know how to overcome these competency deficiencies is a must. The purpose of this paper is to describe a process that may be adopted in overcoming competency deficiencies within an organization in an engineering sector such as aircraft maintenance, repair and overhaul facility.
Keywords Competency, structured on job training, organizational performance

1 Introduction

One of the critical issues faced by managers today in an organization is ensuring that its employees have the competency to fulfill existing and future work requirements [1]. [2] defined competency as "things" that individual must demonstrate to be effective in a job, role, function, task or duty. It includes the behavior, motivation and technical knowledge and skills. For organizations, competency deficiency leads to organizational inefficiencies and ineffectiveness. This results in financial losses, organizational failure and sometimes catastrophe. For individuals, competency deficiency means incapability and degraded performance which increases the incident and accident risk. This may results in inability to meet performance targets and eventually affects one promotion and career development.

From the context of aviation maintenance industry, competency of the maintenance personnel is extremely crucial to ensure that the airworthiness and safe operation of the aircraft is maintained at all times. [3] uses the term airworthiness to define the state of an aircraft where the aircraft conforms to its type design and is in a condition for safe operation. In order to achieve the airworthiness of the aircraft to an acceptable level, the aircraft needs to be maintained in accordance to the manufacturer and authority requirements.

[4], described one of the key purpose of maintenance is to ensure that the airworthiness of the aircraft are maintained to meet the manufacturer's and regulatory requirements. Therefore, it is important that the maintenance personnel receive the appropriate training to have the right competency.

According to [5], the maintenance of aircraft has been becoming more and more complex. Technology advancement has caused the aircraft to become more and more sophisticated. The development of integrated avionics systems and composite material structural construction has been

increasingly adopted. While new aircrafts continue to be developed, there are still many airlines which continue to operate the older fleet due to their familiarization of the models and existing infrastructure set up. As the world moves into the new global economy era, the aviation business competitiveness and economic factors requires the aviation companies to minimize the grounding time of aircrafts. These factors has dictated that the need for higher competency aircraft maintenance personnel.

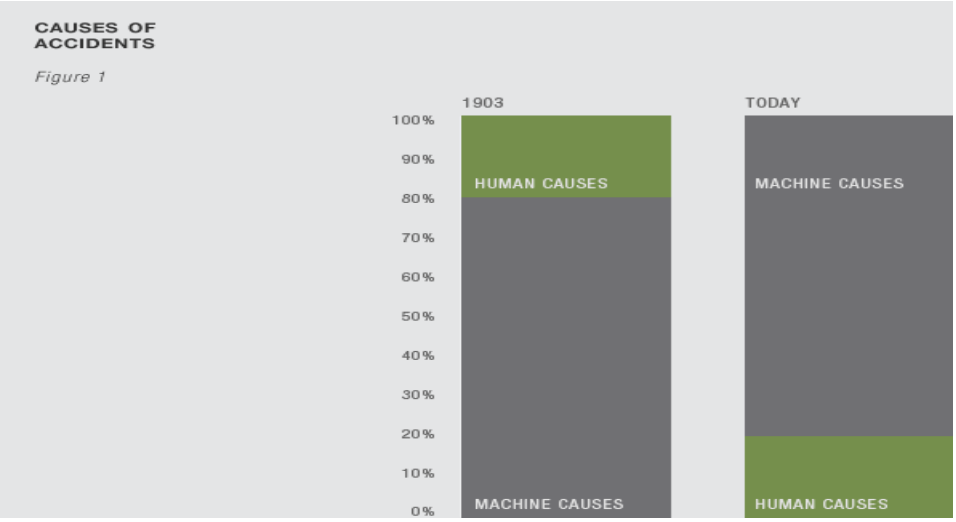
[4] states that the most common aviation authority question when investigating an incident or accident was "was the mechanic properly trained? ". This question arises as the authority needs to know the competency level of the personnel working in the system involved before the incident or accident. This shows what competency deficiency could lead to.

The 2003 International Air Transport Association (IATA) Safety Report found that in 24 of 93 accidents (26 percent), a maintenance-caused event started the accident chain. Overall, humans are the largest cause of all airplane accidents (see fig. 1). Maintenance errors can also have a significant effect on airline operating costs. It is estimated that maintenance errors cause:

- 20 to 30 percent of engine in-flight shutdowns at a cost of US$500,000 per shutdown.
- 50 percent of flight delays due to engine problems at a cost of US$9,000 per hour.
- 50 percent of flight cancellations due to engine problems at a cost of US$66,000 per cancellation.

In the early days of flight, approximately 80 percent of accidents were caused by the machine and 20 percent were caused by human error. Today that statistic has reversed. Approximately 80 percent of airplane accidents are due to human error (pilots, air traffic controllers, mechanics, etc.) and 20 percent are due to machine (equipment) failures

Figure 1 Causes of Aircraft Accidents



Source: http://www.boeing.com/commercial/aeromagazine/articles/qtr_2_07/article_03_2.html

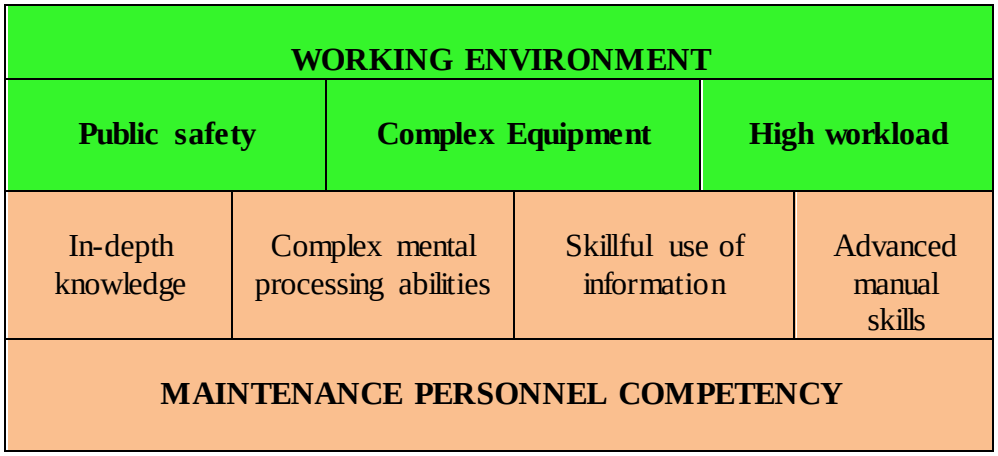
2 Aviation Maintenance Competency Requirements

While many organizations attempt to address the employees competency deficiency issues, not all effort were fruitful. This is especially when an organization require knowledge, skills and abilities which may be very specialize. Further, there could be specific issues in overcoming the deficiency that may not be fully understood.

Though much effort has been initiated to look into human factors such as training to overcome the competency deficiency issue, the statistics above continues to show that the could be some gap involved. There are rules that has been set out by aviation authority [6] detailing the process of qualifying personnel to be competent maintenance personnel. In addition, training facility or institution needs to be certified under FAA Title 14 Code of Federal Regulations Part 147 [7].

Aviation maintenance training is driven by three factors [5] as elaborated below. It is a combination of working environment and the attributes required of a maintenance personnel.

Figure 2 Aviation Maintenance Personnel Competency Perspective



The table above indicates the demand of the skills and knowledge required in aviation maintenance training. To obtain a qualification such as an aircraft maintenance license require a minimum of 30 months working experience working on aircraft airframes and engines [8]. This forms part of the training requirement. It is clear that the training requirements has been clearly stated and yet, [9] research found that there are indeed maintenance that had also been performed by incompetent personnel describing them as unauthorized individual.

Therefore, these indications shows that there are gaps that need to be addressed to overcome these competency deficiencies.

3. Basic Aviation Maintenance Training Principle

If competency deficiencies is critical to both organizations, industry and individuals, and if the organizations and individuals experience difficulty in overcoming this issue, then more needs to know on how to overcome these competency deficiencies.

Due to the continuous report of incidents and accidents, the level of effectiveness of training laid down by CFR has been criticized. According to [10] studies, regular On Job Training (OJT) may not the most effective training in the field due to the variety of multiple skills required by today aviation

maintenance personnel. One of the criticism of the current OJT practices is it tends to be lax as well as unstructured [5]. In addition, training on the field or maintenance facility tends to be carried out on the job without a formal and well-structured set up.

It appear that junior aircraft maintenance technician were attached to senior technicians for unscheduled OJT which appear to be non-systematic. It also appear difficult to ensure that senior technicians teaching process are sufficient to ensure that there is efficient knowledge and skills transfer to the junior [11].

Basic training concepts that are generally being adopted by the society has also been applied to aviation maintenance training. Basic training concepts consist of theory in classrooms setting followed by video or demo presentation [12]. The effectiveness of training is influenced by the format, content and delivery mode that is able to match the trainees need.

[13], advocated an approach known as systems approach. This approach claims to be an efficient training where the knowledge and skills required are delivered at the correct amount at the appropriate time to the learner. Trainers are expected to understand the maintenance task that the learners are expected to learn and later perform correctly. This appear primarily in the classroom setting. There is doubt of the level competency that can be achieved with this classroom approach especially in aircraft maintenance competency.

4. **Structured On-Job-Training Approach**

There is an increasing number of organizations seeking for the right approaches to develop the competency of employees [14]. The approach that is proposed is the structured on job training (S-OJT) [1]. S-OJT is being defined as a planned process by having experienced technicians to train new technicians on units of task in actual work setting. The approach appeared to be suitable for the aviation maintenance training due to the fact that an operating aircraft and it's environment is the avenue where competency will be applied.

According to [1], majority of the training programs in organization are being set in classroom. In reality, employees such as aircraft maintenance technicians learns the most skills and knowledge in a work setting while actually performing their task. Though majority of training institution have good facilities for training, there is still a vast difference between training facility and actual work setting. As the S-OJT utilizes the workplace as the training and learning setting, this presents a closest learning condition for a learner.

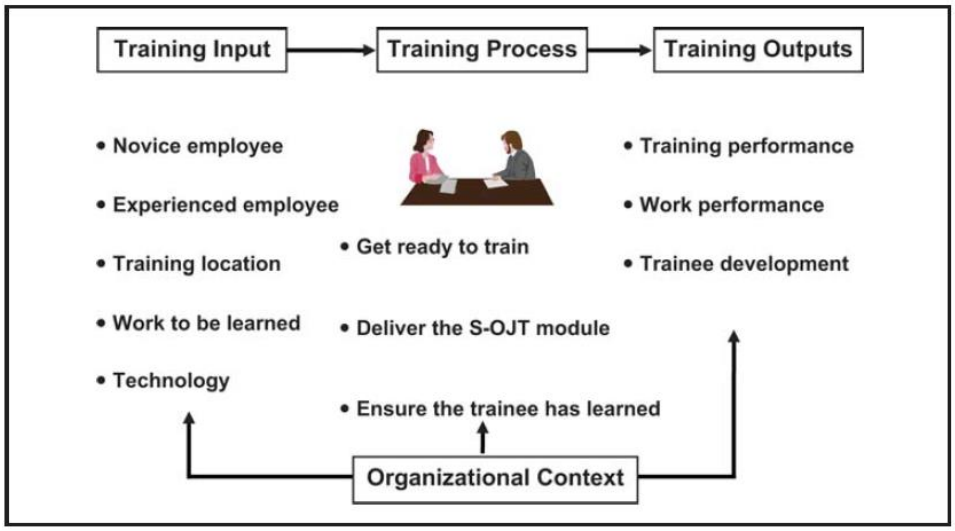
Due to proximity of this this approach to the actual working environment, the level of predictability of training effectiveness improves as it is being conducted by mostly senior technician in a working facility. S-OJT has a flexibility where the training approach can be initiated as and when the need arises with minimal demand on special arrangement within an organization.

As S-OJT is being conducted in an actual working environment (aircraft maintenance facility), supervisors and managers may serve as trainers who is able to emphasize the specific skills and knowledge thereby effectively transferring the core knowledge and skills that is essential for the task. This directly address the competency areas that is crucial for the task or work. Generally this process involves the actual work setting, learner (new technicians) and trainers (manager, supervisor and senior technicians).

The process [14] covers getting the trainer ready, learner ready, training events during delivery of the training and means used including periodic feedback, follow-up observations and performance rating with the objectives that the learner has been able to pick up the content of the training. The S-OJT ends with a results of achieving the objectives of the training, impact on work and individual self-development progress. Eventually, the organization is able to ensure that its competency are available as it continues to sustain and move forward.

The basic principle of S-OJT system is displayed in figure 1 below. S-OJT research is an emerging trend especially in the Malaysian aviation industry to attain its aviation maintenance competencies.

Figure 3 Display of the S-OJT System



Source: Jacobs & Bu-Rahmah [1]

5 Conclusion

Though competency is an issue within an organization as well as its employees, S-OJT approach can be adopted to address this competency issue. The main area of focus of S-OJT is the training efficiency and training effectiveness. Training efficiency includes the reduced time for the training session while achieving the knowledge and skills required in aircraft maintenance field. The outcome of the training includes improved work performance, training performance as well individual development. This it-self brings the financial benefits in-directly. The training effectiveness outcome results in improved work outcomes. This include lower error, higher airworthiness of aircraft, more effective trouble shooting skills and knowledge as well as lower incidents and accidents. To adapt the S-OJT in an organization, will require application in an organization to experience its benefits.

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Behave Yourself Please! Start Saving Lifes

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Abstract Behavior Based Safety (BBS) is a term used to portray the avoidance of mishaps, wounds and misfortune at the work place. Everyone is responsible for the safe working conditions throughout the organization. The objective of the BBS has been to urge workers to ingrain safe behaviour, whereby people perform safety faithfully. The organization needs to address the components of leadership, inspiration and knowledge in actualization the BBS. These components would impacted the organization on how they acted upon towards safety. The industrial players are responsible to coordinate in designing an underlying safety administration system, for the industry. Applying the proposed safety system, organizations may share the benefits and in a long term, enhancing the execution and their corporate image.

Keywords Behavior Based Safety, Management, Safety, Occupational Safety

1 Introduction

Top Management usually plays an important role and responsibility towards safety program implementation throughout their organization. Accident prevention and other safety coordination are given a priority and delegated to responsible person as their main key performance indicators (KPIs). Alternatively, the industry can apply Behaviour Based Safety (BBS) concept to manage safety matters such as the prevention of accidents, injuries and loss at the workplace. It includes the utilization of safety issues faced by the workers in their working environment. Every individual are responsible for their own safety as well as of others [1].

2 Literature Review

2.1 Safety Culture Behavior

BBS is a method dealing particularly to enhance safety and health at work place. It is a practice that conform to both perception and criticism towards the individual concern that is superiors and subordinates to change their behavior [2].

The concept of "Total Safety Culture" is the ultimate goal for most organization. However it is rarely defined and the enculturation of total safety is yet to be seen especially within organization. A comprehensive safety culture should inclusively touch on culture. Thus, in culculating safety, the organization should embrace traits listed below [3];

1. Individuals must practice safety as a 'value' element and not just a mere priority;
2. Individuals must uphold of the safety of their co-workers inclusive to themselves; and
3. All employees must willingly and able to respond to their sense of responsibility and act 'beyond the call of duty'

BBS is about recognizing on potential changes and reactions resulting in the promotion of positive responsibility at all levels. While excluding faulting, blaming workers and ignoring hazards. This leads to performance enhancements [3].

Interventions is being used in people focused behavior-based approach. It can be exercised either by incorporating group obervation or one to one observation of workers performing routine work, undertakings, setting objectives painstakingly and of giving auspicious input on safety related conduct, honing and tutoring [4].

2.2 The Current Scenario

The occupational, safety and health (OSH) standards applications are distinctively different among countries. These can be seen with various approaches by nations in dealing with enactments, directional, requirements and incentives for coherence to guarantee work related safety. For examples, The Health and Safety at Work Act 1974, has been applied among employers and employees in United Kingdom, while United State implemented the Occupational Safety and Health Act 1970. Another type of OSH, called the Occupational Health and Safety Act 1993 is being officially used in South Africa, while Malaysia is adhering to the Occupational Safety and Health Act 1994. Although this depends on the consenting owner or directors, these examples explained the fact that, it is optional for any organisations to used or implement the OSH in accordance to their respective localities [5].

Another outline that we can examine is the U.S. National Mining Association's (NMA) CORESafety HSMS that was used to light up the observational examination in the mining ventures. The NMA CORESafety HSMS contains twenty distinctive components, which addresses the specific risks and dangers associated with mining [6]. The NMA CORESafety handbook demonstrates that the twenty particular components are reliable with the ANSI/AIHA Z-10 and OHSAS 18001 agreement principles and adjusts its twenty segments under the conventional HSMS cycle as appeared in table 1 below [7].

Table 1: Organization of CORESafety's 20 components under the generalized HSMS system cycle

Health and Safety Management System Framework																				
Plan	**Do**													**Checking & Correcting Action**		**Management Review**	**H & S Policy Commitment**		
1. Fatality Prevention & Risk Management	2. Training & Competence	3. Change Management	4. Contractor Management	5. Emergency Management	6. Collaboration & Communication	7. Reinforcement & Recognition	8. Work Procedures & Permits	9. Health Optimization	10. Culture Enhancement	11. HR & Labor Relations	12. Behavior Optimization	13. Engineering & construction	14. Documentation control	15. Compliance & assurance	1. Fatality Prevention & Risk Management	16. Incident Reporting & Investigation	17. Safety & Health Management Assurance	18. Leadership Development	19. Responsibility & Accountability	20. Management System Coordination

Source: Haas, E. J., & Yorio, P. [7]

Table 1 explains the general framework of HSMS systemcycles starting from the planning stage until Health & Safety Policy Commitment. It comprises 20 components which clearly defines the specific risks and hazards associated with mining industry. Eventhough those components are derived based on mining industry, its usage and application kinda broad as all the components highlighted are significant in maintaining and ensuring safety in the organization.

3 Discussion

3.1 Element That Affect Safety Behaviour

To ensure behaviour of the organization is inline with safety objective, there is a need for several elements to support the safety behaviour. These elements will be further explained in the paragraph below.

1st Element: Leadership In Safety

As has been mentioned earlier, BBS is about everyone' behaviour, consequently the action and support of the top level management would have a positive impact to the safety behaviour of the organization. A good leadership skills would impacted positively on their followers' bevaviour [8]. Alternatively, poor leadership skills may lead organization failling in business, create conflicts between staffs, distructing teamwork, seen as rude and cruel, selling out trust, and other negative impacts of leader's action [9, 10].

The top management supports can expand from on-going trainings to giving adequate signs, publications, and other visual guides, meeting room, individual defensive gear (IDG), and others. Workers are prone to support these backings that improve work environment safety by responding their dedication to the system [11].

Therefore, continous support through out the organization ranging from the employees and top management have a strong relationship in achieving the safety objective of the organization. These type of support will inspire every member of the organization to work hand in hand toward fulfilling the safety objectives.

2nd Element: Inspiration In Safety

Safety inspiration can be defined as "an individual's readiness to apply and to authorize safety practices and the valence connected with those practices" [12]. Additionally, another reason on why workplace directions do not take place resulting in working environment mishaps is, the absence of inspiration with respect to safety issues. Consequently, inspiration is the missing element in realising health and safety measures in the organizations [13].

Recent study on the Swedish working environment noted that, the ambiance of working environment have enhanced in the safety context throughout the year. But, it is still facing problems such as work accidents and sick absences. Therefore, individuals need to comprehend, safety behaviour based on safety inspiration. Efforts ought to be made to build up safety inspiration within the organization [14].

Pre-emptive Occupational Safety Health (OSH) administration will embrace their staff to be connected for positive results regardless of challenges, which denotes the interest in health and safety [15]. It noted that an organization with proactive OHS administration would have (15):-

- Higher overall revenues and lower mishap rates however the distinctions neglected to achieve significancy,
- Clearly, a more positive health atmosphere judgements found in over eight out of the nine safety conditional measurement,
- Incremental staff job satisfaction that lead to job commitment.

Consequently, there is causality influence between inspiration and safety. In this manner, the more grounded the safety inspiration among workers, the more eager they are to practice safe practices [16]. As a result of this, it is essential for both workers and safety champions to stay spurred with a specific end goal to make a more safer working environment [17].

3rd Element: Knowledge In Safety

Another element that needs to be addressed in order to create the correct set of behavior toward safety is knowledge. The element of knowledge can either comes from external or internal factors in any organization. A dynamic contribution from outside specialists give an additional advantage in inciting the improvement of a learning lobbyist kind of individual from the Occupational Safety and Health Committee [18] and would take working environment OSH to a more elevated [19].

The Safety and Health Committees (OSHCs) additionally could also act as a channel for learning creation inside the organization. While individuals from OSHCs and business leaders alike would have a clearer understanding of the principle elements of OSHCs and how they are inseparable connected to inform administration [19]. The individuals OSHCs and another individual from the organization needs to distinguish and shares their prosperity and disappointments stories in executing safety practices organizational wide.

The idea of sharing knowledge in safety is not in fault finding, it is about learning from each other's experiences. The safety committee will need to work together to come up with a proper solutions and plan it accordingly, as preventive measures. Through these exercises, an organization involves in Meta-Learning process which embraces outcome of critical relationships (for example-feedbacks from previous actions) for creating and maintaining safety value by continous development [20]. It will not just influence the behavior, but at the same times enriching the knowledge for the organization itself.

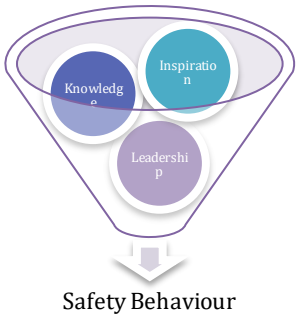

Figure 1. Safety Behaviour's Element.
Source: adopted from various articles; Shamir et.al [8], Neil & Griffin [12], Ummu Kolsome Farouk et.al [19]

Based on the three elements mentioned in figure 1 above, it can be deduced that the organization need to address them in order to influence positively the safety behaviour in the organization with a right approach(es). It would have a very strong influence on how the organization would have react and behave towards safety.

4 Conclusion

In conclusion, the ultimate goal of BBS is to encourage employees to instil safe behaviour as a habit. Whereby individuals perform works safely [21] while knowing that it would save their life and limbs. To meet this goal, the organizations concerned need to be more proactive in managing safety. The organizations need the elements of knowledge, inspiration and leadership in order to execute successful BBS. These three elements would ensure organizations have very strong positive influence on how their entire workforce behave towards safety. Proactive OSH administration is connected to positive results, which underlines the significance of interest in health and safety.

Additionally, all players of the industries have to coorperate in developing an initial framework for multi firm industrial safety management with other stakeholders. They should rethink to open the

notion of "togetherness" and work cooperatively to improve the industrial safety performance as a whole at the industrial zones relationship. Through this exercises, organizations from every industry may share the benefits and in the long term, improve their performance and corporate image [22].

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Predicting Organizational Citizenship Behaviour with Leadership Style, Ethics and Transformational Leadership in South Asian Perspective: A Case of Pakistani Firms

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Abstract The basic purpose of current study is to investigate how leadership ethics, transformational leadership and leadership style is associated with organizational citizenship behaviour and what is their impact in South Asian context, specifically in Pakistan. Data was collected through self-administered questionnaire which was distributed among staff of public and private sectors, which were holding managerial and non-managerial positions. SPSS version 17.0 was used to analyse the data. The survey consisted of various sections like demographics "Organizational Citizenship Behaviour", Leadership style, Leadership Ethics, and Transformational leadership. Findings and the result of this research indicate that there is strong relationship between organizational citizenship behaviour and various other factors i.e. leadership style, transformational leadership, and leadership ethics. All the variables are positively and significantly correlated. Moreover Organizational Citizenship Behaviour was predicted by leadership style, transformational leadership and leadership ethics. Although we tried to chart some new boundaries in south Asian context how various aspects of leadership impact on OCB and what is their relationship among each other. However this study was cross sectional in nature and longitudinal study is required for generalising results with more validity. As the data was collected from single source, that is, from managerial employees only and not the leaders, it is difficult to analyse that the respondents of this survey are un-biased and fair. Although the views from public and private both sectors are included from Punjab, Pakistan but for more generalisability other south Asian countries should also be included. When we considered various aspects of leaderships with OCB, consistent with the previous studies, leadership ethics and style is strong predictors of citizenship behaviour of employees in both sectors, public and private. As the data was collected from organizations that deal in health, telecommunication, educational sector or financial services, these are the major sectors of an economy that contribute to GDP. Policy implications of this study are discussed. There are very few studies that relate leadership with OCB although various other antecedents of OCB have been investigated in south Asian countries. This study will chart new boundaries for future researchers in the field of business management and social sciences.

Keywords Organizational Citizenship Behaviour, Leadership Style, Leadership Ethics, Transformational Leadership.

1 Introduction

Organizational citizenship behavior (OCB) construct has been researched from various perspectives since the era of 1970 that increases the curiosity of organizational citizenship behavior practices because of its organizational importance. Organizational effectiveness and efficiency are enhanced through organizational citizenship behavior. First research work was done on Organizational citizenship behavior by Katz in 1964 and after this plenty of researchers were attracted to this construct that resulted in various books, articles and measurements scales. Later on meta-analysis were also published to establish credibility. Dennis Organ works on the Katz theory in 1988 and explains the organizational citizenship behavior. Dennis Organ is also known as the father of OCB. He defines OBC

as "Individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system and that in the aggregate promotes the effective functioning of the organization" (Organ, n.d.). Organizational effectiveness is effects by OCB aspects. These critical aspects are three in number. First, this definition explains that the actions are voluntary in nature without any compulsion and not part of duty and done without expecting any formal reward. Secondly, "discretionary individual behavior" provides a free decision making environment which tends to effect the organization in a positive or negative sense Third critical aspects when you provides the unrestricted or limitless free environment to individual for decision making or give own choices irrespective of the reward will results overall effectiveness and efficiency of the organization.

1.1 Global Perspective:

Organizational citizenship behaviour is multidimensional construct with diversified and wide range of meaning. As OCB is broader and wider concept that functionally affects organizational effectiveness through various perspectives and dimensions. It is actually the precursor of organisational success and performance. Notion of Organizational citizenship behaviour has classification like empowerment, leadership, gender and management etc. As for as Gender classification is concerns in organizational citizenship behaviour female and male have their own choices and perspectives. Similarly in organization the individuals have their own methods for handling and accomplishing the task which they assigned by supervisor or manager.

Organizational citizenship behaviour practices enhance effectiveness and productivity in world-wide. In this era of global village there are many dimensions of OCB which have effect organization such as loyalty, sportsmanship, organizational commitment, organizational justice, leadership ethics, leadership behaviour, leadership style and others. Due to broader concept of OCB it is impossible to explain it in one article. OCB provides comfort and it also helpful in decreasing stress and tension. "Google" is the very innovative and famous company in this globe. The Organizational citizenship behaviour is practiced in Google because there is no fixed time limit for working and no deadline to complete the tasks, individuals working on the project without any restriction and resultant the productivity proliferation irrespective of award system, without involving tension and stress. Many other companies like Microsoft, Intel, Apple, and IBM, implemented citizenship behaviour in letter and spirit. The organization citizenship behaviour concept exercised globally in various multinational organizations, these practices are implemented according to nature, where organization needs and in different departments. Leadership commitment, knowledge sharing leadership, leadership power, leadership style, leadership management, leadership ethics are some essential variables that influenced on organizational leadership behaviour.

Leadership ethics are very important in organizations because it is the values and priorities you put on morality and reveal through how leader behave with his colleagues and followers as individual human being. The leadership style is also significant because it shows how the leader behaves to its sub-ordinates because it leads towards knowledge sharing and resource sharing. Leadership style also shows that how the individual understand the leader and how the leader communicates with him. Leadership management and commitment are also key aspects of OCB concept. The above described variables are included in OCB concept and those which are not include significantly affects the organization citizenship behaviour. In developed countries the concept of OCBs, is implemented comprehensively and also groomed with high velocity. OCB is important very effective in organization that's why they made up a part of research and development to enhance the aspects and concept of OCB. The key purpose of R & D to determine the variable that reduces the overall effectiveness of the organization and issues that are associated positively with the behavior in OCB through this and increases the performance of the company (Karam, 2011)
(Mayfield & Taber, 2010).

1.2 South Asian Perspective:

In developing countries, such as in South Asia, the idea of OCB realized locally but not in a widespread practice as compare to the developed countries or in multinational organizations. The concept of OCB is only implemented in private organization, but on limited scale due to unawareness of leadership. Leadership plays and important role for the effectiveness of an organisation. The main cause that affects the concept of OCB through leadership is leaders value system and his unique style as is depicted from his followers. But in South Asian countries like Pakistan, leadership focuses on the short-term objectives rather than long-term goals in relation to individuals.

Some organizations are partially exercised the concept of OCB which leads to flaws in completing the operations. In local environment the concept of OCB is valuable but lack of poor role of leadership lessens the importance of OCB concept. Some critical aspects which are widely used in organization and local environment like leadership commitment, leadership behaviour, leadership style, leadership ethics, leadership support, transformational leadership and many others. Attitudes and behaviour like leadership, commitment and organisational support are vital for the enhancement of efficiency and effectiveness of organization. The above mentioned variable are exercised comprehensive and up to the greater extent but leadership ethics, transformational leadership and leadership style and give less importance almost ignored.

2 Previous Literature/ Theoretical Framework

Konu and Viitanen (2009) argued that when managers are indulged in leading role it can enhance productivity at high level. There is significant differences originate in various leadership styles were related to professional background, unit size, gender and activity sector. In intra-organizational activities the leadership style received more attention as compare to extra-organizational roles (Konu & Viitanen , 2009).

It is easy to find the difference between giving oneself and dedication with respect of benevolence, experience. The relationship between transformational leadership and self-sacrifice depends upon the perceived unit performance and follower's collective identity (Singh & R. Krishnan, 2008). Leadership is very difficult and complicated task because its nature itself complicated. Research findings disclose that the leader should empower the employees and go beyond the self-interest for developing followers, transformational leadership qualities and also inspire the followers.(Tabassi & Abu Bakar, 2010)

The study aims is to highlights important of follower's perception about the leader's actual behaviours and expectation of followers. Transformational leadership behaviour was increased with frequency of rank, but there is no influence of active management-by-exception, perceived behaviour and expected contingent reward. Also no effect of perceived active management-by exception and contingent reward and transformational leadership were moderated by follower's expectations or rank (Kline &Ivey, 2010).While we say "school for all", are quite different and shows conflict between what is spoken and what is implemented practically, as the curricula's subject matter ends and upgraded are shown in other manners. For developing transformational leadership behaviour manager shows more responsibility and efficiency in special circumstances as compare to normal circumstances.(Fitzgerald & S. Schutte, 2010). Hierarchical impact of inspirational motivation, individualized consideration, idealized influence and intellectual stimulation on transformational leadership. Research findings affirm that the inspirational motivation and idealized influence happen frequently between upper level managers rather than middle level managers, and there were no differences for individualized consideration and intellectual stimulation. Also, inspirational motivation, idealized influence, and intellectual stimulation were strengthen job satisfaction level in upper level managers rather than middle level managers while individualized consideration effect both groups (Bruch & Walter, 2007)

A combined action will produces a stronger results as compare to individual efforts, these action are combination of value based theories and spiritual leadership. It is very essential for understanding the spiritual leadership and other theories.(Crossman, 2010)

Research examine that the ethical leadership definition and its practical implementation in leadership system. Finding conclude that apparent gap is continue which is not function of ethical definition and enforcement is challengeable under societal, leadership and individuals variables (Nnabuife, 2010).Results affirm that leader's relational support and task builds a positive strengthen link between the follower's level of creativity and transformational leadership. Leader's support motivated the followers (Cheung & Wong, 2011).Full Range leadership model is used in world-wide today. This model helps to build transformational leadership style for leader's success. Transformational leadership will develop with utilizing a "combination of 360 degree feedback using structured workshops, multifactor leadership questionnaire, and one-to-one coaching sessions (Kirkbride, 2006)".

The leaders at Philips were very versatile in their leadership style to build willingness to change and deliberate atmosphere. Researchers assert that final emergent transformation will only be implemented in quality management and historical style pays attention during the process of organizational changes (Karsten, et al., 2009). Library professionals were not sensitive regarding leadership style at work place. The chief librarian uses autocratic leadership style. Library professionals are seems to be highly committed with their task and work and they are in favoured of result oriented culture (Awan & Mahmood, 2010).

Odom, Owen, Valley, & Burrell(2010) conveyed that leading example and leadership model of Obama's behavior is pronounced and uniformly by Avolio and Bass. The results indicate that it is tough for organizational functioning and the engagement between leadership style and climate. The experimental findings assert that three hypothesis are partially supported and fourth was fully supported. (Haakonsson, Burton, Obel, & Lauridsen, 2008). Corporate responsibility strategy support and recognized the employees to construct the values. Leadership plays an important role in effective corporate practice and make the organization structured decentralized based on honourable measures (Rok, 2009). Leadership style (ambidextrous and transformational) affects the team learning and related performance. Research finding affirms that these leadership styles have operational effects as a strategic resource within an organization, team and groups (Bucic, et al., 2010). Researcher examine that the satisfaction of followers with leader. Leadership styles like task oriented leads to pressure, and socio-emotional builds support are effects significantly on follower satisfaction with leader (Casimir & Keith Ng, 2010)

In Western work place generational groups workers have various leadership style and different work characterises. Research findings indicate that the generational groups have different work style in manufacturing industries and have no difference of generational groups in educational sector. Results also indicate that the leader should build various work characteristics among generational groups and adopt different leadership style (Yu & Miller, 2005).The empirical analysis asserts that customer relationship can also be predicted with social capital and ethical leadership and positively associated with them.(Zheng , et al., 2011).

Based on literature and above arguments following model and hypotheses can be developed which are presented in figure 1.

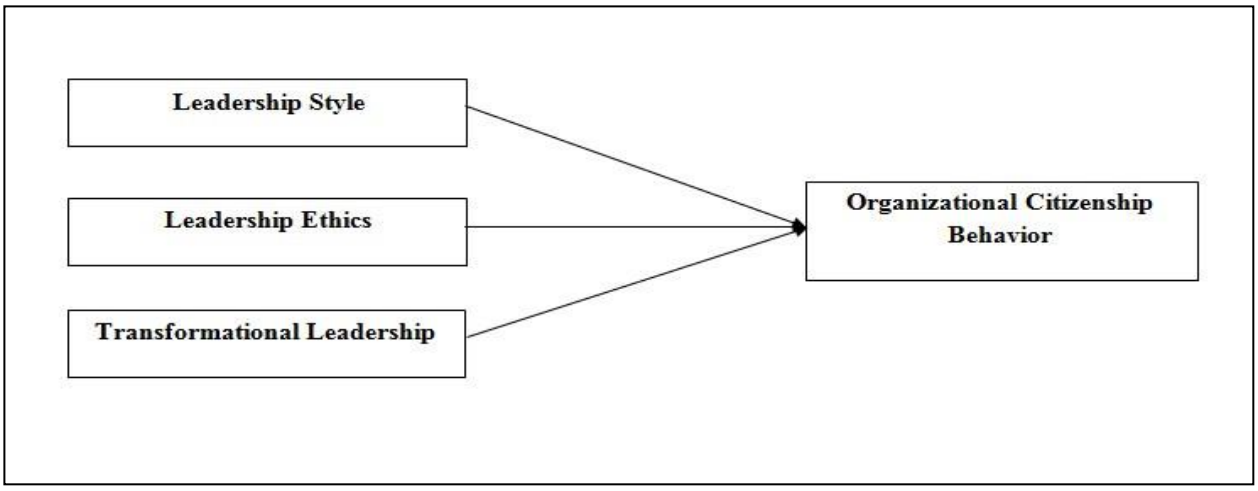

Figure 1: Theoretical framework

In figure 1, leadership ethics, leadership Style, and transformational leadership are independent Variables whereas Organizational Citizenship Behaviour is Dependent Variable.

3 Hypotheses

According to the conceptual framework and literature review, the hypotheses are:

H_1: There is positive and significant relationship between Leadership style and organizational citizenship behaviour.

H2: There is positive and significant relationship between Leadership ethics and organizational citizenship behaviour.

H3: There is positive and significant relationship between Transformational leadership and organizational citizenship behaviour.

4 Methodology

4.1 Sample

Data was collected through Survey method from managerial and non-managerial staff comprising different industries both public and private. The useable sample size was 150 questionnaires. To eliminate the biasness data collected from various sectors. The respondents are consisting of 74% male and 24% are female.

4.2 Instrument

Instrument for current study is comprises five portions. The first section of the questionnaire is regarding demographics of study, second part is related with leadership style questions, third portion is questionnaire regarding leadership ethics, forth part is based on transformational leadership questions, and at last fifth portion is deals with organizational citizenship behaviour. In current study five point Likert scale are used for collecting the data from respondents. The scale of Jamal and Baba (1992) was adopted for the measurement of dependent and independent variables. In five point Likert scale the 1 is used for strongly disagree, 2 is used for disagree, 3 is used for neutral response, 4 is used for agree response and 5 is used for strongly agree response in current study.

5 Analysis and Discussion

Different statistical data analysis techniques are used to investigate the relationship and influence of independent variables (leadership style, leadership ethics, and transformational leadership) on dependent variable (organizational citizenship behavior). The statistical techniques are descriptive statistics, Pearson correlation and regression analysis. Descriptive statistics shows standard deviation and mean of dependent and independent variable.

150 employees are being in use as a sample size for this research in which majority of respondents are males having 111 responses (74%) while further 39 responses are of females having percentage of 26%. According to age groups taken in research, group of 31-35 years of age is having large number of respondents having percentage of 39.3% of total which are around 59 responses; age group of 20 to 25 is having 15 responses (10%). Further 51 (34%), 21 (14%), and 4 (2.7%) respondents falls in age groups of 26-30, 36-40 and 41-45 respectively. According to the marital status, 79 having high percentage of 52.7% are single while other 71 having the percentage of 47.3% are married. Respondents who are working in financial services sector are 80 and having a percentage of 53.3%, 20 respondents having a percentage of 13.3% are working in education sector and same number of respondents and percentage are working in health sector and 30 respondents having a percentage of 20% are working in telecommunication sector. For the degree level, 13.3%, 64%, and 22.7% respondents are having bachelor degree, masters' degree and M.Phil. degree accordingly.

Table 1 Profile of Respondents

Variable	F	(%)	Variable	F	(%)
Gender			Industry		
Male	111	74.0	Financial Services	80	53.3
Female	39	26.0	Education	20	13.3
Age			Health	20	13.3
20-25	15	10.0	Telecommunication	30	20.0
26-30	51	34.0	Total Job Experience		
31-35	59	39.3	0-4	31	20.7
36-40	21	14.0	5-8	50	33.3
41-45	4	2.7	9-12	50	33.3
Marital Status			13 or above	19	12.7
Single	79	52.7	Highest Qualification		
Married	71	47.3	Bachelor	20	13.3
Sector			Master	96	64.0
Public	33	22.0	M.Phil.	34	22.7
Private	117	78.0			
Position					
Manager	116	77.3			
Non- Manager	34	22.7			

Table 2 Descriptive and Correlation Analysis

Variables	Mean	SD	Alpha	1	2	3	4
Leadership Style	3.1978	.61006	.919	1			
Leadership Ethics	4.2467	.58031	.789	.499	1		
Transformational Leadership	4.1644	.56062	.780	.618	.410	1	
Organ61izational Citizenship Behavior	3.9267	.69873	.780	.667	.365	.727	1

All the relationships are significant at p<.001

The OCB value of Means is 3.9267 and SD is .69873. The Mean value to transformational leadership is 4.1644 and SD value is .56062. The Means value of Leadership ethics is 4.2467 and the Standard deviation is .58031. The Standard deviation value of Leadership style is .61006 and Means value is 3.1978. Pearson correlation analysis was use to investigate the relationship between dependent and independent variable.

Table 2 also shows the reliability values of the variables. For the variable leadership style, value of Cronbach alpha was 0.919 which was clearly showing high consistency among the questions. 0.789 Cronbach alpha was obtain for the leadership ethics, 0.780 Cronbach alpha was obtain for transformational leadership and 0.780 was obtain for organizational citizenship behaviour.

Table 3 Regression Analysis

Variable	B	Std. error	t-value	Sig.
(Constant)		0.381	2.998	.005**
Leadership Style	0.323	0.98	3.947	.000***
Leadership Ethics	0.178	0.153	2.099	.003**
Transformational leadership	0.403	0.101	4.565	.001***

Notes: R = 0.789, R2 = .601, Adjusted R2 = 0.575and F Statistics = 40.026**.
*** Variable is significant at the 0.001 level (2-tailed)
** Variable is significant at the 0.01 level (2-tailed).

In order to explore the Relationship among leadership Style, Leadership Ethics and Transformational Leadership with Organizational citizenship behaviour regression analysis is perform. The results of this analysis are indicated in table 3. The finding of this analysis describe that there is direct and significant relationship among leadership style, leadership ethics and transformational leadership with organizational citizenship behaviour.

The value of multiple correlation coefficients (R), using independent variables leadership ethics, leadership style, and transformational leadership and dependent variable organizational citizenship behaviour is 0.789 and the R2 value of this research is 0.601 which means independent variables can explain 60.1% variation in dependent variable. The F-value 40.026 is statistically significant. This indicate that the predictors combine together to predict organizational citizenship behaviour. Also model is measured to be good fit if significance value falls between 0% and 5%. The able F value is significant at 0.000 which means that relationship among independent an dependent variables is highly significant and mood is good fit.

The above Table 3 signifies regression coefficients i.e. beta (β) of leadership style with organizational citizenship behaviour is 0.323 with significant value 0.005 which shows positive and

significant relationship among leadership style with organizational citizenship behaviour. This result support the first research hypothesis, which is leadership style has significant impact on organizational citizenship behaviour. So, we accept the 1st hypothesis. Regression coefficient i.e. beta (β) of leadership ethics with organizational citizenship behaviour is 0.178 with significant value 0.000 which shows a significant and positive impact of leadership ethics on organizational citizenship behaviour. This result the 2nd hypothesis of this research, which is leadership ethics, has significant impact on organizational citizenship behaviour. So we accept the 2nd research hypothesis. Regression coefficients i.e. Beta (β) of transformational leadership style with organizational citizenship behaviour is .403 with significant value .001 which shows positive and significant impact of transformational leadership style on organizational citizenship behaviour. This results support the 3rd hypothesis which is Transformational leadership has significant impact on organizational citizenship behaviour. So we also accept the 3rd hypothesis.

6 Conclusion

In this study, data was collected from total 150 employees of services sector which was the useable response among which 111 were male and 39 were female. From financial services, 53.3%, from educational sector 13.3%, from health sector 13.3% and from telecommunication sector 20% employees make up the whole sample. Employees which are dominant age group lies between 31-35 years and major chunk of these employees were having 5-12 years working experience and hence we were able to conclude that most of the employees have enough work experience. Out of total respondents 22% respondent are working in public sector and remaining 78% respondents are working in private sector. 77.3% respondents are manager level employees and 22.7% respondents are working or non-manager position.

The relationship between dependent and independent variables of the study are positively significant. Results indicate that the purposed hypotheses are accepted and we are failed to accept the null hypotheses. The dependent variable (organizational citizenship behaviour) has positive association between independent variables (leadership style, transformational leadership and leadership ethics).

There are some practical and policy implications of this study for managers. Specifically if managers want to increase the commitment level and positive behaviours of employees at work they must focus on favourable leadership style. They must improve their ethics and morality. If employees are well equipped with modern skills and training these human resources can contribute significantly towards the growth of organisation. Good leaders can produce good followers and mentoring is also one way of succession planning for the future needs of an organisation. If leader is available beyond the call of duty employees will be more willing to spend extra time in organisation.

Although we can assume that the respondents of this study provided unbiased and true responses to the survey, which is necessary for drawing conclusion, there are still some limitations of this study. The data of this study is from a developing country and Asian context these results may not be generalised widely. There is still need to replicate in other regions. Moreover as data was collected from common source and on the basis of self-reporting which may have common method biasedness. Other qualitative techniques must be used which can minimise this biasedness. Some other industrial sectors must also be considered for such type of study.

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Secondary Teachers' Mathematical Content Knowledge and Teacher Education: A Case Study of Dhaka, Bangladesh

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Abstract In Bangladesh, there are improvements in secondary education by quantitative indicators but satisfactory picture is remained far from the quality. The gross deficiency in teaching includes one of the main reasons for poor quality of secondary education. There are higher failure rates in Mathematics subject in Secondary School Certificate examination in the last consecutive years. An extensive review of research has shown that teachers account to a large extent for student learning and achievement gains. For secondary teacher education in Bangladesh, there is a one year long training program named as Bachelor of Education (B.Ed.). Therefore, the study sought to find out the effectiveness of B.Ed. training program on mathematics teachers' content knowledge as a means of improving secondary school mathematics in Bangladesh. The study was conducted among 38 mathematics teachers (trained and untrained) selected from 16 secondary schools of Dhaka city using survey method. Teachers content knowledge were measured through an assessment test and classroom teaching observation. The study found that though the B.Ed. trained mathematics teachers (96.3%) possess better content knowledge than their counterpart (91.7%) but no relationship between teachers' personal characteristics and their content knowledge in mathematics.

Keywords Content knowledge, Secondary school mathematics teachers of Bangladesh, Bachelor of Education, Teachers Training College.

1 Introduction

As well as constitutional obligations (GoB, 1972), successive governments have seen education as critical to poverty reduction, economic progress and prosperity (Andeleeb, 2007; Ministry of Education [MoE], 2012) and have made "international commitments to ensure the achievement of 'education for all' goals and targets for every citizen by the year 2015" (Rahman, Hamzah, Meerah & Rahman, 2010, p. 115). Thus, various government and non-government initiatives have resulted in significant progress with regard to access to both primary and secondary education such as more schools and teachers, curriculum revision and increased enrolment rates especially for girls in secondary education (Rahman et al., 2010). Also, for enhancing the quality of primary and secondary education the government of Bangladesh has been considering teacher education as a major factor. In secondary education a one year compulsory B. Ed teacher education program is being provided by the Teacher Training Colleges (TTCs) to build teacher capacity in the form of new knowledge, skills and attitudes and in the application of these in practice (B.Ed. Curriculum, 2006-2007). However, weakness has been identified in the quality of secondary education particularly in the students' mathematics achievement (Ahmed, Nath, Hossain & Kalam, 2006; Nath et al., 2007). For example, poor student performance in year eight (Junior Secondary year ten (Secondary Certificate) and School Certificate) public examinations has been attributed to consistently high failure rates in English and Mathematics. An extensive review of research (see Hattie, 2003, 2009) has shown that teachers account to a large extent for student learning and achievement gains. Several studies (see Ahmed et al., 2006; Nath et al., 2007) have attributed poor student performance and low quality education to poor instructional practices of teachers as one of the main reason in Bangladesh. Again, there is consensus in teaching and teacher education literature (Bransford, Darling-Hammond & LePage, 2005; Grossman & McDonald, 2008; Hiebert, Morris, Berk & Jansen, 2007; Munby, Russell &

Martin, 2001) that content-specific knowledge, general pedagogical knowledge and skills are important determinants of instructional quality that affect students' learning gains.

In mathematics domain, content knowledge establishes an essential foundation for teacher's pedagogical knowledge and skills for teaching mathematics (Ernest, 1989). Rowan, Chaing & Miller (1997) put the rationale that a deep understanding in the subject being taught facilitates teachers in planning and in the academic interaction in teaching. Consistent with the rationale, studies (Fennema & Franke 1992: Swafford, Jones & Thornton, 1997) also revealed that mathematical content knowledge can lead to higher-quality instruction However, researchers had acknowledged that the profession specific content knowledge is acquired through formal training, university-level training and can be cultivated through systematic reflection on classroom experience (Ball, Lubienski & Mewborn, 2001; Baumart et al., 2010; Berliner, 1994; Grossman, 2008).

Therefore, studies are needed to find out the quality of these teacher training programs offered by different institutions. No empirical studies conducted earlier the present study in the secondary education sector of Bangladesh to evaluate the effectiveness of teacher education programs. The studies (ADB 2002, 2004; MoE 2004) investigated the factors affecting the quality of secondary education and the prevailing problems of teacher education system in Bangladesh. The studies were not conducted on teachers' training objectives or teacher competencies developed through training. Therefore, this study was the first study conducted on Bangladesh secondary education in order to investigate the effectiveness of a teacher education program. However, to examine the quality of all these teacher training programs was not the scope of this study. This study rather attempted to measure the effectiveness of the Bachelor of Education (B.Ed.) program on mathematics with regard to developing profession specific mathematical content knowledge of secondary school mathematics teachers in Bangladesh.

2 Teacher Knowledge

From the beginning of research into teacher knowledge, there have been differences in opinion about the kinds of teacher knowledge. Researchers investigating teachers knowledge have also aimed to develop a knowledge base for teaching and, where possible, translating it into recommendation for teacher education (Reynolds, 1989). Stimulated by Shulman's work and his categories of knowledge bases (Shulman, 1986, 1987), researchers (Killen, 2013; Turner-Bisset, 2001) tended to develop model of knowledge base to sketch the requirement of the all the knowledge bases in effective teaching including defining the knowledge bases. For example, Killen (2013) categorized all the knowledge bases into four broad types: content knowledge, learner and learning knowledge, pedagogical knowledge, and pedagogical content knowledge. According to Killen (2013),

Content knowledge is the knowledge of the subject or the discipline. This knowledge comprises of understanding the subject deeply (the concepts, principles and relationships that define the subject) and flexibly to help students crate cognitive maps, link ideas, address misconceptions.

Pedagogical knowledge is referred as how to guide students' learning in appropriate ways in specific circumstances, for example, how to attract and hold attention, and how to manage resources.

Learner and learning knowledge includes how students learn that consists of different elements: empirical knowledge of learners and cognitive knowledge of learners to interpret learners' statements and actions and to shape productive learning experiences. Empirical knowledge is the knowledge in children physical, social and emotional domains. Cognitive knowledge of learner has two elements- knowledge of child development which inform practice and the other one is context-bound to a particular group of learners.

Pedagogical content knowledge (PCK) is conceptualised as an overarching knowledge base comprising all of the knowledge- content knowledge, knowledge of learner and learning, and pedagogical knowledge and derived from the interaction and intersection of all these knowledge (Killen, 2013).

3 Bachelor of Education (B. Ed.) in Bangladesh

Teacher education program include coursework which focus on equipping teachers with knowledge and understanding of student needs, development and learning, pedagogical knowledge and, content area knowledge (Stronge, 2007). The aim of the secondary teacher education in Bangladesh is to re-orientate secondary teachers' understanding of what constitutes teaching and produces a change in their classroom practice that increases student achievement. Its purpose is to build teacher capacity in the form of new knowledge, skills and attitudes and in the application of these in practice. The curriculum of teacher education is, therefore, based on a defined set of teacher competencies and its content selected to provide the programs that enable untrained teachers and teacher trainees to develop and demonstrate a range of competencies required to promote student learning (B.Ed. Curriculum, 2006-2007). The present B.Ed. syllabus has been revised under National University Act. 1992 (Act 37 of 1992) and has been in effect in the government and private TTCs from the academic year 2006-2007.

Bachelor of Education (B. Ed.) program is titled as Bachelor of Education (Secondary Teaching) and the name of the award is Bachelor of Education. This course is for one academic session (one year long) and there are 1200 student learning hours. The accrediting institute of this program is National University and the implementing institutes are Teacher Training College (TTC) administered by the government and the private sector (B.Ed. Curriculum, 2006-2007, pp- 1 & 8).

3.1 "Teaching Mathematics" course in B.Ed.

"Teaching Mathematics" is a course of the B.Ed. training under 'Teaching Studies' learning area. This course provides a range of learning opportunities designed specifically for trainees seeking to become secondary mathematics teachers. The purpose of this course is to support trainees to develop the knowledge, skills and attitudes required to competently teach mathematics in the Bangladesh secondary school curriculum for years 6-8 and years 9-10. The content of the "Teaching Mathematics" course is divided into 06 (six) units: *Secondary mathematics curriculum in Bangladesh, Teaching learning approaches in the mathematics classroom, Logical approaches to familiar topics, Approaching difficult mathematics topics, Planning lessons for effective teaching and learning in mathematics, Assessment of student progress and achievement, and Independent learning in mathematics.*

4 Literature Review on Teacher Education and Content Knowledge Research

Researchers had explored the effect of teacher education or teacher training effectiveness using different approaches. Some researchers (for example, Farooq & Shahzadi, 2006; Palardy & Rumberger, 2008) had attempted the effect of teacher training program by investigated direct relationships between student achievement and teachers' participation in teacher training and teacher education programs. Farooq & Shahzadi (2006) study in Pakistan evaluated effectiveness of teaching of trained and untrained teachers by comparing the mathematics achievement of 400 students by the teachers. Using descriptive survey design the study found significant differences in the teaching of trained and untrained teachers of mathematics and stressed that the teaching of trained teachers had significant impact on the mathematics achievement of the students.

Guarino, Hamilton, Lockwood & Rathbun (2006) conducted a study using data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998 –99 (ECLS-K) collected by National Centre for Education Statistics (NCES) in the USA. The study examined the relationship of teachers' background variables (teaching certification, coursework in pedagogy, employment status and, teaching experience) and instructional practices and student achievement (in reading and mathematics) during the kindergarten year. Using two-level hierarchical linear modelling (HLM), the study showed only teachers' amount of coursework in pedagogy had a positive relationship with instructional practices (in reading and mathematics) that were associated with higher students' achievement in both subjects. Also, the study found instructional practices were positively associated with student achievement gains in both subjects

but, no direct relationship between the qualifications of teachers and student achievement with the exception of teachers' employment status (part time and full time).

Investigating the relationship between teachers mathematical content knowledge, instructional quality, and students' mathematical score, several studies (Baumert et al., 2010; Harbison & Hanushek, 1992; Mullens, Murnane & Willett, 1996; Rowan et al., 1997) administered mathematical test/quiz to the teachers. For example, Baumert and colleagues (2010) in Germany investigated the extent to which content knowledge (CK) and pedagogical content knowledge (PCK) influenced instructional quality that, in turn, influenced students' learning gains in mathematics. The study was conducted in Germany for one year with a representative sample of Grade 10 students and their mathematics teachers. Students' pre-test and post-test was used to assess mathematics learning progress, a 13 items paper-and-pencil test to measure teachers content knowledge in mathematics, three knowledge dimensions (mathematical tasks, student thinking and multiple representation) to assess PCK, and different data sources (student's rating, teachers' task to students, expert coding, and tapping perceptions) to assess instructional quality into three dimensions (cognitive activation, individual learning support, and effective classroom management). By using the multilevel structural equation model the study revealed that both the CK and PCK had correlation with their instructional approaches as well as students' learning outcomes.

On the other, some researchers (Ball, 1990; Heaton, 2000; Ma, 1999; Simon, 1993) used interviewing teachers in investigating teachers' mathematical content knowledge to provide more informative picture. However, though research (Ernest, 1989, Rowan et al., 1997; Swafford et al., 1997) consistently shows the importance of content knowledge in regard to instructional quality and developed observation checklist to measure the content knowledge of teacher during teaching (for example, EED, 2014), there seem to have paucity of research that evaluated the teachers level of content knowledge using observation checklist.

5 Conceptual Framework and Research Question

The main findings of the literature review above provided the basis for the development of a conceptual framework for the study. The conceptual framework allowed relative comparison of teachers' mathematical content knowledge covering the areas in algebra, trigonometry, and geometry to measure the secondary school mathematics teacher effects particularly the participation in the teacher education program (B.Ed.) on their secondary mathematics content knowledge. With respect to the purpose of the study, the single research question guided the study: *Is there any difference between trained and untrained mathematics teachers in their teaching practices of mathematics?*. The question refers to the development of secondary mathematics content knowledge that the teachers had gained through the B.Ed. program. Besides, this study also examined whether teachers' personal characteristics such as age, duration of service, academic qualification, type of the institute and so forth had any relationship with their content knowledge.

6 Method and Procedure

6.1 Design and sample

A non-experimental comparative approach was employed in the study in order to measure the effectiveness of the B.Ed. program on secondary school mathematics teaching by comparing the secondary mathematics content knowledge of B. Ed trained mathematics teachers' and untrained mathematics teachers. Sample of the study was drawn through convenient sampling strategy. 23 B.Ed. trained secondary school mathematics teachers and 15 untrained secondary school mathematics teachers were identified form 4 public and 12 private secondary school of Dhaka city. Mathematics teachers who had already undergone the Bachelor of Education (B.Ed.) training were considered as trained teachers while those who had neither B. Ed. training nor received any kind of professional training in mathematics

were considered as untrained teachers. Mathematics is taught as a compulsory subject from grade I to grade X in Bangladesh secondary schools. In order to maintain the reliability of the observation data, the mathematics teaching either in grade IX or X were observed.

6.2 Data collection

Primary data was collected by administering a mathematical test on two groups of teachers as well observing their classroom teaching. The items/questions in the assessment test were adopted from the test used in the Bangladesh Rural Advancement Committee (BRAC) research on "Evaluation of PACE Training for Mathematics Teachers of the Rural Non-Government Secondary Schools" in 2007. The assessment test was consisted of ten questions chosen from the contents of Units 3 (Logical approaches to familiar topics) and Unit 4 (Approaching difficult topics) that concretely deal with the mathematical subject knowledge. The test of which the duration was one hour was administered at the teacher's school in the teachers' native language, Bangla. The total score for the test was 100 with 10 scores for each question. All answer sheets of the assessment tests were evaluated by one mathematics instructor of Dhaka TTC and rechecked by the researcher.

The researcher along with either the headmaster of participant teachers' school or the B.Ed. trainer of Dhaka Teacher Training College observed the general mathematics classroom teaching either in grade IX or grade X of the two groups of teachers to assess the depth of content knowledge in mathematics teaching. The item 'Depth of content knowledge' had been adopted from the observation checklist which is used as the "Teaching Practice Assessment Form" to assess the teacher trainees' classroom teaching of the B.Ed. program. This checklist has a five point rating scale from 1 to 5 where 1 refers to poor, 2 refers to fair, 3 indicates good, 4 refers to better, and 5 for the best performance in the teaching behaviour. Scoring for the depth of teachers' content knowledge was done by observing the two aspects of teaching - *Clear logical steps in lesson delivery* and *Competency of the solving problems*.

6.3 Data analysis

The collected data was analyzed quantitatively. For the quantitative analysis, the descriptive statistics were computed using the SPSS version 22.0. Pearson Product Moment Correlation (Pearson Correlation and Kruskal-Wallis H-test) was used to find out the significant correlation between teachers' personal characteristics (age, teaching experience, academic attainment and the type of institute they serve) and their content knowledge.

7 Results

7.1 Characteristics of the sample

The demographic data of all the 38 teachers including their age, academic background, gender, type of institute, experiences in teaching are provided in Table 1. According to the demographical characteristics of both the untrained and the trained teachers, a significant difference was observed only with relation to their age and teaching experience.

Table 1 Demographic Data of Teachers

	Trained teacher (n=23)	Untrained teacher (n=15)
Gender		
Male	15	13
Female	8	2
Age		
Below 30	2	7
31-40	9	4
41-50	10	2
51-60	2	2
Qualifications		
Hons./Pass	9	5
Masters	14	10
Institute		
Public	6	2
Private	17	13
Experience		
Below 1 year	0	5
1-10	5	5
11-20	11	1
21-30	6	3
Above 30	1	1

7.2 Content Knowledge

The content knowledge of teachers was analyzed in two aspects; assessment test and the depth of content knowledge through classroom teaching observation. In both aspects, significant differences were found between the two groups of teachers which showed trained teachers were better than the untrained teachers due to the impact of B.Ed. training.

7.2.1 Assessment test

As mentioned earlier, the ten questions assessment test was administered to all 38 teachers to measure their level of content knowledge in the areas of Algebra (7 items: questions 1-7), Trigonometry (1 item: question 8), and Geometry (2 items: questions 9 and 10). The seven questions of the algebra were: *real number, set, inequalities, equation, determinants, function, and geometrical sequences.*

The mean scores of the two groups (trained and untrained teachers) on this assessment test are depicted in Appendix 1. It could be seen from Appendix 1 that the overall mean score of the trained teachers was higher than that of the untrained teachers. The score of the content knowledge of the trained group ranged from 89-100 whereas the range score of the untrained teacher was 78-100. In the trained group, 100% of teachers scored more than 88 out of 100 marks whereas only 60% of untrained teachers scored more than 88. To obtain the full marks (i.e. 100), 22% trained and 20% untrained teachers were successful.

Table 2 presents the mean scores for each item and for three major areas of Algebra, Trigonometry and Geometry as well as the overall score in the test of the participant teachers. It can be seen from Table 2 that all the mean scores for the trained group are greater than those of untrained group of teachers. Table 2 also shows that overall score for the trained teachers (96.30%) in the test was greater than that of the untrained teachers (91.67%).

Table 2 Mean scores of the teachers in the assessment test

Area and item(s)	Mean score	
	Trained teachers	Untrained teachers
Algebra	95.40%	90.30%
1	10	9.53
2	9	8.93
3	8.87	8.46
4	10	8.93
5	9.65	9.47
6	9.61	8.73
7	9.65	9.2
Trigonometry	100%	98%
8	10	9.8
Geometry	97.60%	93%
9	9.87	9.73
10	9.65	8.87
In all areas	96.30%	91.67%

7.2.1.2. Weak Areas in Mathematics (according to the test)

Table 3 shows the percentage of teachers who scored full marks (100%) for each item of the test (see Appendix 1). It can be seen from the Table 3 that the untrained teachers were weaker in content knowledge of mathematics than the trained teachers except geometrical sequence as both groups had the similar knowledge in geometrical sequence. The weakest area for both groups of was inequalities. As also seen in Table 3 that the untrained teachers had weaknesses in all areas of mathematics whereas trained teachers have no weaknesses at real number, equation and trigonometry. However, the trained teachers were found mostly weak at inequalities, set, and function (in descending order) and rather weak at determinants, geometrical sequences and geometry.

Table 3 Teachers Scored Full Marks (100%) in Each Item

Item no. & content of the question	Trained teachers (%)	Untrained teachers (%)
Q1- Real number	100	73
Q2- Set	70	60
Q3- Inequalities	48	47
Q4- Equation	100	73
Q5- Determinants	87	80
Q6- Function	78	67
Q7-Geometrical sequences	87	87
Q8- Trigonometry	100	87
Q9 & 10- Geometry	87	73

7.2.2 Depth of content knowledge exhibited in classroom teaching

The researcher with the respective school headmaster or the B.Ed. trainer observed 23 teachers' (trained and untrained) lessons measured the depth of teachers content knowledge in a 5 point Likert scale by observing two aspects - *Clear logical steps in lesson delivery* and *Competency of the solving problems*

in classroom teaching. Table 4 presents the score in the depth of content knowledge of the teachers exhibited in their classroom teaching.

Table 4 Teacher Score in Depth of Content Knowledge (demonstrated in classroom teaching)

Content	Group	5	4	3	2	1	Mean
Depth of teachers content knowledge	Trained	42%	50%	---	--	8%	4.17
	Untrained	9%	27%	37%	18%	9%	3.09

From Table 4 it can be seen that that most of the trained teachers (50%) scored 4 whereas most of the untrained teachers (37%) scored 3. 42% trained teachers scored 5 while only 9% untrained teachers scored 5. The mean score of the content knowledge demonstrated through teaching by the trained teachers was 4.17 (83.40%) while the mean score of the untrained teachers was 3.09 (61.90%).

7.2.2.1. Clear logical steps in lesson delivery

In maintaining clear logical steps in the lesson delivery, trained teachers (M = 2.91) showed better performance than their counterparts (M = 2.91). 67% trained and 63% untrained teachers made clear logical steps in the lesson delivery. 42% trained teachers made the topic clearer and followed the steps according to the difficulty level. While demonstrating the lesson, this percentage of trained teachers were conscious about mentioning in details all steps of the mathematical problem, maintained the difficulty level by linking up the formulas or calculation with the problem. In addition, they also stated some common errors students generally made in the exam and advised students to be careful about these errors. On the contrary, 36% untrained teachers showed such characteristics in demonstrating the lesson in order to make the topic clearer and in guiding the students about the common errors. However, 8% trained teachers and 9% untrained teachers failed to make the topic clear, did not maintain the steps according to the difficulty level, and skipped the clear steps of the solution process or did not well link up the formula with the problem.

7.2.2.2. Competency in solving problems

In observing the classroom teaching, trained teachers (M = 1.17) were found to be more competent in solving the problems than the untrained teachers (M = 0.18). 42% trained teachers and 9% untrained teachers expressed mathematics terms in "Linguistic Representation" as well as used students' familiar examples. The trained teachers solved the problems on the blackboard with more detailed oral explanations. In addition, the observers and the students (of the respective sessions) did not notice any mistake in trained teachers' explanations of solutions on the black board. On the contrary, some untrained teachers were found in making mistakes in their explanations of the solutions.

7.2.3. Nonparametric test

7.2.3.1. The assessment test

To investigate any statistically significant differences among the scores of three areas (a*lgebra, trigonometry and geometry)* in the assessment test, Levene's test was computed. In *algebra*, the p value (0.041) was less than the predetermined alpha (0.05) while the p value in *trigonometry* (p = 0.093) and in *geometry* (p = 0.086) was bigger than the predetermined alpha (0.05). Thus, the results indicated that there was a statistically significant difference between the content knowledge in Algebra of the trained teachers and the untrained teachers where t value was 2.12. Further, the t-test result of the overall score in the test between the two groups shows a statistically significant difference between these two groups regarding overall content knowledge of mathematics (p = 0.015 , t = 2.553).

7.2.3.2. The depth of content knowledge exhibited in teaching

The results from the Mann-Whitney U test showed that there was a statistically significant difference between the two groups in the score of the content knowledge during teaching (Z = 2.442, p =

0.015). The finding was further confirmed by the results of the *t*-test at the 5 % significance level (p = 0.032; t = 2.291).

Based on the above results and analysis of the assessment test, classroom observation and the nonparametric test, it can be claimed that mathematics trained teachers possessed more content knowledge than the untrained group did. The difference is significant for the level of content knowledge in algebra and in classroom teaching particularly in solving problems and in presenting clearer logical sequences in lesson delivery.

8 Relationship between Teachers' Personal Characteristics and Content Knowledge

One of the purposes of this study was to find out any significant relationship between the two groups of teachers with regard to their personal characteristics (age, experience, qualification, and institution type) and their mathematical content knowledge.

8.1 Correlation with teachers' age and experience

The Pearson correlation (two tails) test at 5% level of significance was used to measure the correlation of teachers' age, experience with their content knowledge. The summary results are shown in Table 5. As shown in Table 5, it can be revealed that there was no significant relationship between teachers' age and their experience with their content knowledge.

Table 5 Correlation of teachers' age and experience with content knowledge

Variables	Teachers Age	Teaching experience
Content Knowledge	lrl = 0.294 p = 0.073 > 0.05	lrl =0.246 p = 0.137 > 0.05

8.2 Correlation with qualification and type of the institute

The Kruskal-Wallis H-test at 5% level of significance was used to observe the relationship. The summary results are shown in Table 7. According to the results in depicted in Table 7, it was found that there was no significant relationship between teachers' qualification and the type of the institutes they served with their content knowledge in mathematics.

Table 6 Correlation of teachers' qualification and the type of institute (public/private) with content knowledge

Variables	Qualification	Type of Institute
Content knowledge	H = 0.045 p = 0.831 > .05	H = 3.718 p = 0.054 > .05

9 Discussion

9.1 Research question 1: *Is there any difference between the trained and the untrained mathematics teachers in their content knowledge?*

The study found that the trained teachers were ahead of the untrained teachers in the content knowledge level of mathematics. In the assessment test as well as in the depth of content knowledge while teaching, the trained teachers scored better than their counterparts. The nonparametric tests confirmed the findings combined with a significance difference in the level of content knowledge (both in assessment test and depth of content knowledge in classroom teaching) between the trained and the untrained group.

In the assessment test, the variance of the trained teachers' mathematical knowledge was lower (100 - 89 = 11) than that of the untrained teachers (100 - 78 = 22). All trained teachers were able to score 89% marks in the test whereas the untrained teachers' minimum score was 78%. This suggests that that through the training, the trained teachers could confirm the certain level of competency (89%) in mathematics.

In regard to the problem areas in the assessment test, though the trained teachers had problems in some areas of mathematics noticeably in inequalities, set, function, determinants, geometrical sequences and geometry similar to their counterparts, but the level of weaknesses of the untrained teachers was more than that of the trained teachers. Thus, it seemed that the untrained teachers could be able to improve the level of content knowledge in those difficult areas of mathematics through participating in the B.Ed. training. Further, it could be understood that the B.Ed. training had the impact to improve the level of knowledge in mathematics among teachers who enrolled in the B.Ed. program since the teachers could solve the problems in mathematics by enrolling in the program.

As observed, the trained teachers showed the depth of content knowledge than the untrained teachers while teaching mathematics in the classroom. Possessing better content knowledge by the trained teachers reveled in the assessment test could have facilitated them to conduct their sessions by delivering the lessons more logically and precisely to the students and to perform better in solving problems in the classroom.

9.2. Research question 2: *Is there any relationship between teacher's personal characteristics and content knowledges?*

In the two groups of teachers in this study, significant differences were found between age and teaching experiences. Nevertheless, the differences did not have any impact on the differences found in content knowledge between the two groups of teachers since it was found that their age and teaching experience did not have any significant relation. No relationship was also found between teachers' academic qualification and the type of institutes they served. The older age, longer teaching experience and higher academic qualification did not guarantee better content knowledge. Whether the teachers worked in either a pubic or a private institute, it did not have any impact on those professional aspects.

Observing the personal characteristics of the teachers participated in this study, it was seen that, 17 (73%) teachers from the age range between 25 and 40 and 7 teachers (44%) from the age range between 41 and 57 possessed master level qualifications (see Table 1). Therefore, it is noteworthy to mention that more teachers with higher academic qualifications enter the secondary schools as teachers currently than earlier days; the reason may be due to the rising unemployment in Bangladesh. It was showed in Table 1 that, 26% untrained teachers were over 41 years of age and 74 % were below 40. The reasons may be due to the effective implementation of educational reforms by the Bangladesh government regarding the increase of the trained teachers' percentage in secondary schools. This was clear from the percentages of trained teachers in the years 2003, 2004, 2005 which were 48.6%, 50.5%, 53.6% respectively (BANBEIS, 2006).

10 Limitations

Due to the limitation of time and resources, the study could not maintain the standard sample size. As a Japanese Development Scholarship (JDS) fellow, the researcher had very limited time to conduct the field visit. The study utilized a sample size of 38 mathematics teachers from 16 secondary schools of Dhaka city only due to the time constraint and the availability of the resources. The study included data from the teachers in private schools aided by the government. Teachers trained under the previous B.Ed. program were also included in the sample.

11 Conclusion

According to the finding of the study, the B.Ed. trained mathematics teachers had better content knowledge than the untrained mathematics teachers. The trained teachers also exhibited in-depth content knowledge more than their counterparts while teaching mathematics in the classroom. Similar to the untrained teachers, trained teachers also had problems in some areas of algebra such as Inequalities, Set, Function, Determinants, and Geometrical Sequences and in Geometry and so forth.

Teachers' personal characteristics (age, service length, academic background, and type of institute (public or private)) did not have any significant correlation with teachers' content knowledge, pedagogical skills, attitudes and beliefs. Hence, the B.Ed. program was effective in improving the secondary school mathematics teachers' content knowledge level.

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Appendix 1

Score in the Assessment Test

Teacher's ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total
Experimental Group											
1	10	10	10	10	10	10	5	10	10	10	95
2	10	10	10	10	10	10	10	10	10	10	100
3	10	10	10	10	10	10	10	10	10	10	100
4	10	10	8	10	10	10	10	10	10	10	98
5	10	10	8	10	10	9	10	10	10	10	97
6	10	10	9	10	10	10	10	10	10	10	99
7	10	10	8	10	10	10	10	10	10	10	98
8	10	10	10	10	10	7	10	10	9	7	93
9	10	9	10	10	10	10	10	10	10	10	99
10	10	9	9	10	10	10	10	10	10	10	98
11	10	10	8	10	10	10	10	10	10	10	98
12	10	10	8	10	10	10	10	10	10	10	98
13	10	10	8	10	10	10	8	10	10	10	96
14	10	7	7	10	10	9	10	10	10	9	92
15	10	6	10	10	10	10	10	10	10	10	96
16	10	6	7	10	6	10	10	10	10	10	89
17	10	6	6	10	10	8	9	10	10	10	89
18	10	10	10	10	8	8	10	10	10	7	93
19	10	4	8	10	10	10	10	10	8	10	90
20	10	10	10	10	8	10	10	10	10	9	97
21	10	10	10	10	10	10	10	10	10	10	100
22	10	10	10	10	10	10	10	10	10	10	100
23	10	10	10	10	10	10	10	10	10	10	100
Control Group											
24	10	10	10	10	10	10	10	10	10	10	100
25	10	10	10	10	10	7	10	9	10	10	96
26	10	10	10	10	10	7	10	10	10	10	97
27	10	10	10	10	10	10	10	10	10	10	100
28	10	10	10	10	10	10	10	10	10	10	100
29	10	10	6	10	10	4	0	10	10	10	80
30	8	10	8	10	8	10	10	10	10	8	92
31	10	10	10	8	10	10	8	10	10	8	94
32	10	10	7	10	10	10	10	10	10	8	95
33	10	8	6	8	10	6	10	8	10	7	83
34	10	6	8	0	6	10	10	10	10	8	78
35	8	6	8	10	8	10	10	10	10	8	88
36	8	7	6	8	10	7	10	10	10	10	86
37	10	9	10	10	10	10	10	10	10	10	99
38	9	8	8	10	10	10	10	10	6	6	87

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