CONSTRUCTION INDUSTRY HUMAN CAPITAL INVESTMENT IN INDUSTRIAL REVOLUTION 4.0

JAGENMOHAN RAO A/L VENKATASVERARAV

A project report submitted in partial fulfilment of the requirements for the award of Masters of Project Management

Lee Kong Chian Faculty of Engineering and Science
Universiti Tunku Abdul Rahman

December 2020

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

Signature : _____

Name : _____

ID No. : _____

Date : _____

APPROVAL FOR SUBMISSION

I certify that this project report entitled **"CONSTRUCTION INDUSTRY HUMAN CAPITAL INVESVESTMENT IN INDUSTRIAL REVOLUTION 4.0"** was prepared by **JAGENMOHAN RAO A/L VENKATASVERARAV** has met the required standard for submission in partial fulfilment of the requirements for the award of Masters of Project Management at Universiti Tunku Abdul Rahman.

Approved by,

Signature : _____

Supervisor : _____

Date : _____

Signature : _____

Co-Supervisor : _____

Date : _____

ABSTRACT

The role of human capital in Malaysian construction industry is very often underestimated. The construction industry considers human capital as executory force of projects instead of force that builds competitiveness of business. Human capital is highlighted playing a major role in creating market advantage. However, there are many attributes of human capital that need to be paid attention to create the aforesaid market advantage. The emergence of Industrial Revolution 4.0, many services in the industry are automated or digitalised. Therefore, it is limiting the human involvement significantly. In this research five (5) element of human capitals are identified which required for an organisation survive along the IR 4.0. The five elements of human capitals are skill, knowledge, experience, ethics and emotional qualities. The research is aimed to provided the most and least required human capital. The theoretical framework was established through the literature reviews. The questionnaires were setup based on the theoretical framework to collect the data from industry participants. In return ninety-two (92) respondents has responded to the questionnaires. Based on the final outcome of this study, skill, knowledge, and ethics are received welcoming response from the participants. The human capital elements such as experience and emotional qualities receives less supportive responses. The research is benefitted to the construction industry such a way that, it identifies the human capital that required to be focused more. In society it set a guidance to community to make substantial investment to the skills of an individual. The research limitation is, the responses are majorly from the executive level. The responses from the C-level executives and responses from government link companies and public listed companies are not that much as it seems only few are available in market. At the end, the research recommends to synthesise the study of each human capital into more specific with larger sample size.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS / ABBREVIATIONS

ά	Cronbach Alpha Coefficient
IR	Industrial Revolution
IoT	Internet of Thing
BEM	Board of Engineers Malaysia
PWD	Public Works Department (JKR)
CIDB	Construction Industry Development Board

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Industrial Revolution 4.0

Industry 4.0 is fourth in the line of industrial revolutions. The first industrial revolution was the mechanization of the manufacturing and processing industry, utilizing water and steam power. The second revolution saw the coming of the assembly line and electricity, enabling mass production. The third then followed through the rise of automation, providing more efficient processes and manufacturing – what commonly seen today in most factories.

As industry slowly moving past the third industrial revolution and are advancing into Industry 4.0. Unlike the more drastic changes from between the previous industrial revolutions, however, Industry 4.0 simply takes the automation and machinery from the third and makes it better. Through smart systems, using data and machine learning; the Internet of Things (IoT) and AI.

When considering the current state of the Industry 4.0, it is important to understand the preconditions that have to be fulfilled so that a new concept can be introduced in industrial manufacturing system. At least the following has to be fulfilled:

i. Stability of the production has to be guaranteed also during the transition phase.
ii. Stepwise investment should be possible as most of the industrial processes cannot bear big one-time investments.
iii. A good know-how protection is necessary. Closely connected is the cyber security issue.
iv. Furthermore the industry concept is not limited just to the production system but it includes the complete value chain (from suppliers to the customers of one enterprise towards the ‘Connected Word’ of all enterprises) and all enterprise’s functions and services. It is clear that it

is not easy to fulfil these criteria, therefore only some ‘islands’ of the Industry 4.0 concept currently exist.

1.1.1 Malaysia Construction Industry and IR 4.0

Construction is a flat industry which supporting and supported by other industries. Construction industry is on verge of an innovative industrial era. Industrial revolution 4.0 pave way for significant change by altering the direction for further digitally developed trades.

Digital building enables possible accurate decisions to be made throughout a project lifecycle. Despite the early stages of IR 4.0, construction sector still lags significantly compared to other industries in term of automation of processes and the level of digitalisation. Efficiency has decayed since the early years. Digital schemes will assist construction industry to embrace more production scheme. Industry effectiveness and affordability will be improved through knowledge-oriented projects.

Digitalisation allows the data access for fast problem solving. It also will increase the quality and safety of scheme design, physical construction, operation, and maintenance. Previous industry revolution was focussing on enhancing the productivity of business procedures. The current industrial revolution is coming approach is to amalgamate the physical world with information era for further industrial improvement.

The challenges that the construction industry is facing to adopt and keep pace with other developing country is massive. Currently, Malaysia are still in the transition state. The knowledge and realisation of the importance and implication of IR 4.0 towards construction industry is just stared to evolve. Further, the technology and requirement to allow the inception of IR 4.0 is not widely in practise.

TN50 is a proactive and holistic effort from the government to seize the opportunity of the future which is mostly influenced by the rise of IR 4.0. Public Works Department being the government’s largest technical agency, initiated a transformative agenda which is fittingly described in its vision statement – to become a world class service provider and centre of excellence in asset management, project management and engineering services for the

development of the nation's infrastructure through creative and innovative human capital and state of the art technology.

1.1.2 Human Capital Under the IR 4.0

Human capital is considered essential for the success of organisations and Industry 4.0 revolution. Researchers and management practitioners are already forecasting this situation to take a different shape, given the characteristics of the changes anticipated. The features of human capital that are key to accomplishment are education, experience, and knowledge that organisations need to tap while achieving success in the competitive world. Human capital theory deliberates that knowledge prosper better cognitive skills to individuals. Subsequently drive their potential for better productivity and efficiency to accomplish activities.

Human capital can be defined as a set of knowledge, abilities, and skills, used in activities, processes, and services that contribute to economic growth. However, a set of education, experience, knowledge, and skills possessed by employees and that is used to create value for the success of the organisation. In these two phrases, it is observed that experience, knowledge, skills and education are critical for human capital in the organisations.

Construction industry in line with Industry Revolution 4.0, not only requires sufficient workforce, but also human capital nurtured in competitive training systems that is well prepared for creative work environments. The future competencies required are as follow: -

i. Skills
ii. Knowledge
iii. Experience
iv. Ethics
v. Emotional Qualities

1.2 Importance of the Study

Industrial revolution 4.0 since its inception is fully focussed on technology and automation. However, one should understand that the human interference is also has a equal importance to achieve the technology utilisation and automation.

This study going to outline the minimally required human capital attributes that is seen important in achieving the industrial revolution 4.0 in the construction industry. Since there are many school of taught regarding human capitals, hence the attention given to few human capital attributes that proved and predicted useful for the new industrial revolution.

Here , the goal is to study and survey what the industry requires and expect in the form of human capital for future. The new human capital attributes which identified may facilitate the industry are also studied and the opinion of it's significance to the industry is determined. As observed, earlier human capital study was mainly focussed on manufacturing industry, hence in this study, the focus on construction industry now, which it's human capital are still in classic model.

1.3 Problem Statement

Construction organisation, either from developer/employer to the subcontractor and craftsmen, human capital has become crucial for survival. It is a believed that many organisations are striving to develop a better human capital for them to sustain and survive this wave of revolution. Hence, organisations need to invest in developing the human capital. All the elements of human capitals are crucial. Therefore, organisation required to have the most focus and the least focus element before they decide to invest in developing into the human capital. Currently, the construction organisations are just sending their employees to trainings without knowing the degree of importance to their business goal. In order to save the cost and time, one organisation should know in prior which set of human capital they are need most before invest in the particular training scheme.

1.4 Aim and Objectives

Human capital, according to Schultz (1993), is refers to the level of knowledge, skill, abilities, values, and social assets of an employee which will lead to the employee's satisfaction and performance, and eventually on a firm performance. Experience and emotional qualities (EQ) are also to be considered as part of human capital qualities, in my opinion. Thus, the aim of this study is to determine the most required human capital element and least required human capital element for construction industry during IR 4.0.

The objectives of this study are as following;

a. Explore the opinion of the industry participants from various profession background on the five human capital elements namely skill, knowledge, experience, ethics and emotional qualities.
b. Discover the current trend of human capital understanding in construction industry taking consideration of IR 4.0.
c. Understand what the construction industry participant know about human capital in IR 4.0.

1.5 Research Method

The topic is firstly investigated through a proper literature review. Basically, the literature review is to understand the concepts of skill, experience, knowledge, emotional qualities and ethics. The current practice compared to what to be expected is future is studied. Upon collecting the information, the facts are analyzed and the questionnaires are prepared to validated or challenge the ideas or opinions aired by the earlier authors. Some questionnaires are also derived from own working experience and witnesses.

1.6 Scope and Limitation of the Study

The data are collected from construction practitioners from different profession, working background, working experience, organisation

background, and role in that organisation. Results are to analyse any significant variance in responding the questionnaire among the respondents. This study does not cover the interaction and relation between the human capital elements.

1.7 Structure of the Report

The Chapter 1 is an basic introduction to Industrial revolution 4.0 briefly, describe important of the study. The rest is the aim and objective of this study.

Chapter 2 outlines the literature reviews. The earlier researches and studies are reviewed. The opinion and the results of study are analysed. The facts are related the current requirement of human capital standards which suits the industrial revolution 4.0.

Chapter 3 shows how the study was conducted. The research type and design used are elaborated. Technique of data collection of data is described in details. The questionnaire proposed is in accordance with the theoretical framework established. Besides, it also reviews the sampling size and target respondents. The last part of chapter 3 shows the data analysis methods adopted.

Chapter 4 explain the findings and analysing the results. The outcome is compared to the literature review done in chapter 2. This chapter is crucial due the entire study is enclosed in the outcome of the results of the responds from participants..

The final chapter (Chapter 5) of this research summaries the finding of this research. It concludes the entire study and the requirement of human capital in Industrial revolution 4.0. Recommendations are also given to improve or enhance the research further for more detailed study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This section is meant to reviewing the literature from the journal, books, articles, and internet logs. The section 2.2 discuses the non technical skills. These sections focus on what the professionals and academician was in opinion regarding the non technical skill and technical competencies those are expecting in the future. Then, highlights the skill expected in the IR 4.0. This section also outline significant gap from current skill set in the construction industry compared to future requirement. Section 2.3 discussing the ethics related requirements in relation with IR 4.0. Here the literatures are relating the advancement of technology and the ethics of professional. Section 2.4 is discussing what and how the Emotional Qualities are affecting the industry presently and in future. The final section 2.5 is inter-relating the knowledge and experience and the requirement and current development towards the IR 4.0.

Human capital elements in construction industry are identified as following

A. Skill

Technology is becoming complex and will get even more complex in future. Hence, to accommodate this, skills are required to govern the technology. The search for talent has kick in past few years. Many programmes were initiated to look for the new generation of talent to accommodate the demand in labour market. Apparently, it is found that the talents are no longer trained by academy institutions. Instead, the talents are being trained by academic institution but by organisations.

It is understood that, skills are scarce. New skills require adequate time to emerge than the earlier talent to fade away. The academy system is always lags behind the evolving job market. This is witnessed in current market trend in Malaysia, where the academy institutions are just implementing the Education 4.0 policies.

Thus, academic institution has unsuccessful in providing highly qualified and immediate work force into the job market. So, the companies have to provide internal training programs for new talents to meet the business demand. Companies have to provide dedicated training including the facilities and intensives for their employee to stay competitive.

As the automation kick in, companies will start to look for new professional profiles to include in their workforce. Digital construction sector is growing. CIDB and PWD have adopted digital construction recently to be the main agenda for the next generation of buildings. Therefore, many construction companies reported plan to hire modellers and information technology professionals.

There is a discrepancy between the supply of the require job and demand. Further, the majority talents of construction industry are made of engineer with Architectural, Civil, Electrical, or Mechanical engineering. This scenario is found throughout the construction industry in Malaysia.

In addition to the technical skills, IR 4.0 also required other non technical skills such as soft skills. Construction industry also increasingly in demand for communication skill, negotiation, leadership, management, and flexibility skills. Demand for transversal soft skills will increase over the time across the construction industry.

It is foresee that the current workforce will require individual intense training programmes to improve existing skills. Also, new advance programmes to develop the new skill required. To remain in business in the competitive market, the culture of providing training and career guidance by offering opportunities for studying and professional growth.

B. Experience

There are a growing number of organizations that are moving towards IR 4.0. Not all the employee is equally experience. There few experienced employees who are guiding the new or junior employees. So, the experience of employee is useful to set up operating model, such as work processes and policies that permit working in teams. In fact, experience is not an attribute that can be attained vide training and practices. It is developed through years of field experience and many series of trail and errors.

Further, the experience is resided in a person and cannot be expressed on the papers. The investment into the experience is a complex act. The organization must accurately decide what years of experience they wish to have and what is added value the experience could bring to the firm.

The experience of a professional is to guide the decision making. The IR 4.0 is mainly attached to large pool of data for decision making. Therefore, the skilled person may mine, distribute, and analyse the data. However, the skilled person may not enough tendencies to apply the data in accurate manner and make suitable decision to suit the condition.

Therefore, investment in experience is complex and it requires high cost to employ professional. Furthermore, the risk also is higher as there is no guarantee of permanent employment in the industry and it varies from one project to another. So, clear guidance is required in investing into human capital with experience.

C. Knowledge

Knowledge in the construction industry can be categorised into the three categories as following:

i. Domain knowledge:

This form of knowledge gathered from available organisational body and regulation. This information is an essence of the construction industry where everyone has an access. The type of information is standards, technical rules, product databases.

ii. Organisational knowledge:

This is knowledge which is specific events, product or achievement gained by an organization and also being part of intellectual capital of a firm. It is kept formally in company records and informally through the skilled processes of the firm. The knowledge about the personal skills, project experience of the employees and cross-organisational knowledge are part of this knowledge section. The latter covers knowledge involved in business relationships with other competitors, investors, and stake holders.

iii. Project knowledge:

This knowledge is collected and gazetted by company based on projects. The knowledge is developed through interaction between firms. The lesson learned and the methodology used to resolve issue are coded in this knowledge. The knowledge coded will later become policies or guidance in the firm for purpose of regulation.

With emergence of big data, many initiatives have resulted in the creation of information portals. Such as online cost reference and estimations. However, in the construction industry, all these efforts, known as knowledge management have been undertaken by large companies such as multinational and public listed company. Investment in knowledge can be in the form of grouping professionals and establish forum for knowledge debate and sharing. Recently, multinational companies have setup knowledge network where academicians are included in their knowledge network while assisting innovation in industry.

D. Ethics

IR 4.0 is mainly surrounds technology and large pool of data. The unethical conducts may have a direct or indirect implication on the quality of construction. There existing areas of concern in the Malaysian construction industry is ethical standards among construction professional. (Rahman,etal.,2020). Professionalism is enhanced through leadership with leaders serving as example for the organization.

Implication on quality will impact negatively on the reputation of construction industry. Construction professionals must behave with professional integrity and reasonable of care. They must strive to achieve good quality of work as they owe responsibility to the public and regulation. Only when professorial ethics are well practiced, professionalism will be better and thus eliminate or minimise the quality-related problems directly.

Ethic is controlled through a well governed set of code of practice. Investing ethical human quality will give a good integrity to the organization. Besides minimising the quality related issues, it will enhance the repo of organization among the industry players. Furthermore, it will grow the customer confidence to boost and trust the output of organization.

E. Emotional Qualities

Construction is a project-based industry. The developer, designers, contractors, and suppliers are there to work together for relatively short periods of time. The complexity and dynamism of construction industry makes it one of the most challenging environments to manage people efficiently and effectively to meet organisational goals.

Successful management of construction activities in such an environment requires good interaction between project stakeholders.

Therefore, it often demands high levels of Emotional Quality (EQ) amongst project participants. EQ has come to be viewed as an important factor in the IR 4.0 as well as an important predictor of one's ability to succeed on the job (Ogunbayo, 2013).

Exercising emotional qualities in the construction industry will help employees to become more aware of their conducts and motivates them on and off the job site. Also they realise greater value in what they are doing as they learn to channel emotions in a way that is constructive and beneficial to their work. Furthermore, they acquire a greater sense of understanding for their emotional capacity.

Project team successes ultimately commence and end with an understanding and the implementation of emotional qualities. With this, leaders and employees can foster stronger and long-lasting relationships Thus, laying the foundation for stronger engagement, effective team dynamics, and therefore, exceptional project results.

2.2 Current and Future Skill Set

2.2.1 Non-Technical Skills Required In Future

Non technical skills are defined are interpersonal skills which comprises communication skills, leadership skills, team work, problem solving skills, entrepreneurial skills, critical thinking and creative (Roslidawati, 2015). Since the IR 4.0 started in Malaysia and it demands creative, innovative and productive skills.

Communication skills are basically focussing on language communication, in Malaysia. The employer expect employee to have ability to speak and understand language used as mean of communication. Besides that, employees are expected to deliver the ideas through the presentation skills and robust interaction. Computer skills are also contributing equal importance. Programming skills is very important. As the new technologies emerging and utilising the artificial intelligence, programming skill would be much added

advantage skill in the industry. Digital work force demands skills such as big data, cloud computing and artificial intelligence.

Competency is an ability to use, apply, and demonstrate awareness, knowledge, skills, and attitudes to perform tasks and duties in efficient and effective manner. Towards the new change of IR 4.0, vocational skill would produce much flexible system by utilising the cyber-physical system. Vocational skill is extremely important with regard to future advanced production.

The future technical competencies are analysing, interpreting, and documenting data. By possessing this competency, a person should able to connect data via databases, maintenance of data and interpretation of data and making use of knowledge and documentation system.

2.2.2 Industrial Revolution 4.0 Skill Set

Skills need to be upgraded or replaced with new skills to face IR 4.0. Skill development issue is a major concern as the new technologies are developing at faster rate. The skill required for IR 4.0 according to (Kamaruzaman,2019) , are as below:-

a. Complex Problem Solving
b. Critical Thinking
c. Creativity
d. People Management
e. Coordination
f. Emotional Intelligence
g. Decision Making
h. Negotiation
i. Cognitive Flexibility

Focus is now shifted toward automation and artificial intelligence. Generally, skill set may change every 5 years. Hence, it is expected these skills are requires in future to fulfil the demand of labour marker. Compared to current

situation now, there is huge gap of in skill set. Basically, the skills that employee equipped currently are not good enough in coming 5 years time. The significant gap found between existing skills set and IR 4.0 skill set in the following:-

a. Analytical thinking
b. Innovation
c. Active learning and it's strategies
d. Technology design and programming
e. Leadership and social influence
f. Problem solving and ideation
g. System analysis and evaluation

What has been observed is, non technical skills are most paid attention. This is due to technical skills can be learned in practise whilst non-technical skills are developed through training and practise.

2.2.3 Technical Skill Set for Construction Industry IR 4.0

Construction industry is always synonym with complex problems. Complex problem generally arises due to risks associated with cost and scheduling. Solving these complex problems especially at complex and high-end design requires great level of technical skills. Digital skill is the most in high demand to operate and manage the software and digital platforms. The next generation of 5D BIM representing five dimension of physical and functional characteristic. The 5-D BIM platform allows owners and contractors to identify, analyze and record the impact of changes on project costs and planning. The visual and intuitive nature of 5-D BIM gives contractors a better chance to identify risks and make better decisions.

For engineers, in IR4.0, a set of specific skills and qualification was needed as a requirement in order to find a job in companies that implemented IR 4.0. IR 4.0 required a different knowledge and skills that mixes IT and production knowledge. According to (Rashidah,Humphrey,Anizahyati), the

essential skill required by Civil engineers compared to what they have learned so far are ranked as follow:-

Table 2.1: Skills Required For Job Employment Towards IR 4.0

Rank	Skills Required for Job Employment Towards IR 4.0
1	Computational Thinking
2	Social Intelligent
3	Design Mindset
4	Information Technology
5	Organizational Skill
6	Cognitive Load Management
7	Adaptive Thinking
8	Virtual Collaboration
9	Language Skills

2.3 Ethics

In coming year artificial intelligence (AI) will be the key for future and everything that it holds. AI has starts taking over the traditional method of computing. At the same instance, it also changed the culture and norm of industry. Cyber-Physical Systems, enabled technologies such as 3D printing and robotics have pave way a transformation from ICT to Inter-action Technology (IAT) where it emphasizes the importance of the physical action. (Tamburini, 2019)

Classical challenge such as conflict of interest and dilemma are yet exist. Ethic is being a little tricky in IR 4.0. In IR 4.0, ethics plays more significant roles in the internet of things (IoT), automation, the cyber-physical system, and artificial intelligence (AI) all of which affecting humans in making ethical judgments. Not denying the fact the technology may create new job opportunities. However, we foresee the consequences where we have to compete with robots for jobs. (Tamburini, 2019)

IR 4.0 and the comprehensive transformations promote technology. However, it does not exemplify human-centered moral values and are devoid

ethically. The changes will bring about swings in power, and shift in wealth, and knowledge acquisition so by understanding the changes and the speed at which any advances in knowledge and technology happens the 4IR benefits will reach and benefit all. Human rights organizations are presently exploring how to safeguard those new technological advances can benefit all people and do not aggravate huge global inequality levels and further downgrade people who are already severely marginalized. (Tamburini, 2019)

The goal in a project is to deliver the quality works at given price within a certain period of time. Hence, ethic is closely related to quality of project. Companies are aware of importance of ethics in work. The industry participants are agreed that construction industry is tainted by unethical conduct. Unethical conduct is the main contributor to poor quality of project. Consequently, the unethical conduct disrupts the quality management implementation. To mitigate the issues, the most suitable way to enhance the professionalism in construction industry is by setting the standards through leader serving as role models. (Hamzah Abdul-Rahman, 2010).

Data privacy breach and a misuse of private information can be harmful for businesses. Data is now too valuable to go unregulated. Organisation must step up governance system to ensure data protection is a highest level. (Berawi, 2018). Innovations and advanced technology has taken place in constrcution industry. However, a part of that, good ethical practices within the industry are crucial for growth. Effect of politics on public works and personal culture. (Y.Tulubas Gokuc, 2018).

Digital platform has large penetration which resulting daily routines to be more homogenous, predictale and controllable. Thus, risk such as misinformation, thought control, inequalities and algorithm bias. These issues need to be addresses through ethics. Data and Artificial inteleigence used as tool to make decision, optimise and customise services and predict pattern. Most of the current ethical questions on AI arises due to wicked problem related to it’s final applications. Bias and mitigation, are commom issues with AI. (David Pastor-Escuredo1, n.d.)

2.4 Emotional Qualities (EQ)

A project inherit characteristic such as peripheral dynamics and time-limited undertaking. Hence, project member is usually less committed. Therefore, effective leadership is required to enhance team member's commitments. (Keegen and Den Hartog,2004). Intellectual, managerial, and emotional competencies have been identified as the most comprehensive project leadership style (Dulewicz and Higgs,2004).

Emotional intelligence (EI) attributes such as interpersonal skills and empathy are knowingly related to transformational leadership in construction executives. Project managers with higher EI prefer open communication and proactive leadership styles. (Sunindijo,2007). Secondly, leaders with EI may be more motivated to impact subordinates and remind their enthusiasm for challenging tasks (Berson and Avolio, 2004).

Leaders with high empathy may grasp subordinates' expectations and achieve them accordingly (Humphrey,2002). Finally, the competencies to coordinate social interaction and strengthen team management permit leaders to generate new ideas as well as facilitate collaboration, which contributes to intellectual stimulation and collaborative promotion (Polychroniou, 2009).

It has been evident that emotionally surcharged leaders embrace decisions and do bring good decisions. Emotional intelligence is the strongest indicator of human success. (Goleman ,2005). Emotions contributes greater role in thought, decision-making and individual success. Executives had high level of emotional intelligence and decision-making skills. (Sumathy.L, 2015).

Emotional intelligence tends to encourage workers the opportunity to perform their duties with ease without supervision. The higher emotional intelligence workers tend to have higher the level of job involvement. Emotional intelligence tends to motivate workers toward utilization of the emotional skills at workplace even in a complex situation. (Allen and Mayer ,1990).

2.5 Knowledge and Experience

Knowledge is one of the most important assets of an enterprise. It contributes to formation, impact, and contribution to the building and strengthening the competitiveness and value of businesses in the market in current economy. In the age of knowledge economy, the rapid and effective use of knowledge will determine the survival of the business.

The arising issue of majority of organisation is related to “memory of the organisation”. By way meaning, how to accumulate and store the knowledge and prevent it from lost over the time. Information, knowledge, and skills are often closely related in business activity. However, they don’t exist at the whole organisation level.

Advancing information and communication technology (ICT) will make knowledge management works better compared to those earlier days. ICT allows effective storage, transfer, and sharing of knowledge in wider application perspective. When touching regarding the human resource management, organisation learning mechanism plays a crucial part. Training and development of human capital are done through the knowledge management.

Strong development of information technology will assist businesses to gather and store large amounts of information. Later, conveying them to necessary places for those in need swiftly. Jobs are being handled by computer are getting more over the days. Hence, technology is helping to collect, store and transmit information very effectively. In the midst of turning information into knowledge, businesses need their people, knowledge, skills, and experience.

Therefore, technologies need to be combined with knowledge management. So, businesses can create new competitive advantages and enhance their sustainable competitiveness in the market. Taking into account, the rapid development of technology, tasks, processes, and procedures are implemented more efficiently and effectively. The product life cycle from the since the inception of the idea, which goes through the stages of research and development, production, distribution, and after-sales, is therefore reduced.

Outputs are constantly being improved, perfected, and upgraded, and the market and consumer trends are constantly changing. Knowledge, not

technology, directly helps employees make effective decisions in business. However, with the help of technology, businesses operation shall be more efficient and smarter. Hence, business able to make decisions, minimize mistakes and satisfy customers at the highest level.

Tacit knowledge is the experience and expertise kept in construction professional mind, company culture, lesson learned, knowhow, and other elusive information (Y.C Lin, 2005). In construction industry, sharing tacit knowledge help to resolve knowledge management issues (Pathirage, 2008). Firms are relying on experience, professional intuition and other form of tacit knowledge to complete works. The experienced employee shares the tacit knowledge with apprentice through storytelling and communities of practices (Brown, 1991).

Kolb's four (4) stage cognitive models explains the learning as cyclical. It resembles generation of tacit knowledge and utilisation in construction employee. (Kothari, 2004). The model is as follow:-

i. Experience: It provides the basis for the tacit knowledge generation process such as, active involvement.
ii. Reflection: It gains an understanding of the current experiences and processes it in a way that makes sense of the experience.
iii. Experience: It provides the basis for the tacit knowledge generation process such as, active involvement.
iv. Reflection: It gains an understanding of the current experiences and processes it in a way that makes sense of the experience.

Project managers learn from their experiences by focusing on the avenues through which they learn such as formal or informal learning, and the type of learning, planned, self-guided, or innate. The vast majority of of project managers agree learning experiences concerned informal on-the-job learning experiences, and most learning from experiences occurred more or less accidentally from innate learning experience.

The learning experiences project managers mention are in most cases not planned for the purpose of development of the project manager; however, they appear to yield innate learning gains. The data also showed that project managers tend to learn about different themes from their first learning

experience as a project manager, compared with what they learn from later learning experiences.

The developmental phase of project managers might have an impact on what they learn from a certain type of experience. Basically, they learn the hard skill (governance and tool) and soft skills (interpersonal skills, from their experiences. Leadership and team work). Experiences concerning professional Knowledge gained through courses and accreditation did not seem to play a major role in the development of project managers from their own perspective. (Chantal, 2016)

CHAPTER 3

METHODOLOGY AND WORK PLAN

3.1 Introduction

This section elaborates the theoretical framework derived from the outcome of the Chapter 2. The theoretical framework is developed into questionnaires and utilised as research instrument in this chapter. The approaches adopted in this study are clarified in the Section 3.2. The survey questionnaire design and determination of sampling size are elaborated in Section 3.3 and Section 3.4, respectively. The method of the analysis used to evaluate the responses is discussed in the Section 3.5.

3.2 Nature of Research

The nature of this research is exploratory nature. The primary objective of this exploratory research is to explore the human capital that highly required in Industrial Revolution 4.0 for the construction industry. This research is focuses on the finding the ordering of the human capital that duly identified are knowledge, skill, ethic, experience, and emotional qualities. The approach taken to continue this research as quantitative research approach with deductive approached. Firstly, the hypothesis of the area of investigation is established. The hypothesis of this research is the most required human capital is skill and the least required human capital is ethics. Therefore, this hypothesis is required to be rejected or accepted at the completion of this research. Primary data collection is made through the questionnaires. The questions are self-administered by asking respondents to feedback their opinion or thoughts on the question aimed to towards the research subject. The data are analysis by utilising the methods elaborated in the coming sections.

3.3 Research Instrument

Questionnaires are used to collect information for this study. Firstly, the questionnaires are designed to guide the respondents to express the tendency towards all the human capital elements we wish to explore throughout this study. The questionnaires are as per Appendix A was transformed into a Google documents prior distribution. The link contains the questionnaires are distributed via *WhatsApp* mobile application and through *Facebook* to the targeted respondent. The collected data are to be analysed quantitatively using the method as stated in section 3.5.

3.3.1 Design of Questionnaires

The questionnaires are derived based on the categories:

i. Administrative Questions – To identify the participant background
ii. Classification Questions – Segregation of participants of their sociological demographic that groups the participant towards the pattern that can be studied.
iii. Investigation Questions – Address the investigative questions of specific study.

The questions here are structured. The questions are fixed set of choices/ close questions.

The closed response questionnaires are categorised in ranking grid.

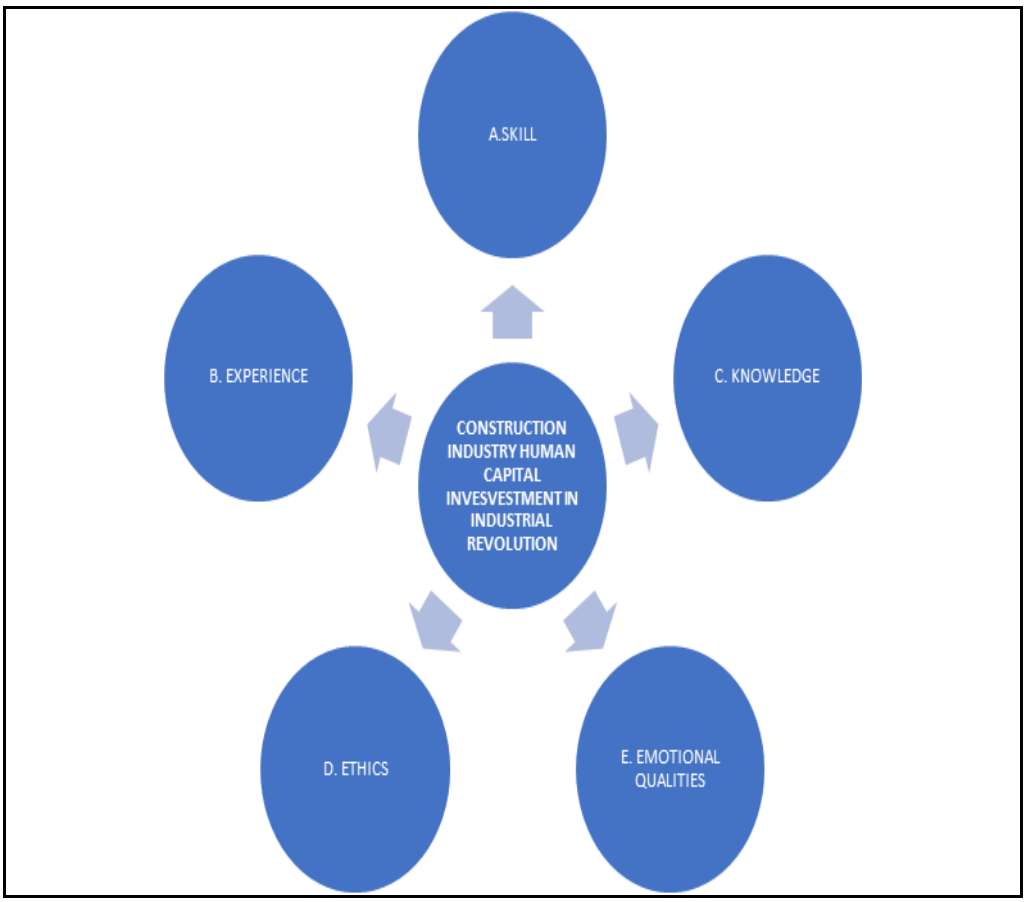

Figure 3.1: Theoretical Frame Work

The figure 3.1 illustrates the theoretical frame works for this study. The human capital element is dispersed to the five elements that identified as crucial elements.

3.4 Sample

In context of this study, the sample is the population that working, participating and involve directly or indirectly in the construction industry. The sample is representative of a particular population to ensure the normalisation of from sample to the population as whole.

3.4.1 Sampling Method

Simple random sampling method was adopted in this study. This technique allows every sample in a population has an even chance and likelihood of being picked in the sample. In this study, population is defined as working personnel in the Construction industry.

Advantage of this method is every sample has the same probability of being picked. Therefore, applied appropriately, it reduces the bias while surveying. Construction industry is made of large sample as the industry is very broad. It is easy to pick a small sample size from this large population for evaluation purpose. The small sample sizing will be discussed in the following section.

3.4.2 Sampling Sizing

The population group is very large in the context of construction industry. Therefore, we need to limit or cover the sampling size to represent the whole group. The theory used to achieve this is Central Limit Theorem (CLT).

CLT is a statistical theory stating that given a sufficiently large sample size from a population with a finite level of variance, the mean of all samples from the same population will be approximately equal to the mean of the population. Furthermore, all the samples will follow an approximate normal distribution pattern, with all variances being approximately equal to the variance of the population, divided by each sample's size.

The central limit theorem states that the sampling distribution of the mean approaches a normal distribution, as the sample size increases. This fact holds especially true for sample sizes over 30.Therefore, as a sample size increases, the sample mean and standard deviation will be closer in value to the population mean μ and standard deviation σ.

3.4.3 Target Respondents

The targeted respondents approached for this study is the working professionals, skill person, suppliers and management officers who is working and participating the Malaysian construction industry. There no limitation set for years of experience and expertises in this study. However, we have segregated the aforementioned attributes according for ease of evaluation.

3.5 Analysis Method

Collected data are requires to be analysed using the available methods of data analysis. The SPSS soft was used to analyse the data collected. The results are firstly, tabulated to assess the pattern. The, the reliability test is done to study the overall results. The descriptive and inferential test is done to heat to general conclusion.

3.5.1 Reliability Test

Reliability test is done to validate the internal consistency of the questionnaires. All the questions are tested to identify their scale of reliability. The reliability test was done through Cronbach's Alpha test. The aforementioned test will measure how close a set of statement are as a group.

Table 3.1: Cronbach's Alpha Test Table

Cronbach Alpha Value	Internal Consistency
$\alpha > 0.9$	Excellent
$0.9>\alpha > 0.8$	Good
$0.8>\alpha > 0.7$	Acceptable
$0.7>\alpha > 0.6$	Questionable
$0.6>\alpha > 0.5$	Poor
$\alpha < 0.5$	Not Acceptable

The coefficient of reliability ranges from 0 to 1 in providing this overall assessment of a measure's reliability. If all of the scale items are entirely independent from one another, without corelation and covariance, then $\alpha = 0$. If all of the items have high covariances, then value of α will approach to value 1 as the number of items in the scale approaches infinity. In other words, the higher the, α, coefficient, the more the items have shared covariance and probably measure the same underlying concept.

If a low alpha is due to poor correlation between items, then selected items should be revised or discarded. The easiest method to find them is to compute the correlation of each test item with the total score test. The items with low correlations (approaching zero) are to be excluded. If alpha is too high it may suggest that some items are redundant as they are testing the same question but in a different guise.

Although a "good" α coefficient are entirely arbitrary and depend on the theoretical knowledge of the scale in question, many methodologists recommend a minimum α value between 0.65 and 0.8 (or higher in many cases); α value that are less than 0.5 are usually unacceptable, especially for scales purporting to be unidimensional.

3.5.2 Inferential Statistics

a. <u>Kruskal Wallis Test</u>

The Kruskal-Wallis test is a rank-based nonparametric test. This test is can be used to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable. It is considered the nonparametric alternative to the one-way ANOVA, and an extension of the Mann-Whitney U test to allow the comparison of more than two independent groups.

The Kruskal-Wallis test is an omnibus test statistic and cannot reveal which specific groups of independent variable are statistically significantly different from each other. It only reveals that at least two groups were different.

b. Mann-Whitney U Test

The Mann-Whitney U test is used to compare differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed. The Mann-Whitney U test is often considered the nonparametric alternative to the independent t-test although this is not always the case.

Unlike the independent-samples t-test, the Mann-Whitney U test allows you to draw different conclusions about data depending on the assumptions you make about your data's distribution. These conclusions can range from simply stating whether the two populations differ through to determining if there are differences in medians between groups. These different conclusions hinge on the shape of the distributions of data, which we explain more about later.

CHAPTER 4

RESULTS AND ANALYSIS

4.1 Respondent Background

There was total ninety-two (N=92) respondents to the designed questionnaires, where N denotes the number of respondents.. The respondents from the group of Quantity surveyor and Project management are made of 33.7% on equal basis with total respondents N=31 for both. The remaining 32.6% respondent equivalent to N=30, respondent on behalf of design engineer. The Quantity surveyors and project management person are dominating the responds.

Looking into the role of the majority respondents in the organisation, they are working in an Executive level equivalent to 57.6% (N=53). The reminder of respondents are coming from the background of Managerial with 37% (N=34). The C-Level working group recorded the lowest response with 5.4% (N=5).

Next, it observes majority of respondents are having working experience of five (5) to ten (10) years with 51.1% (N=47). The remaining followed by professionals with experience of more than 10 years, with 26.1% (N=24). The next followed by participants with experience more than two years and less than five years, with 15.2% (N=14). The least respondents is participants with experience less than two years with 7.6% (N=7)

Moving

on to the nature of business which respondents are associated with, Construction business has recorded highest responses with 46.7%(N=43). This followed by respondents from Consultancy service with 23.9% (N=22). Merchants and supplier responded with 18.5% (N=17). The balance 10.9% (N=10) is respondents from Property Development.

The scale of organisation which the majority of respondents are from is Small Medium Enterprise with 52.2% (N=48). Secondly, participants are from

the Multinational Company with 26.1% (N=24). The next respondents are from Public Listed Company with 16.3% (N=15). The balance portion is responded by the participant working at Government Link Company at 5.4% (N=5).

Finally, the respondents are grouped based on the organization existence in the industry. Majority of participant response are coming organisation exist more than ten years with 59.8% (N=55). Secondly, followed by organisation operation less than 10 years and more than 5 years with 27.2% (N=25). The least respondents are from organisation operating less than 5 years with 13% (N=12). The summary of the respondent's categorisation is as per Table 4.1

Table 4.1: Summary of Respondent for Survey Questionnaires

General Information	**Category of Respondents**	**Frequency**	**Percentage (%)**
Working Profession	Design Engineer	30	32.6
	Quantity Surveyor	31	33.7
	Project Management	31	33.7
Role in Organisation	C-level Executive	5	5.4
	Managerial	34	37
	Executive	53	57.6
Year of Experience in Industry	Less than 2 years	7	7.6
	More than 2 years & less than 5	14	15.2
	More than 5 years & less than 10	47	51.1
	More than 10 years	24	26.1
Nature of business of your organisation.	Property Development	10	10.9
	Consultancy	22	23.9
	Construction Business	43	46.7
	Merchants of equipment/ material	17	18.5
Organisation Scale	Small Medium Enterprise	48	52.2
	Public Listed Company	15	16.3
	Government Link Company	5	5.4

	Multinational Company	24	26.1
Organization Participating in Industry	Less than 5 years	12	13
	More than 5 years and less than 10years	25	27.2
	More than 10 years	55	59.8

4.2 Reliability Test

Table 4.2: Reliability Test for Questionnaires

Items	Cronbach's Alpha
Questionnaires related to Skill	0.8829
Questionnaires related to Experiences	0.789
Questionnaires related to Knowledge	0.759
Questionnaires related to Skill	0.802
Questionnaires related to Skill	0.811

i. For the total eight (8) questionnaires related to skills are listed and evaluated the Cronbach alpha, $\alpha = 0.829$. Thus, this results this evident that the internal consistency is **good**.

ii. For the total five (5) questionnaires related to experiences listed and evaluated the Cronbach alpha, $\alpha = 0.789$. Thus, this results this evident that the internal consistency is **acceptable.**

iii. For the total five (5) questionnaires related to knowledge listed and evaluated the Cronbach alpha, $\alpha = 0.759$. Thus, this results this evident that the internal consistency is **acceptable.**

iv. For the total five (5) questionnaires related to ethics listed and evaluated the Cronbach alpha, $\alpha = 0.764$. Thus, this results this evident that the internal consistency is very **acceptable.**

v. For the total five (5) questionnaires related to EQ listed and evaluated the Cronbach alpha, α= 0.9. Thus, this results this evident that the internal consistency is very **excellent.**

4.3 Analysis of Questions for Skill

4.3.1 Mean Comparison for Human Capital: Skills

i. Analysis of the respondents by profession.

a. Skill is measured by the ability to analyze and resolve issue in shorter time.

The average mean score for this statement is 3.84. The "Project Management" profession score the highest mean, 4.27 among the professions while "Design Engineer" score lowest mean, 3.33.

b. Skill expedite the adaption of new technology.

The average mean score for this statement is 3.75. The "Project Management" profession score the highest mean, 4.13 among the professions while "Design Engineer" score lowest mean, 3.53.

c. Skills will motivate the employees to be innovative.

The average mean score for this statement is 3.84. The "Project Management" profession score the highest mean, 4.17 among the professions while "Design Engineer" score lowest mean, 3.57.

d. Facilities are utilized more efficiently by skilled person.

The average mean score for this statement is 3.76. Here the "Design Engineer" profession score the highest mean, 3.83 among the professions while "Quantity Surveyor" score lowest mean, 3.65.

e. Proper skill shortens the time of work progress.

The average mean score for this statement is 4.02. Here the "Project management" profession score the highest mean, 4.40 among the professions while "Design Engineers" score lowest mean, 3.67.

f. Data accumulation and analysis is more precise if done by skilful person.

The average mean score for this statement is 4.03. Project manager are the one usually have the amount of data accumulated from other peer trades. Therefore, they strongly agree the collection and analysis would be more precise is analysed by skilled person.

g. The quality of skill attracts more future projects.

The average mean score for this statement is 3.9. Project manager are bidding and winning projects by marketing their skills levels. While quantity surveyors are depend on the experience and it involves cost and contract management.

h. Exploring new skill opens new opportunity for organization expansion

The average mean score for this statement is 4.01. Project managers maybe strongly agree that the new skill will open more opportunity for them to take more complex and mega projects. As the skill level of design engineer and quantity surveyors may limited to design and cost control, respectively, this may lead to they just agree to certain extent.

Results indicate that:

i. Project manager are strongly agree to the statement. Project managers requiring great to resolve the arising issues in quickest manner. Therefore, they require to be highly skilled to find solution. Overall, the respondents are on “Neutral” opinion on the statements.

Table 4.3: Mean Comparison for Questionnaires of Skill against Profession.

Please state your working profession.		Skill is measured by the ability to analyze and resolve issue in shorter time.	Skills expedite the adaption of new technology.	Skills will motivate the employees to be innovative.	Facilities are utilized more efficiently by skilled person.	Proper skill shortens the time of work progress.	Data accumulation and analysis is more precise if done by skilful person.	The quality of skill attracts more future projects.	Exploring new skill opens new opportunity for organization expansion.
"Project Management"	Mean	4.27	4.13	4.17	3.80	4.40	4.03	4.13	4.30
	N	30	30	30	30	30	30	30	30
"Quantity Surveyor"	Mean	3.90	3.58	3.77	3.65	4.00	3.81	3.74	3.94
	N	31	31	31	31	31	31	31	31
"Design Engineer"	Mean	3.33	3.53	3.57	3.83	3.67	3.53	3.83	3.80
	N	30	30	30	30	30	30	30	30
Total	Mean	3.84	3.75	3.84	3.76	4.02	3.79	3.90	4.01
	N	91	91	91	91	91	91	91	91

ii. Analysis of the respondents by role in an organisation.

a. Skill is measured by the ability to analyze and resolve issue in shorter time.

The average mean score for this statement is 3.84. This observes that "Managerial" role is strongly agree to the statement since they have large amount of employees working under them. Thus, they see the significance of skill level and output level. C-level Executives are more results oriented, thus they don't care of the skill levels.

b. Skill expedites the adaption of new technology.

The average mean score for this statement is 3.75. The "Managerial" role are strongly agree to the statement as they are directly involves in training and utilisation of new technology compare to C-level Executives who are mainly invest to buy and make most of the new technology.

c. Skills will motivate the employees to be innovative.

The average mean score for this statement is 3.84. The "Executive" role are strongly agree to the statement. The executive requires constant motivation to drive and execute the project since the executive employees are usually less experienced.

d. Facilities are utilized more efficiently by skilled person.

The average mean score for this statement is 3.76. The "Managerial" role are strongly agree to the statement. The managers are responsible of the resources allocated. The usage are maximum if used by skilled person as he/she will use them in wider range.

e. Proper skill shortens the time of work progress.

The average mean score for this statement is 4.02. . The "Executive" role are strongly agree to the statement. The executives are the direct persons who monitoring the works at construction site. Hence, they are

well aware that skill will shorten the execution time if done by proper skilled person.

f. Data accumulation and analysis is more precise if done by skilful person.

The average mean score for this statement is 3.79. The "Managerial" roles are strongly agree to the statement. The managers are highly depending on the data for the control and monitoring. Thus, the analysis should be highly precise for them to make decisions.

g. The quality of skill attracts more future projects..

The average mean score for this statement is 3.90. The "Executive" role are strongly agree to the statement. The executive are in the perception that highly skilled will guarantee the job availabilities. However, the C-level executive may thinks otherwise as they see the future job are based on financially capability and experience.

h. Exploring new skill opens new opportunity for organization expansion

The average mean score for this statement is 4.01. The "Executive" role are strongly agree to the statement. The executive are in the perception that highly skilled will guarantee the job availabilities. However, the C-level executive may thinks otherwise as they see the organisation expansion is based on the expertise and monetary funds.

Results indicate that:

i. Respondents from “Managerial roles are” in average agree statements. Managerial role requiring skill to manage and motivate the team to execute the project plans.

ii. In overall the respondents are on “Neutral” opinion on the statements. However, respondents are strongly agree for statements “Proper skill shortens the time of work progress” and “Exploring new skill opens new opportunity for organization expansion”.

Table 4.4: Mean Comparison for Questionnaires of Skill against Role in Organisation.

What is your role in the organisation?		Skill is measured by the ability to analyze and resolve issue in shorter time.	Skill expediate the adaption of new technology.	Skills will motivate the employees to be innovative.	Facilities are utilized more efficiently by skilled person.	Proper skill shortens the time of work progress.	Data accumulation and analysis is more precise if done by skilful person.	The quality of skill attracts more future projects.	Exploring new skill opens new opportunity for organization expansion.
"Executive"	Mean	3.79	3.72	3.89	3.77	4.06	3.74	3.98	3.98
	N	53	53	53	53	53	53	53	53
"Managerial"	Mean	4.00	3.88	3.76	3.82	4.00	3.91	3.91	4.09
	N	33	33	33	33	33	33	33	33
"C-Level	Mean	3.20	3.20	3.80	3.20	3.80	3.60	3.00	3.80
Executive"	N	5	5	5	5	5	5	5	5
Total	Mean	3.84	3.75	3.84	3.76	4.02	3.79	3.90	4.01
	N	91	91	91	91	91	91	91	91

iii. Analysis of respondents by Year of Experience in Industry.

a. Skill is measured by the ability to analyze and resolve issue in shorter time.

The average mean score for this statement is 3.84. The respondent with working experience of 2-5 years has highest mean score of 3.93 where they strongly agree. This because the early stage of carrier, employees tend to rely on skill to resolve the issues arising. The respondents with working experience more than 10 years thinks otherwise as they probably rely on experience.

b. Skill expedite the adaption of new technology.

The average mean score for this statement is 3.75. The respondent with working experience of 2-5 years has highest mean score of 3.93 is strongly agree.. As these employees are from millennial back ground and having moderate experience, they may foresee the tendency toward technology are higher.

c. Skills will motivate the employees to be innovative.

The average mean score for this statement is 3.84. The respondents with working experience of more than 10years are strongly agree because they have witnessed the evolution of new trend through the skills. The respondents with less than 2 years of working experience are less able to see the whole picture of innovation through skill application.

d. Facilities are utilized more efficiently by skilled person.

The average mean score for this statement is 3.76. The respondents with working experience of more than 10years are strongly agree because the respondent has adequate witness of the facility usage. The respondents with less than 2 years of working experience are less able to gauge the degree of utilisation.

e. Proper skill shortens the time of work progress.

The average mean score for this statement is 4.02. The respondent with working experience of more than 2-5years are strongly agree because of currently experiencing the application of skill while dong work. Respondent with experience 2-5 years are may rely on experience to complete the works.

f. Data accumulation and analysis is more precise if done by skilful person.

The average mean score for this statement is 3.79. The respondent with working experience of more than 10years are strongly agree because respondent are having the ability of decision making based on the output results of the data analysis.

g. The quality of skill attracts more future projects.

The average mean score for this statement is 3.90. The respondent with working experience of 5-10years are strongly agree because of the carrier development curve,

h. Exploring new skill opens new opportunity for organization expansion

The average mean score for this statement is 4.01. The respondent with working experience of 2-5years is strongly agreed because of the vision of venturing the new opportunity.

Results indicate that:

i. Respondents from with experience "More than 10 years" in average agree to the statements. As the more experienced respondent are believes skill will motivate the employees to be innovative, facilities are utilized more efficiently by skilled person and, proper skill shortens the time of work progress and data accumulation and analysis is more precise if done by skilful person.

ii. In overall the respondents are on “Neutral” opinion on the statements. However, respondents are strongly agree for statements “Proper skill shortens the time of work progress” and “Exploring new skill opens new opportunity for organization expansion”.

Table 4.5: Mean Comparison for Questionnaires of Skill Against Respondent Year of Experience

What is your current year of experience in the industry?		Skill is measured by the ability to analyze and resolve issue in shorter time.	Skill expedite the adaption of new technology.	Skills will motivate the employees to be innovative.	Facilities are utilized more efficiently by skilled person.	Proper skill shortens the time of work progress.	Data accumulation and analysis is more precise if done by skilful person.	The quality of skill attracts more future projects.	Exploring new skill opens new opportunity for organization expansion.
"More than 10 years "	Mean	3.71	3.71	4.04	4.08	4.00	4.08	3.88	3.96
	N	24	24	24	24	24	24	24	24
"More than 5 years & less than 10"	Mean	3.87	3.74	3.80	3.61	3.85	3.63	4.00	3.96
	N	46	46	46	46	46	46	46	46
"More than 2 years & less than 5"	Mean	3.93	3.93	3.79	3.79	4.57	3.86	3.86	4.29
	N	14	14	14	14	14	14	14	14

"Less than 2 years"	Mean	3.86	3.57	3.43	3.57	4.14	3.71	3.43	4.00
	N	7	7	7	7	7	7	7	7
Total	Mean	3.84	3.75	3.84	3.76	4.02	3.79	3.90	4.01
	N	91	91	91	91	91	91	91	91

iv. Analysis of Respondents by Nature of Business Respondents Working at.

a. Skill is measured by the ability to analyze and resolve issue in shorter time.

The average mean score for this statement is 3.84. The respondent from "Consultancy" is scores highest mean, 4.02 as they strongly agree whilst the "Property Development" scores least mean, 3.56.

b. Skill expedite the adaption of new technology.

The average mean score for this statement is 3.75. The respondent from "Consultancy" is scores highest mean, 3.98 as they strongly agree whilst the "Property Development" scores least mean, 3.44

c. Skills will motivate the employees to be innovative.

The average mean score for this statement is 3.84. The respondent from "Consultancy" is scores highest mean, 4.02 as they strongly agree whilst the "Merchants of equipment/ material" scores least mean, 3.30.

d. Facilities are utilized more efficiently by skilled person.

The average mean score for this statement is 3.76. The respondent from "Consultancy" is scores highest mean, 3.93 as they strongly agree whilst the "Merchants of equipment/ material" scores least mean, 3.20.

e. Proper skill shortens the time of work progress.

The average mean score for this statement is 4.02. The respondent from "Consultancy" is scores highest mean, 4.23 as they strongly agree whilst the "Merchants of equipment/ material" scores least mean, 3.40.

f. Data accumulation and analysis is more precise if done by skilful person.

The average mean score for this statement is 3.79. The respondent from "Consultancy" is scores highest mean, 4.02 as they strongly agree whilst the "Merchants of equipment/ material" scores least mean, 3.50.

g. The quality of skill attracts more future projects.

The average mean score for this statement is 3.90. The respondent from "Consultancy" is scores highest mean, 4.02 as they strongly agree whilst the "Merchants of equipment/ material" scores least mean, 3.20.

h. Exploring new skill opens new opportunity for organization expansion

The average mean score for this statement is 4.01. The respondent from "Consultancy" is scores highest mean, 4.16 as they strongly agree whilst the "Merchants of equipment/ material" scores least mean, 3.50.

Results indicate that:

i. Respondents from "Consultancy" strongly agree to the statements. In overall the respondents are on “Neutral” opinion on the statements.

Table 4.6: Mean Comparison for Questionnaires of Skill Against Respondent Nature of Business.

Which of the following best describe the nature of business of your organisation?		Skill is measured by the ability to analyze and resolve issue in shorter time.	Skill expedite the adaption of new technology.	Skills will motivate the employees to be innovative.	Facilities are utilized more efficiently by skilled person.	Proper skill shortens the time of work progress.	Data accumulation and analysis is more precise if done by skilful person.	The quality of skill attracts more future projects.	Exploring new skill opens new opportunity for organization expansion.
"Property Development "	Mean	3.56	3.44	3.94	3.50	4.06	3.63	3.94	4.00
	N	16	16	16	16	16	16	16	16
"Consultancy"	Mean	4.02	3.98	4.02	3.93	4.23	3.95	4.02	4.16
	N	43	43	43	43	43	43	43	43
"Construction Business"	Mean	3.73	3.59	3.64	3.86	3.86	3.73	3.95	3.95
	N	22	22	22	22	22	22	22	22
"Merchants of equipment/ material."	Mean	3.70	3.60	3.30	3.20	3.40	3.50	3.20	3.50
	N	10	10	10	10	10	10	10	10

Total	Mean	3.84	3.75	3.84	3.76	4.02	3.79	3.90	4.01
	N	91	91	91	91	91	91	91	91

v. Analysis of Respondents by Scale of Business Respondent Working at.

a. Skill is measured by the ability to analyze and resolve issue in shorter time.

The average mean score for this statement is 3.84. The respondent from "Multi National Company" and "Government Link Company" are scored highest mean, 4.00 as they strongly agree whilst the "Public Listed Company" scores least mean, 3.47.

b. Skill expedite the adaption of new technology.

The average mean score for this statement is 3.75. The respondent from "Government Link Company" is scored highest mean, 4.00 as they strongly agree whilst the "Public Listed Company" scores least mean, 3.60.

c. Skills will motivate the employees to be innovative.

The average mean score for this statement is 3.75. The respondent from "Government Link Company" is scored highest mean, 4.00 as they strongly agree whilst the "Public Listed Company" scores least mean, 3.67.

d. Facilities are utilized more efficiently by skilled person.

The average mean score for this statement is 3.76. The respondent from "Small Medium Enterprise" is scored highest mean, 3.89 as they strongly agree whilst the "Multi National Company "scores least mean, 3.54.

e. Proper skill shortens the time of work progress.

The average mean score for this statement is 4.02. The respondent from "Multi National Company" is scored highest mean, 4.21 as they strongly agree whilst the "Public Listed Company" scores least mean, 3.73.

f. Data accumulation and analysis is more precise if done by skillful person.

The average mean score for this statement is 3.79. The respondent from "Small Medium Enterprise “is scored highest mean, 3.85 as they strongly agree whilst the "Multi National Company " scores least mean, 3.67.

g. The quality of skill attracts more future projects.

The average mean score for this statement is 3.79. The respondent from "Government Link Company “is scored highest mean, 4.20 as they strongly agree whilst the "Multi National Company " scores least mean, 3.58.

h. Exploring new skill opens new opportunity for organization expansion

The average mean score for this statement is 4.01. The respondent from "Government Link Company “is scored highest mean, 4.60 as they strongly agree whilst the "Multi National Company " scores least mean, 3.88.

Results indicate that:

i. Respondents from "Government Link Company" strongly agree to the statements. In overall the respondents are on “Neutral” opinion on the statements. However, respondents are strongly agree to statement “Proper skill shortens the time of work progress”.

Table 4.7: Mean Comparison for Questionnaires of Skill Against Respondent Scale of Organisation.

What is scale of your organisation?		Skill is measured by the ability to analyze and resolve issue in shorter time.	Skill expedite the adaption of new technology.	Skills will motivate the employees to be innovative.	Facilities are utilized more efficiently by skilled person.	Proper skill shortens the time of work progress.	Data accumulation and analysis is more precise if done by skilful person.	The quality of skill attracts more future projects.	Exploring new skill opens new opportunity for organization expansion.
"Multi National Company "	Mean	4.00	3.88	3.83	3.54	4.21	3.67	3.58	3.88
	N	24	24	24	24	24	24	24	24
"Government Link Company"	Mean	4.00	4.00	3.80	3.60	3.80	3.80	4.20	4.60
	N	5	5	5	5	5	5	5	5
"Public Listed Company"	Mean	3.47	3.60	3.67	3.73	3.73	3.80	4.00	4.07
	N	15	15	15	15	15	15	15	15

"Small Medium Enterprise"	Mean	3.85	3.70	3.89	3.89	4.04	3.85	4.00	4.00
	N	47	47	47	47	47	47	47	47
Total	Mean	3.84	3.75	3.84	3.76	4.02	3.79	3.90	4.01
	N	91	91	91	91	91	91	91	91

vi. Analysis of Respondents by Respondent Organisation Participation in Industry

a. Skill is measured by the ability to analyze and resolve issue in shorter time.

The average mean score for this statement is 3.84. The respondent from organisation "More than 10 years" is scored highest mean, 3.85 as they strongly agree whilst the organisation of 5-10 years scores least mean, 3.79.

b. Skill expedite the adaption of new technology.

The average mean score for this statement is 3.75. The respondent from organisation "Less than 5 years" is scored highest mean, 3.83 as they strongly agree whilst the organisation of 5-10 years scores least mean, 3.54.

c. Skills will motivate the employees to be innovative.

The average mean score for this statement is 3.84. The respondent from organisation "5-10 years" is scored highest mean, 3.92 as they strongly agree whilst the organisation of “Less than 5 years” scores least mean, 3.67.

d. Facilities are utilized more efficiently by skilled person.

The average mean score for this statement is 3.76. The respondent from organisation "5-10 years" is scored highest mean, 3.88 as they strongly agree whilst the organisation of “Less than 5 years” scores least mean, 3.25.

e. Proper skill shortens the time of work progress.

The average mean score for this statement is 4.02. The respondent from organisation "Less than 5 years" is scored highest mean, 4.17 as

they strongly agree whilst the organisation of "More than 10 years " scores least mean, 3.93.

f. Data accumulation and analysis is more precise if done by skilful person.

The average mean score for this statement is 3.79. The respondent from organisation "More than 10 years " is scored highest mean, 3.84 as they strongly agree whilst the organisation of "Less than 5 years" scores least mean, 3.67.

g. The quality of skill attracts more future projects.

The average mean score for this statement is 3.90. The respondent from organisation "5- 10 years" is scored highest mean, 4.25 as they strongly agree whilst the organisation of "Less than 5 years" scores least mean, 3.42.

h. Exploring new skill opens new opportunity for organization expansion

The average mean score for this statement is 4.01. The respondent from organisation "Less than 5 years" is scored highest mean, 4.08 as they strongly agree whilst the organisation of "More than 10 years " scores least mean, 3.98.

Results indicate that:

i. Respondents from "More than 5 years and less than 10 years"" strongly agree to the statements. In overall the respondents are on “Neutral” opinion on the statements. However, respondents are strongly agrees to statement “Proper skill shortens the time of work progress”.

Table 4.8: Mean Comparison for Questionnaires of Skill against Respondent Nature of Business.

How long do your organization participating in industry?		Skill is measured by the ability to analyze and resolve issue in shorter time.	Skill expedite the adaption of new technology.	Skills will motivate the employees to be innovative.	Facilities are utilized more efficiently by skilled person.	Proper skill shortens the time of work progress.	Data accumulation and analysis is more precise if done by skilful person.	The quality of skill attracts more future projects.	Exploring new skill opens new opportunity for organization expansion.
"More than 10 years "	Mean	3.85	3.82	3.84	3.82	3.93	3.84	3.85	3.98
	N	55	55	55	55	55	55	55	55
"More than 5 years and less than 10 years"	Mean	3.79	3.54	3.92	3.88	4.17	3.75	4.25	4.04
	N	24	24	24	24	24	24	24	24
"Less than 5 years"	Mean	3.83	3.83	3.67	3.25	4.17	3.67	3.42	4.08
	N	12	12	12	12	12	12	12	12
Total	Mean	3.84	3.75	3.84	3.76	4.02	3.79	3.90	4.01
	N	91	91	91	91	91	91	91	91

vii. Kruskal-Wallis Test on Profession

The Kruskal-Wallis test conducted to determine the significance across the profession. Only that statement successful in rejection where $p<0.05$ of the relevant null hypothesis are shown in table below:-

Table 4.9: Rejected Null Hypothesis for Skill by Profession

Rejected Null Hypothesis	Mean Rank	Asymp. Sig
Skill is measured by the ability to analyze and resolve issue in shorter time.		
"Project Management" "Quantity Surveyor" "Design Engineer"	56.63 47.65 33.67	0.002
Skill expedite the adaption of new technology.		
"Project Management" "Quantity Surveyor" "Design Engineer"	56.88 41.98 39.27	0.012
Proper skill shortens the time of work progress.		
"Project Management" "Quantity Surveyor" "Design Engineer"	56.43 46.52 35.03	0.004
Data accumulation and analysis is more precise if done by skilful person.		
"Project Management" "Quantity Surveyor" "Design Engineer"	53.80 46.34 37.85	0.04

The results indicate that the following: -

i. Project managers (Project management) are statistically significant agreeing that skill is measured by the ability to analyze and resolve issue in shorter time. This indicates that the project managers are requires better skill in dealing with daily issues.

ii. Project manager strongly believes skill expedite the adaption of new technology. The skilful project based personnel would able to use new technologies such as Aconex and Building Information Modelling (BIM) for their daily monitoring and control over the progress.

iii. The project managers agrees proper skill shortens the time of work progress. In the construction industry, skill play a important role to undertake and complete certain job in shorter time.

iv. In IR 4.0, Data accumulation and analysis is more precise if done by skilful person. The skilful person has all the attributes to analyse the data collected by using the available technology adapted.

viii. Kruskal-Wallis on Working Experience

Table 4.10: Rejected Null Hypothesis for Skill by Experience

Rejected Null Hypothesis	Mean Rank	Asymp. Sig
Proper skill shortens the time of work progress.		
"More than 10 years "	46.08	0.042
"More than 5 years & less than 10"	40.68	
"More than 2 years & less than 5"	62.29	
"Less than 2 years"	48.07	

The results indicate that the following:-

i. Respondent with working experience more than 10 years are agreeing that proper skill will shorten the time of work progress. This due to the extent of experience in industry as the respondents witnessed many work progress.

ix. Kruskal-Wallis on Nature of Business

Table 4.11: Rejected Null Hypothesis for Skill by Nature of Business

Rejected Null Hypothesis	Mean Rank	Asymp. Sig
Proper skill shortens the time of work progress.		
"Property Development " "Consultancy" "Construction Business" "Merchants of equipment/ material."	45.56 52.52 41.77 27.95	0.030
The quality of skill attracts more future projects.		
"Property Development " "Consultancy" "Construction Business" "Merchants of equipment/ material."	50.53 49.05 46.23 25.15	0.044

The results indicate that the following: -

i. Property developers believe the proper skill shortens the time of work progress. Property developer is keen to hire better skilled consultants or project managers to execute and monitor the site work progress.

ii. The quality of skill level exposes the capability of delivering a proper project. Hence, the property developer may hire better

skilled personnel to execute the project. Thus, attract more investor to invest on new developments.

x. Man-Whitney Test

For those statements which retain the null hypothesis, Man-Whitney test was conducted by combining the more than two variables into two variables. However, upon the test was conducted, the statements are still retain the null hypothesis. Therefore, there is no significance difference among those groups.

4.3.2 Mean Comparison for Human Capital: Experience

i. Analysis of Respondents by Profession

a. Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0

The average mean score for this statement is 3.84. The respondent from "Quantity Surveyor" background scored highest mean, 3.97 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.67.

b. Experience is relying on tacit knowledge not years of service.

The average mean score for this statement is 3.76. The respondent from "Quantity Surveyor" background scored highest mean, 3.81 as they strongly agree whilst "Project Management" and "Design Engineer" profession scores least mean, 3.73.

c. Experience motivates the project team to strive for more.

The average mean score for this statement is 3.56. The respondent from "Design Engineer" background scored highest mean, 3.67 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.39.

d. Data analysis and result prediction requires broad experience.

   The average mean score for this statement is 3.65. The respondent from "Design Engineer" background scored highest mean, 3.73 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.52.

e. Decision making through the data analysis are precisely made by experience.

   The average mean score for this statement is 3.67. The respondent from "Design Engineer" background scored highest mean, 3.73 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.58.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements. However, respondents are strongly agree to statement “Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0”.

Table 4.12: Mean Comparison for Questionnaires of Experience against Respondent Working Profession

Please state your working profession.		Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0	Experience is relying on tacit knowledge not years of service.	Experience motivates the project team to strive for more.	Data analysis and result prediction requires broad experience.	Decision making through the data analysis are precisely made by experience.
"Project Management"	Mean	3.87	3.73	3.63	3.70	3.70
	N	30	30	30	30	30
"Quantity Surveyor"	Mean	3.97	3.81	3.39	3.52	3.58
	N	31	31	31	31	31
"Design Engineer"	Mean	3.67	3.73	3.67	3.73	3.73
	N	30	30	30	30	30
Total	Mean	3.84	3.76	3.56	3.65	3.67
	N	91	91	91	91	91

ii. Analysis of Respondents by Role in Organisation

a. Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0

The average mean score for this statement is 3.84. The respondent from "Executive" background scored highest mean, 3.89 as they strongly agree whilst "Managerial" scores least mean, 3.76.

b. Experience is relying on tacit knowledge not years of service.

The average mean score for this statement is 3.76. The respondent from "C-Level Executive" background scored highest mean, 4.20 as they strongly agree whilst "Managerial" scores least mean, 3.61.

c. Experience motivates the project team to strive for more.

The average mean score for this statement is 3.76. The respondent from "C-Level Executive" background scored highest mean, 4.20 as they strongly agree whilst "Managerial" scores least mean, 3.61.

d. Data analysis and result prediction requires broad experience.

The average mean score for this statement is 3.65. The respondent from "Executive" background scored highest mean, 3.75 as they strongly agree whilst "C-Level Executive" scores least mean, 3.40.

e. Decision making through the data analysis are precisely made by experience.

The average mean score for this statement is 3.67. The respondent from "Executive" background scored highest mean, 3.79 as they strongly agree whilst "C-Level Executive" scores least mean, 2.80.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements. However, respondents are close to agree to statement “Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0”.

ii. "C-Level Executive" strongly agrees to “Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0”.

Table 4.13: Mean Comparison for Questionnaires of Experience against Respondent Role in an Organisation

What is your role in the organisation?		Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0	Experience is relying on tacit knowledge not years of service.	Experience motivates the project team to strive for more.	Data analysis and result prediction requires broad experience.	Decision making through the data analysis are precisely made by experience.
"Executive"	Mean	3.89	3.81	3.57	3.75	3.79
	N	53	53	53	53	53
"Managerial"	Mean	3.76	3.61	3.58	3.52	3.61
	N	33	33	33	33	33
"C-Level	Mean	3.80	4.20	3.40	3.40	2.80
Executive"	N	5	5	5	5	5
Total	Mean	3.84	3.76	3.56	3.65	3.67
	N	91	91	91	91	91

iii. Analysis of Respondents by Working Experience

a. Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0

The average mean score for this statement is 3.84. The respondent with experience "More than 2 years & less than 5" is scored highest mean, 4.29 as they strongly agree whilst the respondent "Less than 2 years" scores least mean, 3.79.

b. Experience is relying on tacit knowledge not years of service.

The average mean score for this statement is 3.84. The respondent with experience "More than 2 years & less than 5" is scored highest mean, 4.29 as they strongly agree whilst the respondent "Less than 2 years" scores least mean, 3.79.

c. Experience motivates the project team to strive for more.

The average mean score for this statement is 3.56. The respondent with experience "More than 10 years" is scored highest mean, 3.96 as they strongly agree whilst the respondent "More than 2 years & less than 5" scores least mean, 3.14.

d. Data analysis and result prediction requires broad experience.

The average mean score for this statement is 3.65. The respondent with experience "More than 10 years" is scored highest mean, 3.96 as they strongly agree whilst the respondent "More than 2 years & less than 5" scores least mean, 3.14.

e. Decision making through the data analysis are precisely made by experience.

The average mean score for this statement is 4.02. The respondent from organisation "More than 5 years & less than 10" is scored highest

mean, 3.78 as they strongly agree whilst the organisation of "Less than 2 years" scores least mean, 3.00.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements. Respondents with "More than 2 years & less than 5" experience strongly agrees to “Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0”.

Table 4.14: Mean Comparison for Questionnaires of Experience against Respondent Experience in Industry.

What is your current year of experience in the industry?		Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0	Experience is relying on tacit knowledge not years of service.	Experience motivates the project team to strive for more.	Data analysis and result prediction requires broad experience.	Decision making through the data analysis are precisely made by experience.
"More than 10 years "	Mean	3.79	3.96	3.75	3.58	3.71
	N	24	24	24	24	24
"More than 5 years & less than 10"	Mean	3.78	3.67	3.65	3.78	3.76
	N	46	46	46	46	46
"More than 2 years & less than 5"	Mean	4.29	3.93	3.14	3.64	3.50
	N	14	14	14	14	14
"Less than 2 years"	Mean	3.43	3.29	3.14	3.00	3.29
	N	7	7	7	7	7
Total	Mean	3.84	3.76	3.56	3.65	3.67
	N	91	91	91	91	91

iv. Analysis of Respondents by Nature of Business

a. Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0

The average mean score for this statement is 3.84. The respondent from organisation nature "Small Medium Enterprise" is scored highest mean, 3.89 as they strongly agree whilst the organisation nature "Multi National Company " scores least mean, 3.75.

b. Experience is relying on tacit knowledge not years of service.

The average mean score for this statement is 3.84. The respondent from organisation nature "Small Medium Enterprise" is scored highest mean, 3.89 as they strongly agree whilst the organisation nature "Multi National Company " scores least mean, 3.75.

c. Experience motivates the project team to strive for more.

The average mean score for this statement is 3.56. The respondent from organisation nature "Public Listed Company" is scored highest mean, 3.87 as they strongly agree whilst the organisation nature "Small Medium Enterprise" scores least mean, 3.53.

d. Data analysis and result prediction requires broad experience.

The average mean score for this statement is 3.65. The respondent from organisation nature "Government Link Company" is scored highest mean, 3.80 as they strongly agree whilst the organisation nature "Multi National Company" scores least mean, 3.58.

e. Decision making through the data analysis are precisely made by experience.

The average mean score for this statement is 3.67. The respondent from organisation nature "Small Medium Enterprise" is scored highest

mean, 3.83 as they strongly agree whilst the organisation nature "Multi National Company" scores least mean, 3.33.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements. Respondents from “Consultancy” experience strongly agree to “Experience is relying on tacit knowledge not years of service”.

Table 4.15: Mean Comparison for Questionnaires of Experience against Respondent Nature of Business.

Which of the following best describe the nature of business of your organisation?		Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0	Experience is relying on tacit knowledge not years of service.	Experience motivates the project team to strive for more.	Data analysis and result prediction requires broad experience.	Decision making through the data analysis are precisely made by experience.
"Property Development "	Mean	3.75	3.58	3.38	3.58	3.33
	N	24	24	24	24	24
"Consultancy"	Mean	3.80	4.00	3.80	3.80	3.60
	N	5	5	5	5	5
"Construction Business"	Mean	3.80	3.80	3.87	3.73	3.73
	N	15	15	15	15	15
"Merchants of equipment/ material."	Mean	3.89	3.81	3.53	3.64	3.83
	N	47	47	47	47	47
Total	Mean	3.84	3.76	3.56	3.65	3.67
	N	91	91	91	91	91

v. Analysis of Respondents by Scale of Business

a. Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0

The average mean score for this statement is 3.84. The respondent from organisation scale "Small Medium Enterprise" is scored highest mean, 3.89 as they strongly agree whilst the organisation scale "Multi National Company" scores least mean, 3.75.

b. Experience is relying on tacit knowledge not years of service.

The average mean score for this statement is 3.75. The respondent from organisation scale "Multi National Company" is scored highest mean, 3.88 as they strongly agree whilst the organisation scale "Public Listed Company" scores least mean, 3.67.

c. Experience motivates the project team to strive for more.

The average mean score for this statement is 3.75. The respondent from organisation scale "Multi National Company " is scored highest mean, 3.88 as they strongly agree whilst the organisation scale "Public Listed Company" scores least mean, 3.67.

d. Data analysis and result prediction requires broad experience.

The average mean score for this statement is 3.76. The respondent from organisation scale "Small Medium Enterprise" is scored highest mean, 3.89 as they strongly agree whilst the organisation scale "Multi National Company "scores least mean, 3.54.

e. Decision making through the data analysis are precisely made by experience.

The average mean score for this statement is 4.02. The respondent from organisation scale "Multi National Company "is scored highest

mean, 4.21 as they strongly agree whilst the organisation scale "Public Listed Company" scores least mean, 3.73.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements. However, respondents are strongly agree to statement of “Decision making through the data analysis are precisely made by experience”.

ii. The respondent from "Multi National Company" and "Government Link Company" strongly agree to “Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0”.

Table 4.16: Mean Comparison for Questionnaires of Experience against Respondent Nature of Business.

What is scale of your organisation?		Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0	Experience is relying on tacit knowledge not years of service.	Experience motivates the project team to strive for more.	Data analysis and result prediction requires broad experience.	Decision making through the data analysis are precisely made by experience.
"Multi National Company "	Mean	4.00	3.88	3.83	3.54	4.21
	N	24	24	24	24	24
"Government Link Company"	Mean	4.00	4.00	3.80	3.60	3.80
	N	5	5	5	5	5
"Public Listed Company"	Mean	3.47	3.60	3.67	3.73	3.73
	N	15	15	15	15	15
"Small Medium Enterprise"	Mean	3.85	3.70	3.89	3.89	4.04
	N	47	47	47	47	47
Total	Mean	3.84	3.75	3.84	3.76	4.02
	N	91	91	91	91	91

xi. Analysis of Respondents by Organisation Participation in Industry

a. Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0

The average mean score for this statement is 3.84. The respondent from organisation participating "More than 10 years" is scored highest mean, 3.89 as they strongly agree whilst the organisation participating "Less than 5 years" scores least mean, 3.58.

b. Experience is relying on tacit knowledge not years of service.

The average mean score for this statement is 3.76. The respondent from organisation participating "More than 10 years" is scored highest mean, 3.89 as they strongly agree whilst the organisation participating "Less than 5 years" scores least mean, 3.58.

c. Experience motivates the project team to strive for more.

The average mean score for this statement is 3.56. The respondent from organisation "More than 10 years" is scored highest mean, 3.69 as they strongly agree whilst the organisation of “Less than 5 years” scores least mean, 3.00.

d. Data analysis and result prediction requires broad experience.

The average mean score for this statement is 3.65. The respondent from organisation "More than 10 years " is scored highest mean, 3.76as they strongly agree whilst the organisation of “Less than 5 years” scores least mean, 3.17.

e. Decision making through the data analysis are precisely made by experience.

The average mean score for this statement is 3.67. The respondent from organisation "More than 10 years " is scored highest mean, 3.84

as they strongly agree whilst the organisation of “Less than 5 years” scores least mean, 2.75.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements. The respondent from organisation "More than 10 years " is strongly agree on all the statements.

Table 4.17: Mean Comparison for Questionnaires of Experience against Respondent Organisation Participation in Industry.

How long do your organization participating in industry?		Pre-Industrial Revolution 4.0 experiences are still relevant in post Industrial Revolution 4.0	Experience is relying on tacit knowledge not years of service.	Experience motivates the project team to strive for more.	Data analysis and result prediction requires broad experience.	Decision making through the data analysis are precisely made by experience.
"More than 10 years "	Mean	3.89	3.89	3.69	3.76	3.84
	N	55	55	55	55	55
"More than 5 years and less than 10 years"	Mean	3.83	3.71	3.54	3.63	3.75
	N	24	24	24	24	24
"Less than 5 years"	Mean	3.58	3.25	3.00	3.17	2.75
	N	12	12	12	12	12
Total	Mean	3.84	3.76	3.56	3.65	3.67
	N	91	91	91	91	91

4.3.3 Mean Comparison for Human Capital: Knowledge

i. Analysis of Respondents by Profession

a. Tacit knowledge is more valuable in digital construction, than paper qualification.

The average mean score for this statement is 3.73. The respondent from "Quantity Surveyor" background scored highest mean, 3.81 as they strongly agree whilst "Project Management" profession scores least mean, 3.60.

b. Knowledge development in a project are through knowledge sharing.

The average mean score for this statement is 3.73. The respondent from "Project Management" background scored highest mean, 3.83 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.67.

c. Knowledge dimension is not fixed. Need to improvise over the time.

The average mean score for this statement is 3.71. The respondent from "Project Management" background scored highest mean, 3.97 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.47.

d. New knowledge and innovation develop through ‘knowledge network’.

The average mean score for this statement is 3.70. The respondent from "Project Management" background scored highest mean, 3.83 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.53.

e. Knowledge is necessarily comes from highly skilled workers.

The average mean score for this statement is 3.43. The respondent from "Design Engineer" background scored highest mean, 3.70 as they

strongly agree whilst "Project Management" profession scores least mean, 3.07.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Quantity Surveyor" are strongly agreeing statement “Tacit knowledge is more valuable in digital construction, than paper qualification”.
iii. The respondents from "Project Management" are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
iv. The respondents from "Quantity Surveyor" and "Design Engineer" are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents from "Project Management" are strongly agreeing statement “Knowledge dimension is not fixed. Need to improvise over the time”.
vi. The respondents from "Quantity Surveyor" are strongly agreeing statement “Knowledge is necessarily comes from highly skilled workers”.

Table 4.18: Mean Comparison for Questionnaires of Knowledge against Respondent Profession.

Please state your working profession.		Tacit knowledge is more valuable in digital construction, than paper qualification.	Knowledge development in a project are through knowledge sharing.	Knowledge dimension is not fixed. Need to improvise over the time.	New knowledge and innovation develop through 'knowledge network'.	Knowledge is necessarily comes from highly skilled workers.
"Project Management"	Mean	3.60	3.83	3.97	3.83	3.07
	N	30	30	30	30	30
"Quantity Surveyor"	Mean	3.81	3.68	3.71	3.74	3.52
	N	31	31	31	31	31
"Design Engineer"	Mean	3.77	3.67	3.47	3.53	3.70
	N	30	30	30	30	30
Total	Mean	3.73	3.73	3.71	3.70	3.43
	N	91	91	91	91	91

ii. Analysis of Respondents by Role in Organisation

a. Tacit knowledge is more valuable in digital construction, than paper qualification.

The average mean score for this statement is 3.73. The respondent from role of "Managerial" is scored highest mean, 3.91 as they strongly agree whilst the role of "C-Level Executive" scores least mean, 3.60.

b. Knowledge development in a project are through knowledge sharing.

The average mean score for this statement is 3.73. The respondent from role of "C-Level Executive" is scored highest mean, 4.20 as they strongly agree whilst the role of "Executive" scores least mean, 3.64.

c. Knowledge dimension is not fixed. Need to improvise over the time.

The average mean score for this statement is 3.71. The respondent from role of "Executive" is scored highest mean, 3.77 as they strongly agree whilst the role of "C-Level Executive" scores least mean, 3.60.

d. New knowledge and innovation develop through ‘knowledge network’.

The average mean score for this statement is 3.70. The respondent from role of "C-Level Executive" is scored highest mean, 3.79 as they strongly agree whilst the role of "Managerial" scores least mean, 3.52.

e. Knowledge is necessarily comes from highly skilled workers.

The average mean score for this statement is 3.43. The respondent from role of "Executive" is scored highest mean, 3.51 as they strongly agree whilst the role of "Managerial" scores least mean, 3.30.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Managerial" role are strongly agreeing statement “Tacit knowledge is more valuable in digital construction, than paper qualification”.
iii. The respondents from "C-Level Executive" role are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
iv. The respondents from "Executive" role are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents from "C-Level Executive" role are strongly agreeing statement “Knowledge dimension is not fixed. Need to improvise over the time”.
vi. The respondents from "Executive" role are strongly agreeing statement “Knowledge is necessarily comes from highly skilled workers”.

Table 4.19: Mean Comparison for Questionnaires of Knowledge against Respondent Role in Organisation.

What is your role in the organisation?		Tacit knowledge is more valuable in digital construction, than paper qualification.	Knowledge development in a project are through knowledge sharing.	Knowledge dimension is not fixed. Need to improvise over the time.	New knowledge and innovation develop through 'knowledge network'.	Knowledge is necessarily comes from highly skilled workers.
"Executive"	Mean	3.62	3.64	3.77	3.79	3.51
	N	53	53	53	53	53
"Managerial"	Mean	3.91	3.79	3.64	3.52	3.30
	N	33	33	33	33	33
"C-Level Executive"	Mean	3.60	4.20	3.60	4.00	3.40
	N	5	5	5	5	5
Total	Mean	3.73	3.73	3.71	3.70	3.43
	N	91	91	91	91	91

iii. Analysis of Respondents by Working Experience

a. Tacit knowledge is more valuable in digital construction, than paper qualification.

The average mean score for this statement is 3.84. The respondent from years of experience "More than 2 years & less than 5" is scored highest mean, 4.26 as they strongly agree whilst the role of "Less than 2 years" scores least mean, 3.43.

b. Knowledge development in a project are through knowledge sharing.

The average mean score for this statement is 3.29. The respondent from years of experience "More than 10 years " is scored highest mean, 3.96 as they strongly agree whilst the role of "Less than 2 years" scores least mean, 3.29.

c. Knowledge dimension is not fixed. Need to improvise over the time.

The average mean score for this statement is 3.56. The respondent from years of experience "More than 10 years " is scored highest mean, 3.75 as they strongly agree whilst the role of "More than 2 years & less than 5" and "Less than 2 years" scores least mean, 3.14.

d. New knowledge and innovation develop through 'knowledge network'.

The average mean score for this statement is 3.65. The respondent from years of experience "More than 5 years & less than 10" is scored highest mean, 3.78 as they strongly agree whilst the role of "Less than 2 years" scores least mean, 3.00.

e. Knowledge is necessarily coming from highly skilled workers.

The average mean score for this statement is 3.67. The respondent from years of experience "More than 5 years & less than 10" is scored highest mean, 3.76 as they strongly agree whilst the role of "Less than 2 years" scores least mean, 3.29.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents with experience "More than 2 years & less than 5" are strongly agreeing statement “Tacit knowledge is more valuable in digital construction, than paper qualification”.
iii. The respondents with experience "More than 10 years" are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
iv. The respondents with experience "More than 10 years" are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “Knowledge dimension is not fixed. Need to improvise over the time”.
vi. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “Knowledge is necessarily comes from highly skilled workers”.

Table 4.20: Mean Comparison for Questionnaires of Knowledge against Respondent Working Experience in Industry.

What is your current year of experience in the industry?		Tacit knowledge is more valuable in digital construction, than paper qualification.	Knowledge development in a project are through knowledge sharing.	Knowledge dimension is not fixed. Need to improvise over the time.	New knowledge and innovation develop through 'knowledge network'.	Knowledge is necessarily comes from highly skilled workers.
"More than 10 years "	Mean	3.79	3.96	3.75	3.58	3.71
	N	24	24	24	24	24
"More than 5 years & less than 10"	Mean	3.78	3.67	3.65	3.78	3.76
	N	46	46	46	46	46
"More than 2 years & less than 5"	Mean	4.29	3.93	3.14	3.64	3.50
	N	14	14	14	14	14
"Less than 2 years"	Mean	3.43	3.29	3.14	3.00	3.29
	N	7	7	7	7	7
Total	Mean	3.84	3.76	3.56	3.65	3.67
	N	91	91	91	91	91

iv. Analysis of Respondents by Nature of Business

a. Tacit knowledge is more valuable in digital construction, than paper qualification.

The average mean score for this statement is 3.73. The respondent from business nature of "Consultancy" is scored highest mean, 3.79 as they strongly agree whilst respondent from "Construction Business" scores least mean, 3.60.

b. Knowledge development in a project are through knowledge sharing.

The average mean score for this statement is 3.73. The respondent from business nature of "Consultancy" is scored highest mean, 3.79 as they strongly agree whilst respondent from "Property Development " scores least mean, 3.63.

c. Knowledge dimension is not fixed. Need to improvise over the time.

The average mean score for this statement is 3.71. The respondent from business nature of "Consultancy" is scored highest mean, 3.84 as they strongly agree whilst respondent from "Construction Business" scores least mean, 3.55.

d. New knowledge and innovation develop through ‘knowledge network’.

The average mean score for this statement is 3.70. The respondent from business nature of "Property Development" is scored highest mean, 3.88 as they strongly agree whilst respondent from "Merchants of equipment/ material." scores least mean, 3.40.

e. Knowledge is necessarily comes from highly skilled workers.

The average mean score for this statement is 3.43. The respondent from business nature of "Construction Business" is scored highest mean, 3.68 as they strongly agree whilst respondent from "Merchants of equipment/ material." scores least mean, 3.10.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Consultancy" background are strongly agreeing statement “Tacit knowledge is more valuable in digital construction, than paper qualification”.
iii. The respondents from "Consultancy" background are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
iv. The respondents from "Consultancy" background are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents from "Property Development" background are strongly agreeing statement “Knowledge dimension is not fixed. Need to improvise over the time”.
vi. The respondents from "Construction Business" are strongly agreeing statement “Knowledge is necessarily comes from highly skilled workers”.

Table 4.21: Mean Comparison for Questionnaires of Knowledge against Respondent Nature of Business.

Which of the following best describe the nature of business of your organisation?		Tacit knowledge is more valuable in digital construction, than paper qualification.	Knowledge developments in a project are through knowledge sharing.	Knowledge dimension is not fixed. Need to improvise over the time.	New knowledge and innovation develop through 'knowledge network'.	Knowledge is necessarily comes from highly skilled workers.
"Property Development "	Mean	3.56	3.63	3.69	3.88	3.50
	N	16	16	16	16	16
"Consultancy"	Mean	3.79	3.79	3.84	3.74	3.35
	N	43	43	43	43	43
"Construction Business"	Mean	3.77	3.68	3.55	3.64	3.68
	N	22	22	22	22	22
"Merchants of equipment/ material."	Mean	3.60	3.70	3.60	3.40	3.10
	N	10	10	10	10	10
Total	Mean	3.73	3.73	3.71	3.70	3.43
	N	91	91	91	91	91

v. Analysis of Respondents by Scale of Business

a. Tacit knowledge is more valuable in digital construction, than paper qualification.

The average mean score for this statement is 3.73. The respondent from organisation scale of "Government Link Company" is scored highest mean, 4.20 as they strongly agree whilst respondent from “Multi National Company "scores least mean, 3.38.

b. Knowledge development in a project are through knowledge sharing.

The average mean score for this statement is 3.73. The respondent from business nature of "Public Listed Company" is scored highest mean, 4.20 as they strongly agree whilst respondent from "Small Medium Enterprise" scores least mean, 3.51.

c. Knowledge dimension is not fixed. Need to improvise over the time.

The average mean score for this statement is 3.71. The respondent from business nature of "Government Link Company" is scored highest mean, 4.20 as they strongly agree whilst respondent from “Small Medium Enterprise" scores least mean, 3.53.

d. New knowledge and innovation develop through ‘knowledge network’.

The average mean score for this statement is 3.70. The respondent from business nature of "Public Listed Company" " is scored highest mean, 3.93 as they strongly agree whilst respondent from "Small Medium Enterprise" scores least mean, 3.55.

e. Knowledge is necessarily comes from highly skilled workers.

The average mean score for this statement is 3.43. The respondent from business nature of "Public Listed Company" is scored highest mean, 4.27 as they strongly agree whilst respondent from "Multi National Company" scores least mean, 2.88.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Government Link Company" background are strongly agreeing statement “Tacit knowledge is more valuable in digital construction, than paper qualification”.
iii. The respondents from "Public Listed Company" background are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
iv. The respondents from "Government Link Company" background are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents from "Public Listed Company" background are strongly agreeing statement “Knowledge dimension is not fixed. Need to improvise over the time”.
vi. The respondents from "Public Listed Company" are strongly agreeing statement “Knowledge is necessarily comes from highly skilled workers”.

Table 4.22: Mean Comparison for Questionnaires of Knowledge against Respondent Scale of Organisation.

What is scale of your organisation?		Tacit knowledge is more valuable in digital construction, than paper qualification.	Knowledge development in a project are through knowledge sharing.	Knowledge dimension is not fixed. Need to improvise over the time.	New knowledge and innovation develop through 'knowledge network'.	Knowledge is necessarily comes from highly skilled workers.
"Multi National Company "	Mean	3.38	3.83	3.75	3.83	2.88
	N	24	24	24	24	24
"Government Link Company"	Mean	4.20	3.80	4.20	3.80	3.60
	N	5	5	5	5	5
"Public Listed Company"	Mean	4.00	4.20	4.07	3.93	4.27
	N	15	15	15	15	15
"Small Medium Enterprise"	Mean	3.77	3.51	3.53	3.55	3.43
	N	47	47	47	47	47
Total	Mean	3.73	3.73	3.71	3.70	3.43
	N	91	91	91	91	91

iii. Analysis of Respondents by Organisation Participation in Industry

a. Tacit knowledge is more valuable in digital construction , than paper qualification.

The average mean score for this statement is 3.73. The respondent from organisation participating year of "More than 5 years and less than 10 years" is scored highest mean, 3.96 as they strongly agree whilst respondent from organisation “Less than 5 years" scores least mean, 3.42.

b. Knowledge development in a project are through knowledge sharing.

The average mean score for this statement is 3.73. The respondent from organisation participating year of "More than 5 years and less than 10 years" is scored highest mean, 3.82 as they strongly agree whilst respondent from organisation "More than 5 years and less than 10 years" and "Less than 5 years" scores least mean, 3.58.

c. Knowledge dimension is not fixed. Need to improvise over the time.

The average mean score for this statement is 3.73. The respondent from organisation participating year of "More than 10 years " is scored highest mean, 3.93 as they strongly agree whilst respondent from organisation "Less than 5 years" scores least mean, 3.08.

d. New knowledge and innovation develop through ‘knowledge network’.

The average mean score for this statement is 3.71. The respondent from organisation participating year of "More than 10 years " is scored highest mean, 3.78 as they strongly agree whilst respondent from organisation "Less than 5 years" scores least mean, 3.33.

e. Knowledge is necessarily comes from highly skilled workers.

The average mean score for this statement is 3.43. The respondent from organisation participating year of "More than 10 years" is scored

highest mean, 3.55 as they strongly agree whilst respondent from organisation "Less than 5 years" scores least mean, 2.33.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from organisation exist "More than 5 years and less than 10 years" are strongly agreeing statement “Tacit knowledge is more valuable in digital construction, than paper qualification”.
iii. The respondents from organisation exist "More than 10 years" background are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
iv. The respondents from organisation exist "More than 10 years" are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents from organisation exist "More than 10 years" background are strongly agreeing statement “Knowledge dimension is not fixed. Need to improvise over the time”.
vi. The respondents from organisation exist "More than 5 years and less than 10 years" are strongly agreeing statement “Knowledge is necessarily comes from highly skilled workers”.

Table 4.23: Mean Comparison for Questionnaires of Experience against Respondent Organisation Participation in Industry.

How long do your organization participating in industry.		Tacit knowledge is more valuable in digital construction, than paper qualification.	Knowledge development in a project are through knowledge sharing.	Knowledge dimension is not fixed. Need to improvise over the time.	New knowledge and innovation develop through 'knowledge network'.	Knowledge is necessarily comes from highly skilled workers.
"More than 10 years "	Mean	3.69	3.82	3.93	3.78	3.55
	N	55	55	55	55	55
"More than 5 years and less than 10 years"	Mean	3.96	3.58	3.54	3.71	3.71
	N	24	24	24	24	24
"Less than 5 years"	Mean	3.42	3.58	3.08	3.33	2.33
	N	12	12	12	12	12
Total	Mean	3.73	3.73	3.71	3.70	3.43
	N	91	91	91	91	91

Based on the Kruskal-Wallis test conducted, to determine the significance across the current year of experience. Only those statement successful in rejection where $p<0.05$ of the relevant null hypothesis are shown in table below:-

Table 4.24: Rejected Null Hypothesis for Knowledge by Year of Experience

Rejected Null Hypothesis	Mean Rank	Asymp. Sig
Tacit knowledge is more valuable in digital construction, than paper qualification.		
"More than 10 years "	48.33	
"More than 5 years & less than 10"	49.34	0.0039
"More than 2 years & less than 5"	28.18	
"Less than 2 years"	51.71	

The results indicate that the following: -

i. The respondents with experience less than 2 years have higher agreement that the tacit knowledge is more valuable than academic qualification. These participants look at the senior employees as an example to refer, as they tend to realise that the senior figures are rely on tacit knowledge obtained from experience used to come through the cooperate ladder.

ii. However, the participant with experience 2-5 years does seem decided over the statement. This may be due to the reason they are still in the developing curve.

Table 4.25: Rejected Null Hypothesis for Knowledge by Organisation Participation

Rejected Null Hypothesis	Mean Rank	Asymp. Sig
Knowledge dimension is not fixed. Need to improvise over the time.		
"More than 10 years "	51.05	0.032
"More than 5 years and less than 10 years"	41.79	

"Less than 5 years"	31.25	
Knowledge is necessarily comes from highly skilled workers.		
"More than 10 years "	48.00	0.010
"More than 5 years and less than 10 years"	51.67	
"Less than 5 years"	25.50	

The results indicate that the following: -

i. Respondent with experience "More than 10 years' highly agrees that the knowledge need to improvise over time. The experienced respondents are in opinion that the knowledge needs to be upgraded or learned in order to sustain in the industry. To suit the industry evolvement.

ii. Respondent with experience "More than 5 years and less than 10 years" highly agrees that the knowledge and skill are inter related. They in opinion that, a person shall development the knowledge through the skill learned.

Table 4.26: Rejected Null Hypothesis for Knowledge by Scale of Organisation.

Rejected Null Hypothesis	**Mean Rank**	**Asymp. Sig**
Knowledge is necessarily comes from highly skilled workers.		
"Multi National Company "	34.90	0.0018
"Government Link Company"	50.20	
"Public Listed Company"	61.47	
"Small Medium Enterprise"	46.29	

The results indicate that the following: -

i. Respondents from "Public Listed Company" highly agrees that knowledge is necessarily comes from highly skilled workers. Public listed companies are usually acquire the employees from highly skilled category with association of deeper knowledge of industry as part of their employment policy

4.3.4 Inferential Test Results for Human Capital: Ethics

i. Analysis of Respondents by Profession

a. Data privacy challenging in digital transformation of industry practice.

The average mean score for this statement is 3.81. The respondent from "Project Management" background scored highest mean, 3.97 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.57.

b. Probability of data breach is high in the trend of automation and data exchange.

The average mean score for this statement is 3.84 The respondent from "Project Management" background scored highest mean, 3.97 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.67.

c. Technology will slow down human involvement in the physical construction.

The average mean score for this statement is 3.54 The respondent from "Quantity Surveyor" background scored highest mean, 3.65 as they strongly agree whilst "Project Management" profession scores least mean, 3.33.

d. Professionalism is limited in the wake of high technology.

The average mean score for this statement is 3.40 The respondent from "Project Management" background scored highest mean, 3.43 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.37.

e. Remote monitoring method will increase the quality of works.

The average mean score for this statement is 3.35. The respondent from "Design Engineer" background scored highest mean, 3.53 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.16.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Project Management" background are strongly agreeing statement “Data privacy challenging in digital transformation of industry practice”.
iii. The respondents from "Project Management" background are strongly agreeing statement “Probability of data breach is high in the trend of automation and data exchange”.
iv. The respondents from "Quantity Surveyor" background are strongly agreeing statement “Technology will slow down human involvement in the physical construction”.
v. The respondents from "Project Management" background are strongly agreeing statement “Professionalism is limited in the wake of high technology”.
vi. The respondents from "Design Engineer" background are strongly agreeing statement “Remote monitoring method will increase the quality of works”.

Table 4.27: Mean Comparison for Questionnaires of Ethics against Respondent Profession.

Please state your working profession.		Data privacy challenging in digital transformation of industry practice.	Probability of data breach is high in the trend of automation and data exchange.	Technology will slow down human involvement in the physical construction.	Professionalism is limited in the wake of high technology.	Remote monitoring method will increase the quality of works.
"Project Management"	Mean	3.97	3.97	3.33	3.43	3.37
	N	30	30	30	30	30
"Quantity Surveyor"	Mean	3.90	3.87	3.65	3.39	3.16
	N	31	31	31	31	31
"Design Engineer"	Mean	3.57	3.67	3.63	3.37	3.53
	N	30	30	30	30	30
Total	Mean	3.81	3.84	3.54	3.40	3.35
	N	91	91	91	91	91

ii. Analysis of Respondents by Role In Organisation

a. Data privacy challenging in digital transformation of industry practice.

The average mean score for this statement is 3.81. The respondent from role of "Executive" scored highest mean, 3.89 as they strongly agree whilst "C-Level Executive" role scores least mean, 3.60.

b. Probability of data breach is high in the trend of automation and data exchange.

The average mean score for this statement is 3.84. The respondent from role of "Executive" scored highest mean, 3.89 as they strongly agree whilst "Managerial" role scores least mean, 3.76.

c. Technology will slow down human involvement in the physical construction.

The average mean score for this statement is 3.54. The respondent from role of "C-Level Executive" scored highest mean, 3.80 as they strongly agree whilst "Managerial" role scores least mean, 3.52.

d. Professionalism is limited in the wake of high technology.

The average mean score for this statement is 3.40. The respondent from role of "C-Level Executive" scored highest mean, 3.60 as they strongly agree whilst "Executive" role scores least mean, 3.32.

e. Remote monitoring method will increase the quality of works.

The average mean score for this statement is 3.35. The respondent from role of "C-Level Executive" scored highest mean, 3.60 as they strongly agree whilst "Executive" role scores least mean, 3.25.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Executive" role are strongly agreeing statement “Data privacy challenging in digital transformation of industry practice”.
iii. The respondents from "Executive" role are strongly agreeing statement “Probability of data breach is high in the trend of automation and data exchange”.
iv. The respondents from "C-Level Executive" role are strongly agreeing statement “Technology will slow down human involvement in the physical construction”.
v. The respondents from "C-Level Executive" role are strongly agreeing statement “Professionalism is limited in the wake of high technology”.
vi. The respondents from "C-Level Executive" role are strongly agreeing statement “Remote monitoring method will increase the quality of works”.

Table 4.28: Mean Comparison for Questionnaires of Ethics against Respondent Role in Organisation.

What is your role in the organisation?		Data privacy challenging in digital transformation of industry practice.	Probability of data breach is high in the trend of automation and data exchange.	Technology will slow down human involvement in the physical construction.	Professionalism is limited in the wake of high technology.	Remote monitoring method will increase the quality of works.
"Executive"	Mean	3.89	3.89	3.53	3.32	3.25
	N	53	53	53	53	53
"Managerial"	Mean	3.73	3.76	3.52	3.48	3.48
	N	33	33	33	33	33
"C-Level Executive"	Mean	3.60	3.80	3.80	3.60	3.60
	N	5	5	5	5	5
Total	Mean	3.81	3.84	3.54	3.40	3.35
	N	91	91	91	91	91

iii. Analysis of Respondents by Working Experience

a. Data privacy challenging in digital transformation of industry practice.

The average mean score for this statement is 3.81. The respondent with experience "More than 10 years " scored highest mean, 3.75 as they strongly agree whilst respondent with experience "Less than 2 years" scores least mean, 3.60.

b. Probability of data breach is high in the trend of automation and data exchange.

The average mean score for this statement is 3.84. The respondent with experience "More than 2 years & less than 5"scored highest mean, 3.86 as they strongly agree whilst respondent with experience "Less than 2 years" scores least mean, 3.71.

c. Technology will slow down human involvement in the physical construction.

The average mean score for this statement is 3.54. The respondent with experience ""More than 5 years & less than 10" scored highest mean, 3.67 as they strongly agree whilst respondent with experience "Less than 2 years" scores least mean, 3.14.

d. Professionalism is limited in the wake of high technology.

The average mean score for this statement is 3.40. The respondent with experience "More than 10 years "scored highest mean, 3.46 as they strongly agree whilst respondent with experience "Less than 2 years" scores least mean, 2.86.

e. Remote monitoring method will increase the quality of works.

The average mean score for this statement is 3.35. The respondent with experience "More than 10 years" scored highest mean, 3.42 as they strongly agree whilst respondent with experience "Less than 2 years" scores least mean, 2.71.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “Data privacy challenging in digital transformation of industry practice”.
iii. The respondents with experience "More than 2 years & less than 5" are strongly agreeing statement “Probability of data breach is high in the trend of automation and data exchange”.
iv. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “Technology will slow down human involvement in the physical construction”.
v. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “Professionalism is limited in the wake of high technology”.
vi. The respondents with experience ""More than 10 years " are strongly agreeing statement “Remote monitoring method will increase the quality of works”.

Table 4.29: Mean Comparison for Questionnaires of Ethics against Respondent Year of Experience.

What is your current year of experience in the industry?		Data privacy challenging in digital transformation of industry practice.	Probability of data breach is high in the trend of automation and data exchange.	Technology will slow down human involvement in the physical construction.	Professionalism is limited in the wake of high technology.	Remote monitoring method will increase the quality of works.
"More than 10 years "	Mean	3.75	3.83	3.50	3.46	3.42
	N	24	24	24	24	24
"More than 5 years & less than 10"	Mean	3.93	3.85	3.67	3.50	3.43
	N	46	46	46	46	46
"More than 2 years & less than 5"	Mean	3.71	3.86	3.36	3.21	3.29
	N	14	14	14	14	14
"Less than 2 years"	Mean	3.43	3.71	3.14	2.86	2.71
	N	7	7	7	7	7
Total	Mean	3.81	3.84	3.54	3.40	3.35
	N	91	91	91	91	91

iv. Analysis of Respondents by Nature of Business

a. Data privacy challenging in digital transformation of industry practice .

The average mean score for this statement is 3.81. The respondent from nature of business "Merchants of equipment/ material." scored highest mean, 4.00 as they strongly agree whilst respondent with from "Construction Business" scores least mean, 3.64.

b. Probability of data breach is high in the trend of automation and data exchange.

The average mean score for this statement is 3.84. The respondent from nature of business "Merchants of equipment/ material." scored highest mean, 4.10 as they strongly agree whilst respondent with from "Construction Business" scores least mean, 3.82.

c. Technology will slow down human involvement in the physical construction.

The average mean score for this statement is 3.54. The respondent from nature of business "Merchants of equipment/ material." scored highest mean, 4.10 as they strongly agree whilst respondent with from "Consultancy" scores least mean, 3.42.

d. Professionalism is limited in the wake of high technology.

The average mean score for this statement is 3.40. The respondent from nature of business "Merchants of equipment/ material." scored highest mean, 3.60 as they strongly agree whilst respondent with from "Consultancy" scores least mean, 3.35.

e. Remote monitoring method will increase the quality of works.

The average mean score for this statement is 3.35. The respondent from nature of business "Construction Business" scored highest mean, 3.55 as they strongly agree whilst respondent with from "Merchants of equipment/ material." scores least mean, 3.20.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Merchants of equipment/ material" background are strongly agreeing statement “Data privacy challenging in digital transformation of industry practice”.
iii. The respondents from "Merchants of equipment/ material." background are strongly agreeing statement “Probability of data breach is high in the trend of automation and data exchange”.
iv. The respondents from" Consultancy" background are strongly agreeing statement “Technology will slow down human involvement in the physical construction”.
v. The respondents from "Merchants of equipment/ material." background are strongly agreeing statement “Professionalism is limited in the wake of high technology”.
vi. The respondents from "Construction Business" are strongly agreeing statement “Remote monitoring method will increase the quality of works”.

Table 4.30: Mean Comparison for Questionnaires of Ethics against Respondent Organisation Nature of Business.

Which of the following best describe the nature of business of your organisation?		Data privacy challenging in digital transformation of industry practice.	Probability of data breach is high in the trend of automation and data exchange.	Technology will slow down human involvement in the physical construction.	Professionalism is limited in the wake of high technology.	Remote monitoring method will increase the quality of works.
"Property Development "	Mean	3.81	3.88	3.50	3.44	3.31
	N	16	16	16	16	16
"Consultancy"	Mean	3.84	3.77	3.42	3.35	3.30
	N	43	43	43	43	43
"Construction Business"	Mean	3.64	3.82	3.55	3.36	3.55
	N	22	22	22	22	22
"Merchants of equipment/ material."	Mean	4.10	4.10	4.10	3.60	3.20
	N	10	10	10	10	10
Total	Mean	3.81	3.84	3.54	3.40	3.35
	N	91	91	91	91	91

v. Analysis of Respondents by Scale of Business

a. Data privacy challenging in digital transformation of industry practice.

The average mean score for this statement is 3.81. The respondent from scale of business "Government Link Company" scored highest mean, 4.60 as they strongly agree whilst respondent with from "Public Listed Company" scores least mean, 3.60.

b. Probability of data breach is high in the trend of automation and data exchange.

The average mean score for this statement is 3.84. The respondent from scale of business "Government Link Company" scored highest mean, 4.40 as they strongly agree whilst respondent with from "Multi National Company " and "Small Medium Enterprise" scores least mean, 3.79.

c. Technology will slow down human involvement in the physical construction.

The average mean score for this statement is 3.54. The respondent from scale of business "Public Listed Company" scored highest mean, 4.07 as they strongly agree whilst respondent with from "Multi National Company" scores least mean, 3.25.

d. Professionalism is limited in the wake of high technology.

The average mean score for this statement is 3.40. The respondent from scale of business "Public Listed Company" scored highest mean, 4.00 as they strongly agree whilst respondent with from "Government Link Company" scores least mean, 3.20.

e. Remote monitoring method will increase the quality of works.

The average mean score for this statement is 3.35. The respondent from scale of business "Government Link Company" scored highest mean,

4.20 as they strongly agree whilst respondent with from "Multi National Company" scores least mean, 3.04.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Government Link Company" background are strongly agreeing statement “Data privacy challenging in digital transformation of industry practice”.
iii. The respondents from "Public Listed Company" background are strongly agreeing statement “Probability of data breach is high in the trend of automation and data exchange”.
iv. The respondents from "Public Listed Company" background are strongly agreeing statement “Technology will slow down human involvement in the physical construction”.
v. The respondents from "Public Listed Company" background are strongly agreeing statement “Professionalism is limited in the wake of high technology”.
vi. The respondents from "Government Link Company" are strongly agreeing statement “Remote monitoring method will increase the quality of works”.

Table 4.31: Mean Comparison for Questionnaires of Ethics Against Respondent Organisation Scale of Organisation.

What is scale of your organisation?		Data privacy challenging in digital transformation of industry practice.	Probability of data breach is high in the trend of automation and data exchange.	Technology will slow down human involvement in the physical construction.	Professionalism is limited in the wake of high technology.	Remote monitoring method will increase the quality of works.
"Multi National Company"	Mean	3.88	3.79	3.25	3.29	3.04
	N	24	24	24	24	24
"Government Link Company"	Mean	4.60	4.40	3.80	3.20	4.20
	N	5	5	5	5	5
"Public Listed Company"	Mean	3.60	3.87	4.07	4.00	3.80
	N	15	15	15	15	15
"Small Medium Enterprise"	Mean	3.77	3.79	3.49	3.28	3.28
	N	47	47	47	47	47
Total	Mean	3.81	3.84	3.54	3.40	3.35
	N	91	91	91	91	91

vi. Analysis of Respondents by Organisation Participation

a. Data privacy challenging in digital transformation of industry practice.

The average mean score for this statement is 3.81. The respondent from organisation "More than 5 years and less than 10 years" scored highest mean, 3.92 as they strongly agree whilst respondent with from organisation "Less than 5 years" scores least mean, 3.50.

b. Probability of data breach is high in the trend of automation and data exchange.

The average mean score for this statement is 3.84. The respondent from organisation "More than 10 years " scored highest mean, 3.91 as they strongly agree whilst respondent with from organisation "Less than 5 years" scores least mean, 3.67.

c. Technology will slow down human involvement in the physical construction.

The average mean score for this statement is 3.54. The respondent from organisation "More than 10 years " scored highest mean, 3.80 as they strongly agree whilst respondent with from organisation "More than 5 years and less than 10 years" scores least mean, 3.13.

d. Professionalism is limited in the wake of high technology.

The average mean score for this statement is 3.40. The respondent from organisation "More than 10 years " scored highest mean, 3.58 as they strongly agree whilst respondent with from organisation "Less than 5 years" scores least mean, 2.67.

e. Remote monitoring method will increase the quality of works.

The average mean score for this statement is 3.45. The respondent from organisation "More than 10 years " scored highest mean, 3.45 as they strongly agree whilst respondent with from organisation "Less than 5 years" scores least mean, 2.75.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from organisation exist "More than 5 years and less than 10 years" are strongly agreeing statement “Data privacy challenging in digital transformation of industry practice”.
iii. The respondents from organisation exist "More than 10 years" background are strongly agreeing statement “Probability of data breach is high in the trend of automation and data exchange”.
iv. The respondents from organisation exist "More than 10 years" are strongly agreeing statement “Technology will slow down human involvement in the physical construction”.
v. The respondents from organisation exist "More than 10 years" background are strongly agreeing statement “Professionalism is limited in the wake of high technology”.
vi. The respondents from organisation exist "More than 10 years " are strongly agreeing statement “Remote monitoring method will increase the quality of works”.

Table 4.32: Mean Comparison for Questionnaires of Ethics against Respondent Organisation Participation in Industry.

How long do your organization participating in industry?		Data privacy challenging in digital transformation of industry practice.	Probability of data breach is high in the trend of automation and data exchange.	Technology will slow down human involvement in the physical construction.	Professionalism is limited in the wake of high technology.	Remote monitoring method will increase the quality of works.
"More than 10 years "	Mean	3.84	3.91	3.80	3.58	3.45
	N	55	55	55	55	55
"More than 5 years and less than 10 years"	Mean	3.92	3.75	3.13	3.33	3.42
	N	24	24	24	24	24
"Less than 5 years"	Mean	3.50	3.67	3.17	2.67	2.75
	N	12	12	12	12	12
Total	Mean	3.81	3.84	3.54	3.40	3.35
	N	91	91	91	91	91

Based on the Kruskal-Wallis test conducted to determine the significance across the current year of experience. Only those statement successful in rejection where $p<0.05$ of the relevant null hypothesis are shown in table below:-

Table 4.33: Rejected Null Hypothesis for Ethics by Organisation Participation

Rejected Null Hypothesis	Mean Rank	Asymp. Sig
Professionalism is limited in the wake of high technology.		
"More than 10 years "	48.85	0.048
"More than 5 years and less than 10 years"	47.73	
"Less than 5 years"	29.46	

The results indicate that the following: -

i. Respondents from organisation exist more than 10 years highly agree that the technology limits the professionalism. Construction industry requires high professional involvement on field. In the wake of technology, certain due diligent such as site inspection was conducted through web cam or video conference in the assistance of technology. It is still relevant but the physical presence on field will enhance more close inspection and deliver.

4.3.5 Mean Comparison for Human Capital: Emotional Qualities

i. Analysis of Respondents by Profession

a. Works are valued and shared in an organization.

The average mean score for this statement is 3.48. The respondent from "Project Management" background scored highest mean, 3.81 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.35.

b. Good EQ boost the morale of the project.

The average mean score for this statement is 3.68. The respondent from "Project Management" and "Design Engineer" background scored highest mean, 3.80 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.45.

c. EQ improves decision making.

The average mean score for this statement is 3.79. The respondent from "Project Management" background scored highest mean, 3.90 as they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.71.

d. Complex problem solving and critical thinking is through EQ.

The average mean score for this statement is 3.58. The respondent from "Quantity Surveyor" background scored highest mean, 3.65 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.47.

e. EQ increase the leadership competency to drive project.

The average mean score for this statement is 3.52. The respondent from "Project Management" background scored highest mean, 3.57 as

they strongly agree whilst "Quantity Surveyor" profession scores least mean, 3.52.

f. EQ build rapport and trust among stakeholders. Thus, enhance sustainability.

The average mean score for this statement is 3.59. The respondent from "Project Management" background scored highest mean, 3.77 as they strongly agree whilst "Design Engineer" profession scores least mean, 3.47.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Project Management" are strongly agreeing statement “Works are valued and shared in an organization”.
iii. The respondents from "Project Management" and "Design Engineer" are strongly agreeing statement “Good EQ boost the morale of the project”.
iv. The respondents from "Project Management" are strongly agreeing statement “EQ improves decision making”.
v. The respondents from "Quantity Surveyor" are strongly agreeing statement “Complex problem solving and critical thinking is through EQ”.
vi. The respondents from "Project Management" are strongly agreeing statement “EQ increase the leadership competency to drive project”.
vii. The respondents from "Project Management" are strongly agreeing statement “EQ build rapport and trust among stakeholders. Thus, enhance sustainability”.

Table 4.34: Mean Comparison for Questionnaires of Emotional Qualities against Respondent Profession.

Please state your working profession.		Works are valued and shared in an organization.	Good EQ boost the morale of the project.	EQ improves decision making.	Complex problem solving and critical thinking is through EQ.	EQ increase the leadership competency to drive project.	EQ build rapport and trust among stakeholders. Thus, enhance sustainability.
"Project Management"	Mean	3.63	3.80	3.90	3.63	3.57	3.77
	N	30	30	30	30	30	30
"Quantity Surveyor"	Mean	3.35	3.45	3.71	3.65	3.52	3.55
	N	31	31	31	31	31	31
"Design Engineer"	Mean	3.47	3.80	3.77	3.47	3.47	3.47
	N	30	30	30	30	30	30
Total	Mean	3.48	3.68	3.79	3.58	3.52	3.59
	N	91	91	91	91	91	91

ii. Analysis of Respondents by Role

a. Works are valued and shared in an organization.

The average mean score for this statement is 3.48. The respondent from role of "C-Level Executive" scored highest mean, 4.00 as they strongly agree whilst "Executive" and "Managerial" role shares mean, 3.45.

b. Good EQ boost the morale of the project.

The average mean score for this statement is 3.68. The respondent from role of "Executive" scored highest mean, 3.72 as they strongly agree whilst "C-Level Executive" role scores least mean, 3.60.

c. EQ improves decision making.

The average mean score for this statement is 3.79. The respondent from role of "Executive" scored highest mean, 3.87 as they strongly agree whilst "C-Level Executive" role scores least mean, 3.60.

d. Complex problem solving and critical thinking is through EQ.

The average mean score for this statement is 3.58. The respondent from role of "C-Level Executive" scored highest mean, 3.80 as they strongly agree whilst "Managerial" role scores least mean, 3.45.

e. EQ increase the leadership competency to drive project.

The average mean score for this statement is 3.52. The respondent from role of "C-Level Executive" scored highest mean, 4.00 as they strongly agree whilst "Managerial" role scores least mean, 3.42.

f. EQ build rapport and trust among stakeholders. Thus, enhance sustainability.

The average mean score for this statement is 3.59. The respondent from role of "Executive" and "C-Level Executive" scored highest mean, 3.60 as they strongly agree whilst "Managerial" role scores least mean, 3.58.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "C-Level Executive" role are strongly agreeing statement “Works are valued and shared in an organization”.
iii. The respondents from "Executive" role are strongly agreeing statement “Good EQ boost the morale of the project”.
iv. The respondents from "Executive" role are strongly agreeing statement “EQ improves decision making”.
v. The respondents from "C-Level Executive" role are strongly agreeing statement “Complex problem solving and critical thinking is through EQ”.
vi. The respondents from "C-Level Executive" role are strongly agreeing statement “EQ increase the leadership competency to drive project”.
vii. The respondents from "Executive" and "C-Level Executive" role are strongly agreeing statement “EQ build rapport and trust among stakeholders. Thus, enhance sustainability.”.

Table 4.35: Mean Comparison for Questionnaires of Emotional Qualities against Respondent Role in Organisation.

What is your role in the organisation?		Works are valued and shared in an organization.	Good EQ boost the morale of the project.	EQ improves decision making.	Complex problem solving and critical thinking is through EQ.	EQ increase the leadership competency to drive project.	EQ build rapport and trust among stakeholders. Thus, enhance sustainability.
"Executive"	Mean	3.45	3.72	3.87	3.64	3.53	3.60
	N	53	53	53	53	53	53
"Managerial"	Mean	3.45	3.64	3.70	3.45	3.42	3.58
	N	33	33	33	33	33	33
"C-Level Executive"	Mean	4.00	3.60	3.60	3.80	4.00	3.60
	N	5	5	5	5	5	5
Total	Mean	3.48	3.68	3.79	3.58	3.52	3.59
	N	91	91	91	91	91	91

iii. Analysis of Respondents by Working Experience

a. Works are valued and shared in an organization.

The average mean score for this statement is 3.48. The respondent with working experience of "More than 10 years "scored highest mean, 3.79 as they strongly agree whilst respondents "Less than 2 years" score least mean, 3.86.

b. Good EQ boost the morale of the project.

The average mean score for this statement is 3.68. The respondent with working experience of "More than 5 years & less than 10" scored highest mean, 3.79 as they strongly agree whilst respondents "Less than 2 years" score least mean, 3.29.

c. EQ improves decision making.

The average mean score for this statement is 3.79. The respondent with working experience of "Less than 2 years" scored highest mean, 3.86 as they strongly agree whilst respondents "More than 2 years & less than 5" score least mean, 3.64.

d. Complex problem solving and critical thinking is through EQ.

The average mean score for this statement is 3.58. The respondent with working experience of "More than 5 years & less than 10" scored highest mean, 3.63 as they strongly agree whilst respondents "More than 2 years & less than 5" score least mean, 3.36.

e. EQ increase the leadership competency to drive project.

The average mean score for this statement is 3.52. The respondent with working experience of "More than 10 years "scored highest mean, 3.58 as they strongly agree whilst respondents "Less than 2 years" score least mean, 3.00.

f. EQ build rapport and trust among stakeholders. Thus, enhance sustainability.

The average mean score for this statement is 3.59. The respondent with working experience of "More than 5 years & less than 10" scored highest mean, 3.83 as they strongly agree whilst respondents "Less than 2 years" score least mean, 2.71.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents with experience "More than 10 years" are strongly agreeing statement “Works are valued and shared in an organization”.
iii. The respondents with experience "More than 10 years" are strongly agreeing statement “Good EQ boost the morale of the project”.
iv. The respondents with experience "Less than 2 years" are strongly agreeing statement “EQ improves decision making”.
v. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “Complex problem solving and critical thinking is through EQ”.
vi. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “EQ increase the leadership competency to drive project”.
vii. The respondents with experience "More than 5 years & less than 10" are strongly agreeing statement “EQ build rapport and trust among stakeholders. Thus, enhance sustainability”.

Table 4.36: Mean Comparison for Questionnaires of Emotional Qualities Against Respondent Experience in Industry.

What is your current year of experience in the industry?		Works are valued and shared in an organization.	Good EQ boost the morale of the project.	EQ improves decision making.	Complex problem solving and critical thinking is through EQ.	EQ increase the leadership competency to drive project.	EQ build rapport and trust among stakeholders. Thus, enhance sustainability.
"More than 10 years "	Mean	3.79	3.79	3.83	3.62	3.58	3.58
	N	24	24	24	24	24	24
"More than 5 years & less than 10"	Mean	3.57	3.74	3.80	3.63	3.67	3.83
	N	46	46	46	46	46	46
"More than 2 years & less than 5"	Mean	3.00	3.50	3.64	3.36	3.14	3.29
	N	14	14	14	14	14	14
"Less than 2 years"	Mean	2.86	3.29	3.86	3.57	3.00	2.71
	N	7	7	7	7	7	7
Total	Mean	3.48	3.68	3.79	3.58	3.52	3.59
	N	91	91	91	91	91	91

iv. Analysis of Respondents by Nature of Business.

a. Works are valued and shared in an organization.

The average mean score for this statement is 3.48. The respondent from business nature of "Construction Business" scored highest mean, 3.59 as they strongly agree whilst respondents from "Consultancy" score least mean, 3.40.

b. Good EQ boost the morale of the project.

The average mean score for this statement is 3.68. The respondent from business nature of "Construction Business" scored highest mean, 3.95 as they strongly agree whilst respondents from "Merchants of equipment/ material." score least mean, 3.40.

c. EQ improves decision making.

The average mean score for this statement is 3.79. The respondent from business nature of "Property Development "scored highest mean, 3.94 as they strongly agree whilst respondents from "Construction Business" score least mean, 3.68.

d. Complex problem solving and critical thinking is through EQ.

The average mean score for this statement is 3.58. The respondent from business nature of "Property Development "scored highest mean, 3.81 as they strongly agree whilst respondents from "Merchants of equipment/ material." score least mean, 3.40.

e. EQ increase the leadership competency to drive project.

The average mean score for this statement is 3.52. The respondent from business nature of "Construction Business" scored highest mean, 3.64 as they strongly agree whilst respondents from "Merchants of equipment/ material." score least mean, 3.30.

f. EQ build rapport and trust among stakeholders. Thus, enhance sustainability.

The average mean score for this statement is 3.59. The respondent from business nature of "Consultancy" scored highest mean, 3.72 as they strongly agree whilst respondents from "Merchants of equipment/ material." score least mean, 3.20.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Construction Business" background are strongly agreeing statement “Works are valued and shared in an organization”.
iii. The respondents from "Construction Business" background are strongly agreeing statement “Good EQ boost the morale of the project”.
iv. The respondents from "Property Development" background are strongly agreeing statement “Knowledge development in a project are through knowledge sharing”.
v. The respondents from "Property Development" background are strongly agreeing statement “EQ improves decision making”.
vi. The respondents from "Construction Business" are strongly agreeing statement “EQ increase the leadership competency to drive project”.
vii. The respondents from "Construction Business" are strongly agreeing statement “EQ build rapport and trust among stakeholders. Thus, enhance sustainability”.

Table 4.37: Mean Comparison for Questionnaires of Emotional Qualities against Respondent Nature of Business.

Which of the following best describe the nature of business of your organisation?		Works are valued and shared in an organization.	Good EQ boost the morale of the project.	EQ improves decision making.	Complex problem solving and critical thinking is through EQ.	EQ increase the leadership competency to drive project.	EQ build rapport and trust among stakeholders. Thus, enhance sustainability.
"Property Development "	Mean	3.56	3.81	3.94	3.81	3.63	3.31
	N	16	16	16	16	16	16
"Consultancy"	Mean	3.40	3.56	3.81	3.53	3.47	3.72
	N	43	43	43	43	43	43
"Construction Business"	Mean	3.59	3.95	3.68	3.59	3.64	3.73
	N	22	22	22	22	22	22
"Merchants of equipment/ material."	Mean	3.50	3.40	3.70	3.40	3.30	3.20
	N	10	10	10	10	10	10
Total	Mean	3.48	3.68	3.79	3.58	3.52	3.59
	N	91	91	91	91	91	91

v. Analysis of Respondents by Scale of Business.

a. Works are valued and shared in an organization.

The average mean score for this statement is 3.48. The respondent from business scale of "Government Link Company" scored highest mean, 4.20 as they strongly agree whilst respondents from "Small Medium Enterprise" score least mean, 3.36.

b. Good EQ boost the morale of the project.

The average mean score for this statement is 3.68. The respondent from business scale of "Public Listed Company" scored highest mean, 4.20 as they strongly agree whilst respondents from "Small Medium Enterprise" score least mean, 3.51.

c. EQ improves decision making.

The average mean score for this statement is 3.79. The respondent from business scale of "Public Listed Company" scored highest mean, 4.27 as they strongly agree whilst respondents from "Small Medium Enterprise" score least mean, 3.62.

d. Complex problem solving and critical thinking is through EQ.

The average mean score for this statement is 3.58. The respondent from business scale of "Public Listed Company" scored highest mean, 4.00 as they strongly agree whilst respondents from "Small Medium Enterprise" score least mean, 3.40.

e. EQ increase the leadership competency to drive project.

The average mean score for this statement is 3.58. The respondent from business scale of "Public Listed Company" and "Government Link Company" scored highest mean, 4.00 as they strongly agree whilst respondents from "Multi National Company" score least mean, 3.29.

f. EQ build rapport and trust among stakeholders. Thus, enhance sustainability.

The average mean score for this statement is 3.59. The respondent from business scale of "Government Link Company" scored highest mean, 4.20 as they strongly agree whilst respondents from "Small Medium Enterprise" score least mean, 3.45.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from "Government Link Company" background are strongly agreeing statement “Works are valued and shared in an organization”.
iii. The respondents from "Public Listed Company" background are strongly agreeing statement “Good EQ boost the morale of the project”.
iv. The respondents from "Public Listed Company" background are strongly agreeing statement “EQ improves decision making”.
v. The respondents from "Public Listed Company" background are strongly agreeing statement “Complex problem solving and critical thinking is through EQ”.
vi. The respondents from "Government Link Company" and "Public Listed Company" are strongly agreeing statement “EQ increase the leadership competency to drive project”.
vii. The respondents from "Government Link Company" are strongly agreeing statement “EQ build rapport and trust among stakeholders. Thus, enhance sustainability”.

Table 4.38: Mean Comparison for Questionnaires of Emotional Qualities Against Respondent Organisation Scale.

What is scale of your organisation?		Works are valued and shared in an organization.	Good EQ boost the morale of the project.	EQ improves decision making.	Complex problem solving and critical thinking is through EQ.	EQ increase the leadership competency to drive project.	EQ build rapport and trust among stakeholders. Thus, enhance sustainability.
"Multi National Company"	Mean	3.38	3.63	3.88	3.63	3.29	3.46
	N	24	24	24	24	24	24
"Government Link Company"	Mean	4.20	4.00	3.60	3.80	4.00	4.20
	N	5	5	5	5	5	5
"Public Listed Company"	Mean	3.80	4.20	4.27	4.00	4.00	4.07
	N	15	15	15	15	15	15
"Small Medium Enterprise"	Mean	3.36	3.51	3.62	3.40	3.43	3.45
	N	47	47	47	47	47	47
Total	Mean	3.48	3.68	3.79	3.58	3.52	3.59
	N	91	91	91	91	91	91

vi. Analysis of Respondents by Organisation Participation In Industry

a. Works are valued and shared in an organization.

The average mean score for this statement is 3.48. The respondent from organisation participating "More than 10 years "scored highest mean, 3.67 as they strongly agree whilst respondents from organisations participating "Less than 5 years" score least mean, 2.83.

b. Good EQ boost the morale of the project.

The average mean score for this statement is 3.68. The respondent from organisation participating "More than 10 years "scored highest mean, 3.82 as they strongly agree whilst respondents from organisations participating "Less than 5 years" score least mean, 3.17.

c. EQ improves decision making.

The average mean score for this statement is 3.79. The respondent from organisation participating "More than 10 years "scored highest mean, 3.91 as they strongly agree whilst respondents from organisations participating "Less than 5 years" score least mean, 3.58.

d. Complex problem solving and critical thinking is through EQ.

The average mean score for this statement is 3.58. The respondent from organisation participating "More than 5 years and less than 10 years" scored highest mean, 3.71 as they strongly agree whilst respondents from organisations participating "Less than 5 years" score least mean, 3.25.

e. EQ increase the leadership competency to drive project.

The average mean score for this statement is 3.58. The respondent from organisation participating "More than 10 years " scored highest mean, 3.65 as they strongly agree whilst respondents from organisations participating "Less than 5 years" score least mean, 2.83.

f. EQ build rapport and trust among stakeholders. Thus, enhance sustainability.

The average mean score for this statement is 3.59. The respondent from organisation participating "More than 10 years" scored highest mean, 3.80 as they strongly agree whilst respondents from organisations participating "Less than 5 years" score least mean, 2.83.

Results indicate that:

i. In overall the respondents are on “Agree” opinion on the statements.
ii. The respondents from organisation exist "More than 10 years" are strongly agreeing statement “Works are valued and shared in an organization”.
iii. The respondents from organisation exist "More than 10 years" background are strongly agreeing statement “Good EQ boost the morale of the project”.
iv. The respondents from organisation exist "More than 10 years" are strongly agreeing statement “EQ improves decision making”.
v. The respondents from organisation exist "More than 5 years and less than 10 years" background are strongly agreeing statement “Complex problem solving and critical thinking is through EQ”.
vi. The respondents from organisation exist "More than 10 years" are strongly agreeing statement “EQ increase the leadership competency to drive project”.
vii. The respondents from organisation exist "More than 10 years " are strongly agreeing statement “EQ build rapport and trust among stakeholders. Thus, enhance sustainability”.

Table 4.39: Mean Comparison for Questionnaires of Emotional Qualities Against Respondent Profession.

How long do your organization participating in industry.		Works are valued and shared in an organization.	Good EQ boost the morale of the project.	EQ improves decision making.	Complex problem solving and critical thinking is through EQ.	EQ increase the leadership competency to drive project.	EQ build rapport and trust among stakeholders. Thus, enhance sustainability.
"More than 10 years "	Mean	3.67	3.82	3.91	3.60	3.65	3.80
	N	55	55	55	55	55	55
"More than 5 years and less than 10 years"	Mean	3.38	3.63	3.63	3.71	3.54	3.50
	N	24	24	24	24	24	24
"Less than 5 years"	Mean	2.83	3.17	3.58	3.25	2.83	2.83
	N	12	12	12	12	12	12
Total	Mean	3.48	3.68	3.79	3.58	3.52	3.59
	N	91	91	91	91	91	91

CHAPTER 5

DISCUSSION AND JUSTIFICATION OF RESULTS

5.1 Findings of Results of Human Capital, Skill

From the results in section 4, the significant across profession, the result found in the statement “Skill is measured by the ability to analyse and resolve issue in shorter time”. The finding is supported by the study made by (Kamaruzaman, 2010) which states that significant gap is shown in between existing skill set in job market and IR 4.0 job market namely on the analytical thinking. The author highlights that this skill is required by fresh graduate in the IR 4.0 era.

The skilled person has the ability to understand the depth of problem and find the suitable solution that suit to resolve the problem. The problems need to be analysed carefully prior providing the solution. Therefore, the skill will enhance the resolution of problem in shorter period compared to if the problem is to be resolved by lesser skilled person. In the results, participants from Project management has agreed tot the statement as they know in project issues need to be solved fast. Hence, such can be achieved by a skilled person.

The statement “Skill expedite the adaption of new technology”. The finding is supported by the study made by (Sackey & Bester, 2016) which states that IR 4.0, engineers are required to provide and optimise step-by-step guidance and instructions for multi-machine operators and open to change, possess greater flexibility to adapt to new roles and work environments, including becoming accustomed to continuous interdisciplinary learning.

New technology required great practise to be mastery. As skilful person will learn the new technology in a faster rate compared to others. Moreover, the in IR 4.0, the new technology are depended on the AI and digital platform. These technologies are required to be adapted in faster rate. Hence, this can be achieved by as skilful person. Project managers are believed that this attribute of learning is required in a team to enhance the integration of technology at faster rate.

The statement “Proper skill shortens the time of work progress.”. The finding is supported by the study made by (Hwang and Ng ,2013) which states that scheduling and planning management is the most significant knowledge for the construction project while cost, quality, human resource, and communication management are the second most competencies in the construction project.

Work progress at projects is depended to the amount of man hours spent on a work scope. The most of the delays are contributed by inefficient management of skill works in completing a work scope. Specialised skills such as craftsmen required to be hired based on their skill level not based on the cost, solely. Selecting the proper skilled workers to suit the work scope will increase the efficiency of man-hours. Consequently, will shorten the work progress without compromising the quality. Hence, the participant with longer experience are agreeing to the statement through their analysis and years of monitoring.

The statement “Data accumulation and analysis is more precise if done by skilful person.”. The finding is supported by the study made by (Rashidah, Humphrey, Anizahyati,2018) which states that computational skill/thinking is the most highly ranked. Their study also highlights that it is important for the students to be able to understand, convert and arrange a large amount of data and arrange it in its simplest form as one the required skill.

The current form of software which handles large pool of data requires great skilled person to arrange and analyse data before comes to a conclusion. With current work scope emergence such as data scientist, it has set a standard for skill on what data to be collected and how it is analysed. To achieve this, the data analysis to be done by highly skilled data scientist to be fair.

The statement “The quality of skill attracts more future projects”. The finding is supported by the study made by (Achara, 2016) which states that project management technical skill and management skill focusing on learning activities and practises their experiences in order to enlarge and fulfil professional skill. The development and implementation establish a link for project success and project managers’ competencies in construction industry. By developing project team, skills and technical competencies of team members will eventually increase project performance. Thus, more project to be undertaken with enhanced competencies by project managers.

5.2 Findings of Results of Human Capital, Knowledge

The statement “Tacit knowledge is more valuable in digital construction, than paper qualification.”. The finding is supported by the study made by (Brown, 1991) stating that firms are relying on experience, professional intuition, and other form of tacit knowledge to complete works. The experienced employee shares the tacit knowledge with apprentice through expressing to the practising community.

Tacit knowledge is derived from the years of experiences and knowledge gained by a human working in the construction industry. Longer experience professional believed that tacit knowledge is valuable because the paper qualification only gives and opportunity to join the construction industry. Whilst, the tacit knowledge will crate a competency to survive aand encourage to learn further.

The statement “Knowledge dimension is not fixed. Need to improvise over the time”. The finding is supported by the study made by (Dewhurst,2013) saying that value creating capability resides in the tacit knowledge of the engineers, managers and marketing staff and this dynamic tacit knowledge capability creates sustainable competitive advantage.

Knowledge does not expire. However, the know need to improve over the time to suit the current flow of technology and competencies. The experienced participant is believing that the working trend is changing over the time. Hence, the knowledge related are need to be updated. The obsolete know is to be documented to future reference.

The statement “Knowledge is necessarily coming from highly skilled workers”. The finding is supported by the study made by (Edum,McCafer,2010) which states that Project managers acquire various knowledge and skills through the experiences they go through in their working life. The relevance of such experience originates from the varying conditions of their business environment. Thus, what academic knowledge and training acquired earlier will need to be tuned to match the changing conditions of practices within the construction industry.

Skilled person usually underwent a lot of training and faced many issues and solutions along the way. Therefore, that person is equipped with massive amount of knowledge in the form of tacit knowledge. In general, these experienced professionals do possess such knowledge through their training.

5.3 Findings of Results of Human Capital, Ethics

The statement “Professionalism is limited in the wake of high technology”. The finding is supported by the study made by (Merkofer &Murphy, 2009) which states that Finally, no efforts to improve ethics in the workplace can now ignore the global context, but this study of ICT ethics demonstrates that this global view also presents new challenges of

coordination and possible cultural conflict. In terms of effective policy response, our findings reflect other work on the need for reliable data and the complexities involved

Experienced construction professional thinks that high technology is limiting the professionalism. Emergence of technology make way for engineers to work remotely. Many inspections are now done through live video recording instead of the physical presence at site for inspection. A part of that, many engineering related calculations are done by technology in the form of software. There are rarely seen engineers do their own justification. Instead, they just rely on the result simulated by software.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Research Aim, Objective and Results

Referring to the results obtained in part 4. The conclusion to be as the following:-

a. The significance observed in attribute of skill refers. As per Table 4.13, from the results, the projects managers are in opinion agree that skill is important criteria of the construction industry. The project managers required to have high skill such as communication and interpersonal skills. As referring to the Table 4.14, the experience participants agree to that skill is one of the requirements in construction industry. Therefore, they have an opinion that proper skill shortens the time of work progress. In Table 4.14, the business scale of Property development are also in view that skill is required to shorten the time of work progress and attracts more future projects.

b. The significance observed in attribute of knowledge refers. Referring to the table 4.28, the experience participants are in opinion that tacit knowledge is more valuable in digital construction, than paper qualification. Further to aforementioned, knowledge dimension is not fixed. Need to improvise over the time as what observed in table 4.29. In relation to the, item (a) mentioned above, participants from public listed companies are in opinion knowledge is necessarily comes from highly skilled workers. Thus, we observe that knowledge and skill are inter-related attribute required by an employee in construction industry in future.

c. The significance also observed in the ethics attribute. The experienced participants are in opinion that, the professionalism is limited in the wake of high technology.

d. The other two human capital attribute namely, experience and emotional qualities (EQ) are not seen much significance throughout this research. The experience is seen less importance and the IR 4.0, the construction industry is more digitalised. The design process will be more organised and oriented via the software and the execution is controlled up by the "big data" such as man-day work tracking and procurement control. So, the experience and EQ are required to be minimal to sail through the IR 4.0.

Through this research, it is observed that the construction industry irregardless of profession, they are seeking for skill as best to stay competitive in the industry. They have an opinion that knowledge that is gained through the experience are much more valuable than the paper qualification. In term of ethic, there are expectation that the participants are still consider the ethics play a major in professional's practice. However, the participants are left undecided if the experience and emotional qualities are still required in the IR 4.0. From this study, major focus is still rely on the technology, it's adaption and implementation. Human capital requirement are still not really considered as the IR 4.0 in Malaysian construction industry are still at beginning stage.

Thus, we can conclude that the human capital attributes required for industrial revolution 4.0 is mainly skill and knowledge in a way agreeing to (Schultz ,19993). The ethics also is one of the attributes required in IR 4.0, as mentioned by (Kamaruzaman,2019). So, we can conclude that the abovementioned human capital elements to be focused for development in future. The order of human capital elements are skills, knowledge, ethics, experience and emotional qualities, in descending order.

6.2 Research Implication

Currently, all the industry participants are aggressively investing exploring the technology options available to set themselves competitive. Numerous amounts of money is invested in technology acquisitions. However, all the technology is required to be operated by humans. So, this research will set guidance for construction participants to select the proper and correct human capital to be invested for the organisation able to function in line with new technology inception. This research also, investigates other human capital which may be required with minimal attention in future. So, it is advantageous to organisation to focus on important element of human capital in meantime also prepare other human capital investment to be more competitive.

6.2.1 Research Implication on Construction Industry

The intent of construction industry players (developer, consultant, constructor and merchants) investing in human capital plays an important part in overall development of human capital. Large spending is directed towards development of of skills and competences which driving the economic value of a firm. However, it is found difficult to gauge accurately the effectiveness as it is not reported in many company expenditures.

Consequently, under reporting has caused huge setback for policy makers to consolidate the overall human capital in an industry or individual firm. Further, it deteriorates the tendency of a firm decision to plan and invest further. Under invest happen in industry due to human capital development is treated as expenditure rather than investment associated with non-monetary return.

Through the findings in this study, some under reporting related to human capital investment might potentially be rectified or minimised. Large number of informal training that taking place through structured coaching or on-job mentoring can be more converge to particular element of human capital that required by an organization. Thus, such informal investment can be measured effectively, and may continue as a quantified component in the

growth in human capital. Important issues cover in this study includes determining what level of influence a human capital can make in construction industry.

6.2.2 Research Implication on Society

Family institution plays a major role nurturing and delivering the professionals into the society. In IR 4.0, society especially family institution shall make a substantial investment in activities which may directly or indirectly influence the development of human capital in their children. This investment is not necessary be financial or material. Being enough motivational and fostering the urge to learn new skill and gain proper knowledge are important inputs to the creation of human capital.

In the context of ethics, we have highlighted the implication of ethics attribute towards the IR 4.0. As technology grows, the works become more simpler and reliance on the technology will increase. The usual practices such as site visit may obsolete sooner or later with all the testing and commissioning may be done through remotely. This will greatly affect greatly the quality of final product. Therefore, professionalism shall be paid an equal attention in line with the technology growth. Proper moral value need to be shared to foster the better professionalism in young in future.

The study also advises that organisation which deploying advanced technology, tend to be more concerned with technology-related ethics compared to the companies which still in preliminary digital journey. Those organizations are also encouraged to be supported by leaders who committed to exploring and considering the intended and unintended impacts of technology disruptors. Then, surround themselves with input from a diverse and inclusive set of stakeholders, and fostering an organizational culture of continuous learning, debate, transparency, and open dialogue.

Companies still in the preliminary stages of digital transformation may not be focused on ethical due to they may still be trying to determine what their actual digital strategy is. Consequence of their relative lack of experience,

leaders also may not fully increase in value particular technologies' potential implications or downstream effects.

6.2.3 Research Implication on Authority/Regulation body

Government initiative shall start from the spreading the awareness of the human capital requirement as part of preparation for IR 4.0. The government must begin to bringing training schemes and enterprises the TVET (Technical and Vocational Education and Training). Skill is identified as main element of human capital that needs the most attention and investment. Therefore, the programmes to educate the industry players to prepare and practise the technologies shall come into the place sooner.

The professional bodies such as BEM must pay the main role in preparing the professionals in ethical aspect to adapt the high-level technologies. Further, the aforesaid entity must identify, establish, and regulate the code of conduct to suit the technological era, IR 4.0 The code of practise shall include the do and don't requirements without causing any hindrance to the adaption of technology.

The regulatory body CIDB shall undertake the monitoring and measurement of the human capital stock in construction industry to ensure human capital growth keep pace with technological advancement. Apart from that, CIDB also may impacted with the finding that the knowledge is one of the main elements of human capital that to focus investment. CIDB shall establish a platform for the project manager under the regulation of it to access and share the latest knowledge and experience obtained from it to the rest of industry participants.

The statutory regulation shall not be eliminated to suit the finding of this study. Instead, the regulations shall be adjusted to allow more practical to suit the technology advancement. The employment act to be revisited to allow more flexible time of work. The reason employees may have an extra time for the advancement of the skill level for them to stay competitive. Competency training shall made mandatory for the construction industry participants

especially from consultant and constructor background for them to deliver sustainable design and quality output in effective and timely manner.

6.2.4 Research Implication on Education System

Meeting the needs of the IR 4.0 in the future, education must be viewed from a four-dimensional perspective: vocational education, entrepreneurial education, financial education, and digital education. As the skills is found crucial for the IR 4.0, the vocational education need to be enhanced. The vocational education shall be revolutionised by upgrading all the traditional learning method and syllabus to digital and technology oriented.

The new programmes such as computer programming, robotics and automation shall be focused. The theoretical education whilst must focus on developing the knowledge of the usage and utilisation of the latest technology. The education must be convergence to suit the intended carrier of the student instead of general education. The converged education such as computer architecture would develop and train a person to be more specialised.

The other values such as emotional qualities shall be developed through more practical inter personal skill and soft skill development program. This will prepare the student to be more aware of the technological changes happening at faster rate. In addition, it will allow the student to quickly adapt and adjust to suit the current market trend and requirement without undergoing massive training.

6.3 Research Limitation and problems

This research had the limitation of obtaining the opinions from higher ranked participants such as C-level executives. Same goes to the participant from Government Link Companies and Public Listed Companies as the companies are limited in the numbers in the market.

6.4 Research Recommendation

The research is to be further synthesized to the extent of specific attributed in the human capital elements. The sample collected through the central limit theorem to be extended to wider sample range for more converge data analysis and results.

REFERENCES

Almeida, R., & Carneiro, P. (2009). The return of firm investment in human capital. Labour Economics, 16, 97 – 106.

Agolla, J. E., 2018. Human Capital in the Smart Manufacturing and Industry Revolution. Intech , pp. 41-58.

Alaloul, W. S., Liew, M., N. A. W. A. Z. & Kennedy, I. B., 2020. Industry Revolution 4.0 in the construction industry : Challeges and opportunuities for stakeholders. Ain Sham Engineering Journal, Volume 11, pp. 225-230.

Cooper, D. and Schindler, P., 2012. BUSINESS RESEARCH METHODS..12th ed. New York: McGraw-Hill Irwin.

Dess, G. D. & Picken, J. C. (1999). Beyond productivity: How leading companies achieve superior performance by leveraging their human capital. New York: American Management Association.

Dess, G. and Picken, J., 2008. How Leading Companies Achieve Superior Performance by Leveraging Their Human Capital, American Management Association, Beyond Productivity.

Ehsan, N., Anwar, S. & Talha, M., 2009. Professional Ethics in Construction Industry of Pakistan. Proceeding of the World Congress on Engineering , Volume 1.

Fugar, F.D.K., Ashiboe-Mensah, N.A. and Adinyira, E., 2013. Human capital theory: implications for the Ghanaian construction industry development. Journal of Construction Project Management and Innovation, 3(1), pp.464-481.

Jernak, K., 2015. The essence of Human Capital in Buildign Company. Science Direct , pp. 95-103.

Mischung, J. J. et al., 2015. A review of Emotional Intelligence and Considerations for EI's Use within Construction Management Programs. ASC International Conference Proceedings.

Rahman, H. A., C. W. & Yap, X. W., 2010. How professional ethics impact construction quality: Perception and evidence in a fast developing economy. Scientific Research and Essays , 5(23), pp. 3742-3749.

S.P, D. S. & SM, A. R., 1993. Productivity In Construction. Ottawa: National Research Council .

Schwab, K., 2018. Shaping The Future of The Fourth Industrial Revolution. Geneva: World Economic Fund .

Ogunbayo, O. M., 2013. Impact of Builder's Emotional Intelligence on Site Workers Performance in Nigeria Constrcution Industry. International Journalof Scientific & Engineering Research, 4(5), pp. 1243-1247.

APPENDICES

APPENDIX A: Survey Questionnaire

APPENDIX B: Kruskall Wallis Test Results

APPENDIX C: Mann Whitney Test Results

APPENDIX D: Cronbach Alpha Test