



The Relationship between Board Diversity of Information and Communication Technology Expertise and Information and Communication Technology Investment: A Review of Literature

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ABSTRACT

Board members with diverse expertise are crucial to supplement the need of the board to oversee the conduct of the management is in line with the shareholders' interests. In relation to the information and communication technology (ICT) related industry, diverse board with ICT expertise is in need. There are very limited studies have been conducted to investigate the relationship between board diversity of ICT expertise and ICT investment. Thus, this paper provides the literature review on the relationship between board diversity of ICT expertise and ICT investment. It is hoped that this paper provides important guidance and insights to have a clear understanding of the relationship between board diversity of ICT expertise and ICT investment.

Keywords: Information and Communication Technology Investment, Board Diversity, Information and Communication Technology Expertise, Firm Performance

JEL Classifications: G34, D83, O14

1. INTRODUCTION

The global financial crisis that erupted during the period of 2007-2009 has shaken the global information and communication technology (ICT) development. ICT demand dropped dramatically and investment especially in the ICT industry were curtailed during the period of crisis (International Telecommunication Union, 2009). This reduction in ICT investment has had overwhelming effects on many ICT projects which resulted significant losses. Since the ICT development has been dominated by the U.S country, the economic crisis has left dramatic decrease in the economic growth in other countries. Despite the severe economic crisis, many companies have realized the important need of best practices of ICT for short term strategy in order to sustain the continuity of their ICT development (Contreras and Tormo, 2009). Investment in ICT has become commercialized and had significant contribution to the economic development of many developed (Daveri, 2002; Jalava and Pohjola, 2002; Stiroh, 2002; Oliner and Sichel, 2001; Jorgenson and Stiroh, 2000) as well as in stimulating economic

growth and poverty reduction in developing countries (International Monetary Fund, 2001). Apart from its impact on the countries' economic development, ICT investment also plays an important and valuable mechanism for business organizations to transform their business processes and operations to function more effectively and efficiently (Barney, 1991). The emergence of technological advancements such as social media, mobile, analytics and cloud computing in today's business world have revolutionized the way that companies conduct their business operations. As companies face numerous challenges in their businesses to meet the needs of customers, suppliers, and new regulations imposed by national government as well as the availability of quality software and hardware in the market, these factors are seen as an opportunity for companies to invest in ICT in order to keep pace with the ICT challenges in today's global market.

1.1. Purpose of Inquiry

This conceptual paper is intended to study the relationship between board diversity of ICT expertise and ICT investment. The answer

of the inquiry questions will be based on the literature analysis. Although there has been much debate about the potential benefits of ICT investment to business organizations, undue reliance solely on the ICT investment is not sufficient to bring positive value to firm performance (Shin, 2001). Improper management of ICT investment not only can affect the business operational performance but also can lead to significant losses for businesses. It is argued that ICT can only be beneficial for companies if its implementation is accompanied by other resources (Chukwunonso et al., 2011) in order to ensure that all decisions related to ICT is properly governed by strong and independent board (Peansupap and Walker, 2005) to meet the strategic direction (Zhang and Chulkov, 2011). Despite its many benefits, recent ICT failure cases discovered by Solon (2015), the Standish Group (2013), and the Victorian (2011) as discussed in the literature showed that the investment has yet to prove success. This phenomenon of failures in ICT investment is often debated due to the inability of board of directors in ICT matters (Birmingham, 2015; Clamp, 2015; Valentine, 2013; Cohn and Robson, 2011; Nolan and McFarlan, 2005). One of the critical issues that have been highlighted in the current corporate governance practices is related to board diversity in ICT (Deloitte, 2015; Leblanc, 2012). As companies confront various ICT challenges in today's business environment, they should broaden the element for board diversity grounded in ICT expertise. Although many studies of ICT investment and board diversity have been widely discussed in previous year, studies on the relationship between board diversity especially in ICT expertise and ICT investment have never been tested. Therefore, this paper is relevant because it is not only to create awareness about the importance of ICT investment for business improvement but also highlights the need for board of directors with diverse ICT expertise in ensuring that ICT investment decisions are appropriate and properly governed.

2. LITERATURE REVIEW

2.1. Importance of ICT Investment

Previous studies have highlighted various inducing factors why companies choose to invest in ICT. ICT is seen more as a support function rather than a strategic tool (Willcocks and Lester, 1991) that can help companies to streamline and optimize their business processes (Kvochko, 2013), to increase their business profitability to better reflect firm performance (Gunasekaran et al., 2001). Heine et al. (2003) stressed that the ICT investment made is intended to contribute to the performance of an organization, in line with Gunasekaran et al. (2001) that ICT investment made is for the purpose of business operational improvement in an effort to reduce costs and increase profitability of the company. Recent studies have shown that investment in ICT has led companies to better performance either in terms of their profitability (Arabyat, 2014; Makinde, 2014; Zhang et al., 2012; Leckson-Leckey et al., 2011; Liang et al., 2010; Zehir et al., 2010), productivity (Liang et al., 2010), efficiency (Safari and Zhen, 2014; Romdhane, 2013; Liang et al., 2010) and innovation (Spyros and Euripidis, 2014; Jesudasan et al., 2013; Chukwunonso et al., 2011).

Besides that, ICT investment through the acquisition of ICT equipment also helps companies to increase their competitive

advantage (Voudouris et al., 2012; Apulu and Latham, 2011). Apulu and Latham (2011) emphasized the need for ICT investment for companies not only for their sustainable advantage but also to improve their business operations to function more efficiently that would lead to persistent growth. However, some studies argued that depending solely on ICT is not enough to cater for the sustainable advantage unless its implementation is complemented by other strategic business resources (Chukwunonso et al., 2011). As the acquisition of ICTs need a huge amount of investment (Melville et al., 2004), it is important for companies to ensure that all decisions made for ICT including its direction, strategy and investment is successfully governed so as to align with their strategic direction (Zhang and Chulkov, 2011).

2.2. Important Roles of Board of Directors in ICT Investment

According to the IT Governance Institute (ITGI), board of directors and executives play an important role in governing ICT to ensure that company's ICT sustains and extends its business's strategies and objectives (De Haes and Van Grembergen, 2004; ITGI, 2003). It has been argued that ICT will be managed more effectively if it is accompanied by both board of directors and management, strive together in order to ensure that ICT can streamline their business operations and sustain their company's growth. This kind of relationship is best referred to the theory of agency that suggests a principal (boards on behalf of the shareholders) and agent (management) relationship occurs when the management is engaged in running the company's business whereas the board of directors is responsible in monitoring the management conduct in ICT so as to ensure that the way of their ICT management is in the owner's interest (Jensen and Meckling, 1976).

Previous studies argued that the involvement of management in conducting ICT has reduced the control weaknesses in a company (Boritz and Lim, 2008; 2007) led to increase in business effectiveness (Jamba et al., 2013; Ali et al., 2009; Ali and Green, 2005). However, this paper gives more focus to the board's role in handling ICT related matters since their capabilities in ICT is often questionable due to lack of ICT development exposure (Birmingham, 2015), lack of ICT experience in performing their ICT oversight duties (Cohn and Robson, 2011) and lack of ICT knowledge and competencies (Nolan and McFarlan, 2005). Why does board matter in ICT investment? Board of directors play an important role in making a rationale ICT investment decision to ensure that company is on the right track to reap good returns on their investment (Useem, 2006). Useem (2006) argued that a good decision making on the strategy and products by the board usually can lead business organization to achieve higher performance. In other words, the board must be aware of all issues and aspects related to current trends of ICT to ensure that their decisions are in line with the company's objectives.

2.3. Issues Related to Board's Role in the ICT Conduct

Recent studies have discovered that many ICT investment made in the past have proven unsuccessful. Although ICT investment has been recognized as an important mechanism that promises many benefits and good returns to companies, the phenomenon of ICT failure cases still persist. According to Solon (2015), the U.K. government has wasted more than £100 million on failed

ICT projects. The Standish Group, an independent internal IT research advisory firm has reported that the 2012 investment results of ICT implementation projects in the U.S. have yet to prove success as a whole. A total of 61% which comprises of failed (18%) and challenged (43%) ICT projects were still considered risky if compared to the 39% of successful ICT projects (The Standish Group, 2013). In Australia, the ICT failure case reported by the Victorian (2011) found that the Victorian public sector has suffered a loss of \$1.3 billion while an additional cost of \$1.44 billion was added to the failed projects. Some researchers have pinpointed some of the factors that contribute to the failure of ICT implementation in relation to the board of directors' weaknesses in dealing with ICT related matters. The board's role is often disputed in terms of their ability to carry the assigned responsibility in ensuring that the return of ICT investment meets the company's target of increasing profits (Birmingham, 2015; Cohn and Robson, 2011; Nolan and McFarlan, 2005) so as to fulfill the interest of company's shareholders. Boards should be responsible in ICT project outcome because they have the authority to make ICT investment decisions on the shareholder's behalf. Michael Krigsman, who is a technology expert, argued that the successful implementation of ICT projects in an organization is depending on its technology professionals on board who know better in dealing with ICT matters (Vance, 2011). Another issue is whether the board has sufficient members with ICT knowledge, skills and experiences in ensuring that company's ICT investment is properly governed.

The phenomenon of this failure conduct was attributed to several cases found in recent studies. For example, as reported by the U.S. Government Accountability Office (GAO), the U.S. Library Congress has failed to implement the ICT investment management framework which has been developed by the U.S. GAO and about \$119 million have been wasted by the Library due to its vulnerability in ICT governance conduct (U.S. GAO, 2015). Valentine (2013) was strongly argued on the reality of board's role and their technology incompetence to govern technology. This critical issue is one part of the current corporate governance issue as the board's oversight role has become increasingly challenging in confronting a wide range of ICT risks (e.g. ICT project risks, ICT infrastructure risks, cyber-security risks and ICT competence risks) in today's digital business environment (Valentine, 2013). Apart from governance issue, a poor project board composition was also another highlighted factor that contributed to the failure of ICT conduct.

According to the survey conducted by Roger Sharp, the chairman of Asia Pacific Digital, only 10% out of 800 boards' resume from 20 top companies in Australia, New Zealand, Singapore and Hong Kong did acquire technology knowledge and experiences. Sharp has also strongly emphasized the lack of board's technology capabilities due to limited exposure on technology development (Birmingham, 2015). Nolan and McFarlan (2005) found that the board's technology competencies was still at low levels that cause an inability to practice good ICT governance practices and put the companies at high risks. Cohn and Robson (2011) in their article based on the survey conducted by the Oliver Wyman's Global Risk Center and the National Association of Corporate Directors

found that the factor of insufficient board expertise highly hindered the board of directors in performing their ICT oversight duties. With increasingly diverse ways in doing business nowadays, as ICT promises many benefits and become a vital component for successful businesses, these factors clearly demonstrate the real purpose behind the investments made by companies in ICTs. However, companies need to face with various challenges and will be exposed to many risks especially in today's digital business environment that may potentially affect their ICT implementation. In reality, many companies are still facing difficulties to deal with ICT related matters due to factors such as lack of competencies and knowledge on how advancements in ICT today can help smoothen their business operations (Deloitte, 2015).

According to Carla Clamp, the Director of Advisory Services through her published Grant Thornton Global Governance Report (2015), board of directors faced with a difficult challenge to effectively advise management levels in meeting the challenges in today's digital business environment if they do not seek to make fundamental changes in themselves. Faced with today's digital disruption, boards should realize on the important need of diversity among board members (Clamp, 2015; Deloitte, 2015; Leblanc, 2012) and stressed that the criteria of board diversity is not only limited to the gender perspectives, however the other elements of board diversity such as skills and education should also be prioritized in helping board to reduce "groupthink" and increase performance (Clamp, 2015). Deloitte (2015) and Leblanc (2012) have emphasized the important need of board members with diverse competencies and knowledge especially in ICT (Deloitte, 2015; Leblanc, 2012) in order to enhance and stimulate ICT discussion in the boardroom. However, due to lack of diversity and technology experience (Clamp, 2015) boards commonly will be delegating all ICT related matters such as ICT strategy and risk to the ICT management (Valentine, 2013). Undue reliance on the ICT management's capabilities can potentially lead to the so-called agency problems between board of directors and ICT management. Although boards do not daily involve in the ICT operations, an effective governing ICT related matters including ICT investment and ICT strategic planning can be achieved if its implementation is supported by diverse boards' characteristics in a company.

2.4. Relationship between Board Diversity and ICT Investment

ICT investment is often associated with huge amount of money and this investment needs good board supervision in order to ensure company reaps greater returns on its investment. Accordingly diversity is referred to as a group that composed of individuals with different characteristics on which they base their own social identity (O'Reilly et al., 1998). Gardenswartz and Rowe (2008) divided the term of diversity into four dimensions, namely: Organizational, external, internal and personality. Organizational dimension refers to the culture aspect which is practiced in the company's working environment. External and internal dimensions are adapted from Loden and Rosener (1991) in which external dimension includes outside influences such as working experiences, educational background, income level, religion, geographic location, etc. that characterizes diverse characteristics in an individual whilst internal dimensions is attributed to uncontrollable factors such as race, age,

gender, etc. The dimension of personality refers to personal style with different personalities in an individual.

There has been lack of empirical evidences in examining the relationship between board diversity and ICT investment. However, this study also takes into account other views on how board diversity can influence investment decision in general perspectives. The inputs gaining through general perspectives are believed to give an overview to the relationship between board diversity and ICT investment. In general, previous studies have shown the importance of board diversity in company's investment decision. Sonnabend (2010) revealed that board diversity with the presence of women directors was strongly affect companies' return on sales, return on equity and return on invested capital and improved shareholder value. Peters (2013) highlighted that the adoption of board diversity in a company would give an overview on company culture and governance practices that would enable investors to make more informed voting and investment decisions. In the context of Italian studies, the results showed that the elements of board diversity such as the presence of outside directors and strategy committee meeting did positively affect investment in innovation however not for board gender diversity and minority shareholders (Martini et al., 2012).

The impact of board diversity on the boardroom discussion is huge because diversity is not only about bringing different perspectives and opinions at the boardroom discussion but it also may influence other individual board to make changes in their behavior (Phillips, 2014) especially for investors in making their crucial investment decision (Bradford, 2015; Peters, 2013; Sonnabend, 2010). If the role of the board is to oversee, monitor and control the management actions, the theory of agency is the best theory to be applied in the study of board diversity of the boards. Since the implementation of investment needs a proper decision to be decided at the board level (McIntyre et al., 2007) and given that the board's role is not only focusing in preventing any potential negative management conduct, but also responsible to encourage management's actions to be in line with the interest of shareholders, thus the resource dependence theory will be another appropriate theory to be applied in this study.

As ICT investment is too costly and risky, its accomplishment should be accompanied with a strong and independent board (Peansupap and Walker, 2005). Through the perspective of agency theory, boards will be responsible as a monitoring tool for shareholder interests to safeguard their investments (Fama and Jensen, 1983) as well as to monitor management behavior to ensure that their focus and conduct is in line with the interest of shareholders (Hermalin and Weisbach, 2012; Lipartito and Morii, 2010; Fama and Jensen, 1983; Berle and Means, 1932). The agency theory suggests that the agency problem is to occur in the relationship between board of directors and ICT management level, given that the boards are not full-time participated in the company's daily activities especially in monitoring the ICT daily operations. This situation put the board of directors (principal) in a difficult situation to monitor the management level (agents) since they acquire more powers (e.g. the ability to overrule any company's decisions) such as knowledge and expertise in respective area of industry compared to boards. Reliance solely

on the ICT management's capabilities can potentially lead to management's conflict of interest in misappropriating company's ICT resources for their personal benefits due to lack of ICT competencies among board of directors (Valentine, 2013). To minimize the potential for such agency problems, the RDT is proposed as an alternative to the agency theory (Daily et al., 2003). From the RDT perspective, Pfeffer and Salancik (1978) argued that a company is characterized as an open system, dependent on external environment's contingencies. A properly controlling over company resources is crucial to prevent a one-party being dependent on others.

In order to minimize interdependent relationships of boards on the management's capabilities in ICT, boards should realize on the important need to bringing in resources to balance the board powers at the boardroom when dealing with ICT investment decision making. With the wide use of more complex and sophisticated of ICTs among companies, there is a dire need for diversity of expertise in ICT especially among board of directors. Boards with diverse types of ICT expertise are believed to add value to company performance especially in enhancing shareholders' investment through better practices. Since there is no uniform concept of board diversity (ACCA, 2015) to suit the need of ICT expertise among board of directors, the concept of board diversity will be fined-tuned in this study to align what would constitute a board with an ideal diversity of expertise in confronting with today's ICT challenges. Several types of board diversity of ICT expertise will be introduced in this study to cater to the needs of ICT expertise at the board level, helping the companies to drive better ICT investment decisions for future business success.

2.4.1. Board educational background

The term educational background has been defined in different ways from previous studies. According to Hambrick and Mason (1984), educational background is viewed as a measure of knowledge, skills base and cognitive abilities held by individuals. While the term is also viewed as graduate degrees (Hoffman et al., 1995) and types of formal education level that has been completed by an individual employees (Kvålshaugen, 2001). Board educational background is referred to the maximum educational level among boards is assessed through the specific criteria such as board's without a bachelor's degree, bachelor's degree, master's degree, and doctoral degree (Al-Musali and Ku Ismail, 2015; Talke et al., 2010). While Tarus and Aime (2014) define the board educational level as the degree of heterogeneity among board members with respect to educational qualifications which is classified under five categories: No college degree, some college degree (such as diploma), bachelor degree, master degree and PhD.

ICT investment is typically a high risk project (Angelou and Economides, 2014) as it is associated with various types of risks and high failure rate of its implementation (Pourdarab et al., 2011). Since ICT development becomes more complicated and quite challenging to business nowadays, boardroom discussion in making ICT investment decision will face with a big problem if it is not supported by boards with extensive knowledge in ICT. Boards with greater educational level in ICT may be more

innovative (Chen, 2012; Talke et al., 2010; Barroso et al., 2011) to bring changes in decision-making related to ICT investment to the company's development to keep abreast with today's ICT advancement which is consistent with Hambrick and Mason (1984), that the educational level is also seen as an individual's tendency to identify and evaluate new opportunities and alternatives, amount of innovation and strategic changes in the company. Besides that, it is also argued that individuals with greater educational levels are much more inclined to produce strategic decision-making (Hambrick and Mason, 1984) and found better in handling companies (Sebora and Wakefield, 1998) especially in ICT decision to transform business operations to keep pace with today's ICT development.

Previous studies have found that the level of individual employees education is positively related to improvement and in an innovation's adoption (Barroso et al., 2011; Dalziel 2011; Lin et al., 2011; Talke et al., 2010; Wincent et al., 2010; Escribá-Esteve et al., 2009), lead to better innovation (Dalziel et al., 2011), lead to absorb and invest in new technologies (Chen, 2012; Lin et al., 2011), increase their ability to accurately analyze information (Wincent et al., 2010) as well as more effectively in dealing with technology complexities (Escribá-Esteve et al., 2009). Having board members with diverse educational background in ICT are crucial for companies since their competency in evaluating a rationale behind the company's decision in making ICT investment in order to avoid company from significant losses. Thus, companies with more highly educated board members in ICT are likely to engage in more ICT activities, consequently increasing their willingness for doing ICT investment.

2.4.2. Board professional qualifications

Mieg (2008) views professional qualification of occupational groups and fields of work from the perspective of several domain-specificity expertise such as writing significant textbooks, establishing professional methods, founding or managing professional associations or professional schools, or exhibiting best professional practice. In his study in 2009, Mieg defines the term of professionalism as an engagement for a profession, for instance by setting or defining professional standards of a field or through the development of its organizational and educational structures. Companies should not be struggled in making decision of whether to hire potential board candidates with good academic degrees or professional qualifications; rather they must understand what characteristics that distinguishes between these two criteria and how each may benefit the companies in the process of making important decision.

According to the Table 1, the academic and professional qualifications have been distinguished based on several features such as warrants of competence, best practice analysis, annual renewal fee for the maintaining qualified designation, professional conduct and accountability, recertification, the practice of ethical accountability, the credentials assessment and recognition and experience requirements (Balthazard, 2010). From the presented concepts, it can be concluded that the professional qualification requires individual professionals to practice their position professionally in the field they involved in. There will be a

professional or regulatory body that is responsible to recognize their professional designation in order to assure their qualification to perform a job or task related to their respective fields. Many international institutions have initiated several initiatives towards the development of skills in upgrading the quality of ICT profession along with the global recognition of the profession. For example, the Information and Communications Technology Council (ICTC) promotes and facilitates the informal exchange of ideas, knowledge and experiences on management and the use of ICT in the worldwide. The ICTC provides various certifications of ICT professional such as the information security penetration testing professional (sp²), the computer information forensics investigator and the intellectual property management and digital (MIP) for the candidates who are looking to advance their careers in ICT profession.

Although investment in ICT provides companies with more competitive advantage (Voudouris et al., 2012; Apulu and Latham, 2011), a careful monitoring of ICT from the initial process in making decision for ICT investment up to its implementation in order to ensure companies get the best return from the investment. For that purpose, adding several ICT professionals or technology experts to the board may make sense for many business organizations. The presence of individual with ICT professional qualification in the boardroom is not only accountable for company's ICT oversight, but also responsible to provide strategic ICT investment advice to address the knowledge gap in the boardroom discussion. In line with that notion, several researchers stressed on the important need for boards with ICT professional qualifications as their professional levels of knowledge and skills in ICT able to drive to ICT strategic decisions, costly projects tend to remain under control and provide companies with competitive advantage (Nolan and McFarlan, 2005). The Securities and Exchange Commission emphasizes the need of ICT expertise among the company's board of directors (Trautman, 2012; Trautman and Altenbaumer-Price, 2011) and suggests that every board should at least have two qualified professional board member not only in finance but also in the ICT field. Thus, it can be concluded that boards with ICT professional qualification are believed able to advise company on ICT priorities especially in driving decision to make ICT investment.

2.4.3. Board industry experience

Board industry experience is another criterion of board expertise that has been highlighted by Hoffman et al. (1995) which has been the main focus of shareholder activists, the press and many corporate governance experts in the aftermath of the recent financial crisis (Drobetz et al., 2014; Bertsch, 2011, Pozen, 2010) and has been identified as one of the top attributes sought in hiring new directors (Deloitte, 2015; Lowe, 2015; Corporate Board Member, 2014). Industry experience is defined as a distinctive asset of an individual as he or she acquired skills and competence of field of knowledge gained over the years of actual practice that has an impact on his or her level of understandings in the respective field of industrial undertakings (Doe, 2014). Having boards with ICT industry experience is crucial to future prospect of company's ICT development through their ability in dealing with ICT investment decision making as well as more critically in addressing issues associated with ICT.

Table 1: Differences between professional and academic qualifications

Features	Professional qualifications	Academic qualifications
Warrants of competence	The professional's knowledge and skills is warranted by the professional bodies as safe and appropriate practice of the trade or profession	No warrant of competent to recognize the academic credentials to practice a trade or profession
Best practice analysis	Those certified professionals are always being accompanied by best practice analysis to ensure that they know on what they have to know or be able to do	A formal and systematic practice analysis on academic credentials is rare
Professional conduct and accountability	The professional bodies are responsible for the conduct of their professional members and some requirements, standards and assessment protocols have been stated to protect public	Academic institutions do not assume responsibility of the actions of their graduates
Annual renewal fee for maintaining qualified designation	Annual renewal fee has been imposed by the professional association or regulatory body on professionals to remain their professional designations	No payment imposed by the academic institutions on their graduates to maintain their academic degree after their academic conferment
Recertification	The professionals are required to re-certificate their professional designations to maintain the level of their competencies for competent practices	No expiry date for the academic credentials' competencies
Recourse	The professionals are subjected to disciplinary actions if they involved in any professional misconduct	The academic institutions do not have such mechanisms
The practice of ethical accountability	Professional associations and regulatory bodies also offer "warrants of appropriate professional behavior," which includes professional ethics	Academic institutions do not set out rules of conduct that graduates must abide by after graduation
The credentials assessment and recognition	The professional regulatory bodies are solely as warrantor of competence of their professional members	Such educational programs developed in the academic institutions have to meet the educational requirements and approved by the certifying bodies
Experience requirements	Some minimum of educational requirement is needed	The academic institutions do provide various practical experiences to their academic credential, however, the experience requirements of professional and trade designations are typically much more extensive than academic programs
The authority of credential jurisdiction	There is only one professional association or regulatory body that will issue a given professional credential	Academic credentials, such as B.Com., B.A., B.Sc., MBA, Ph.D., are granted by a number of different academic institutions each accredited to issue such credentials

Source: Balthazard (2010)

Bravard (2015) argued that the criterion of an individual board is not only subject to those who are having management and leadership experience, but also those who have ICT industry experience. There are various issues ranging from cyber security have been on rise in today's business environment. Many corporate boards realized their difficulties in dealing with incredibly complex ICT systems (Nash, 2012; Broadbent, 2003), however no such actions have been taken to improve ICT expertise at the board level and left the problem of poor corporate governance of ICT remains unresolved (Bravard, 2015). A recent research study conducted by the Accenture Global Research (2015) found that only 6% of board of directors and 3% of CEOs at the world's leading banks have professional technology experience. In addition to that, the results also revealed that more than two-fifths (43%) of the banks have no boards and nearly one-third (30%) have only one board member with technology experiences. The lack of board industry experience is considered as one of the contributing factor to board underperformance which led to the failure of company to strive for success (Leblanc, 2012).

From the perspective of corporate governance practices, previous researchers have shown that boards with industry

experience play an important role in their governance oversight responsibilities (Drobetz et al., 2014; Wang et al., 2013; Brickley and Zimmermann, 2010). Wang et al. (2013) argued that the presence of boards with relevant industry experience were able to curtail firms' earning management and reduce the tendency for firms to commit financial fraud, thereby increased the effectiveness of boards' role in corporate governance practice. While some recent studies revealed that the companies' announcement of higher returns (Von Meyerinck et al., 2015) and positive effect of firm value (Drobetz et al., 2014) were positively associated with the industry experience of the board of directors. In the context of ICT governance, previous studies have also discovered that boards with industry experience reduced the investment-cash flow sensitivities and helped to avoid investment distortions, led shareholder value enhancing investment decisions, especially R&D investments (Drobetz et al., 2014) as well as increased innovation activities (Masulis et al., 2012). This study emphasized on the importance of boards with industry experience which is not only important in influencing ICT investment decision but also plays a significant role in ensuring the best return on the investment for the company. Therefore, it can be concluded that

boards with ICT industry experience is crucial in determining the effectiveness of the ICT investment made, helping the companies to achieve their successful business outcomes.

2.4.4. Board training

Generally, training has been defined as “a planned process to modify attitude, knowledge or skill behavior through a learning experience to achieve effective performance in any activity or range of activities in order to develop the abilities of the individual and to satisfy current and future manpower needs of the organization” (Manpower Services Commission, 1981). While some researchers argued that training is a direct way to improve job performance that provides appropriate knowledge, skills and attitudes to perform job-related tasks (Truelove, 1992). Generally, in the context of employees’ development, some studies argued that the provision of training programs is able to produce better trained employees with superior knowledge and skills that provide many benefits to companies (Fleagen, 2010) especially in improving business operations (Nguyen et al., 2010). Recent studies have shown that good employees’ quality of work performance was positively associated with the training programs provided by the companies (Muzaffar, 2014; Ameerq and Hanif, 2013; Iqbal et al., 2013; Jagero et al., 2012; Sultana et al., 2012; Afaq et al., 2011; Khan et al., 2011).

Training is another criterion of board diversity of expertise (Hoffman et al., 1995) that should also be addressed in order to add value in the corporate governance practices. In other words, providing workplace training for board of directors is one of the important mechanisms for companies that are seeking to operate at its greatest effectiveness in ensuring that their boards are remained qualified as a strategic asset to the companies. As technologies evolve rapidly and new advanced technology systems are developed, corporate boards must be able to keep up the company to not fall behind the competition. Based on the RDT, ICT trainings are seen as important source of boards’ competencies for keeping them up to date on current development of ICT and other technologies. In the context of Malaysian study, generally, ICT training is viewed as a comprehensive training that includes basic to advanced ICT skills (Noor and Apadore, 2014).

As emphasized by Yardley (2014) through her comprehensive insights article on the important need of technology capacity for board of directors in empowering their ICT governance, several highly experienced panels has pointed out that gaining new or enhanced learning about ICT is a must for every board member regardless of their credentials, intelligence and area of expertise. The ICT training programs allow all board members to govern ICT more effectively without placing full responsibility on a single individual who is expert in ICT in order to avoid the consequences of agency problem. By providing appropriate ICT training to boards, companies will be able to improve its investment performance through their boards’ innovative ideas and their ability to cope with the rapid changes in ICT development as well as their superior competencies in managing ICT related risks. It is the boards’ responsibility to ensure that the company has a clear ICT investment strategy in order to maximize the shareholder return from the investment made.

Despite the undoubted benefits and opportunities offered by ICTs, significant effect of today’s cyber security threats may disturb the effectiveness of its investment. Foster (2015) argued on the important need of technology know-how in cyber security among board of directors to enhance their performance in controlling and monitoring of ICT activities especially when dealing with ICT risks. Accordingly, it is perceived that board members who are regularly attending training courses will not only be more concerned on and knowledgeable in grabbing at every opportunity offered by ICTs but also efficient in dealing with ICT issues.

2.4.5. Board age

The criteria of age diversity is one of the important attribute of a board (Abdullah et al., 2013) which a board should be composed of a mixed of directors of different ages (Mishra and Jhunjhunwala, 2013). The age diversity of board of directors plays an important role in the way the directors think to cope with various challenges in today’s business environment. However, due to the lack of literature on these two relationships, the criteria for this analysis is extended to general view on the relationship between age diversity and other board performance as long as the input value can be attributed to investment decision. In general view of age diversity, previous studies have shown that demographic characteristic of age diversity of directors has an ability to bring positive effect on firm performance (Cimerova et al., 2015; Letting et al., 2012; Li et al., 2011), however inconsistent (Abdullah et al., 2013; Galia and Zenou, 2013; Wellalage and Locke, 2013; Horváth and Spirollari, 2012; Dagsson et al., 2011), no significant (Van Ness et al., 2010), and negative (Eulerich et al., 2014) results were also found in previous studies in the relationship between board age and firm performance.

Given the great challenges facing companies at various types of ICT risks, it makes diverse directors’ characteristics particularly related to age diversity of boards is seen relevant to cater the need of today’s business environment. It is important to have age diversity in boardroom as it may bring new perspectives to the ICT discussion through different boards’ skills and experiences in ICT. Often a large number of the board is dominated by retired-age members (Mishra and Jhunjhunwala, 2013) and there is a call for young board members to fill the space within company especially in confronting today’s digital age (Musitwa, 2015). As investment in ICT is not only anticipated with high risk, but also potentially lead companies to a vast opportunity, boards should realize on the important need of board age diversity in bringing new perspectives of ICT understanding and innovative insight to company. Young board members are often associated with the willingness to confront the risk in order to make such improvements in their future firm performance (Horváth and Spirollari, 2012). Besides that, their extensive knowledge and practical of latest technology are expected to bring new perspectives on the issues boards are concerned with (Abdullah et al., 2013) in terms of different skills and experience to create a balanced board (Mishra and Jhunjhunwala, 2013) in making company’s strategic decisions (Mahadeo et al., 2012), particularly in ICT investment decision.

Recent study conducted by Capgemini consulting and the MIT Sloan school of management demonstrated that companies’

initiatives in doing investment in ICT has increased their revenue while those companies that have been given priority to the board digital transformation in both technology and leadership experienced greater profitability and market capitalizations in addition to increase revenues. According to Grossman et al. (2015), a conducted analysis on the backgrounds of all board of directors of 300 large companies in the United States, Europe and Asia Pacific revealed that majority of boards were classified under non-digital background. 80% of the companies' boards were not having any digital background, while only 10% were highly digital and partially digital. The researchers also revealed that the average of the digital directors was 51 years old compared to the average of 62 years old for non-digital directors. In addition to that, only 3% of the boards were 40 years old or younger while 81% were 50 years old or older. Results of this study clearly show that the digital board penetration is still low if compared to the rapid development of ICT today that needs, across the board, for a competent and digitally ready workforce.

Young directors are more energetic, skilled at using technologies that can support companies' investment for innovation (Mishra and Jhunjhunwala, 2013; Galia and Zenou, 2013) of ICT. Darmadi (2012) and Horváth and Spirollari (2012) found that young board members are more inclined to risk-taking (Grimm and Smith, 1991) and openness to new challenges and strategic changes (Hambrick and Mason, 1984) for companies' innovation and growth strategies (Grimm and Smith, 1991). However, the abilities of older directors also cannot be denied in contributing to the effectiveness of doing ICT investment. Older board of directors are acknowledged as individuals that have greater experience (Abdullah et al., 2013; Galia and Zenou, 2013), independence and long-term connections (Cimerova et al., 2015; Galia and Zenou, 2013; Van Ness et al., 2010) and financial resources (Galia and Zenou, 2013). Since the average age of boards are 62 years old (Grossman et al., 2015; King, 2012), there is no expectation that all boards will be competent in governing the ICT (Carter and Lorsch, 2004). Nevertheless, an imbalance in board's skills and knowledge and deeply entrenched old board culture, are often associated with strongly resistant to change (Leblanc and Gillies, 2003) which may affect the lack of ICT governance at board level in overseeing the ICT implementation (U.S. GAO, 2015; Valentine and Stewart, 2013; Kaur et al., 2012; Van Grembergen and De Haes, 2010). Thus, having diverse age among board members will assist companies in reducing 'group thinking' behavior, lead to making better ICT investment decision.

2.4.6. Board gender

According to several researchers, the issue of gender diversity of the board of directors has been appeared as the most widely observed attribute (Alvarado et al., 2011; Darmadi, 2011) apart from other common attributes such as race, ethnicity, age and nationality Darmadi (2011). Basically, gender diversity is the equal treatment and acceptance of both males and females through their different skills, resources as well as their potentials in an organization. Through observation from the literatures, recent studies of board gender diversity were mostly found in the context of firm performance (Cimerova et al., 2015; Makhoul et al., 2015; Thanh et al., 2015; Eulerich et al., 2014; Lenard et al., 2014;

Abdullah et al., 2013; Galia and Zenou, 2013; Darmadi, 2012; Van Ness et al., 2010).

Gender representation on boards is referred to the proportion of men and women who occupy board member positions. The issue of gender imbalance on boards is a proven fact that showed men occupied more board seats (90.2%) than woman (9.8%) as evidenced by a recent survey conducted by the 2015 Corporate Women Directors International (CWID) over 19 APEC economies¹. The 2015 CWID report showed that among APEC economies, Australia and Malaysia have high rates of increase in the appointment of women to board seats. As depicted in Table 2, Australia is indicated as the largest country that has more than doubled increase of 11.85% in its percentage of women board directors from 8.3% in 2009 to 20.1% in 2015 compared to Malaysia that shows increase 5.6% in the percentage of women boards from 6.1% in 2009 to 11.7% in 2015. The increase rates of the appointment of women directors of both countries were due to initiatives taken to accelerate the participation of women in company boards. For instance, the Malaysia government has targeted to have 30% of women board directors by 2016 which will be imposed either to the publicly listed or state-owned companies.

Some experts argued that the gender-diverse board increases performance through improve corporate governance practices, decision making process as well as achieving good financial returns (Keefe and Krawcheck, 2015). A 2012 Credit Suisse Report has underlined several benefits of gender-diverse board to the company that include: (a) A better signal for company performance; (b) generate more collaborative efforts among boards; (c) a better balance in leadership skills; (d) assessing to a wider pool of talent; (e) a better reflection of the consumer decision maker; (f) improve corporate governance; and (g) risk aversion. Having gender diversity on board is believed to be able to make better decisions at the boardroom, discussions than non-diverse groups (Keefe and Krawcheck, 2015). Through the economic evidences, in terms of skills, Croson and Gneezy (2009) suggested that men and women have their own strengths and weaknesses especially in managing investments. With respect to trading strategies, men were more overconfident compared to women who in turn lowered returns from the investment once transaction costs were incorporated (Barber and Odean, 2001). Previous studies also argued that women did better at forecasting the stock market returns (Kumar, 2010) and more risk averse with respect to financial decisions (Jianakoplos and Bernasek, 1998). Bogan et al. (2013) argued that male presence on a management team were more likely to involve in higher risk investment rather than to choose an investment that requires realizing a larger loss, caused females to be more risk taking.

Consequently, this study focuses on the gender expertise among board members especially in ICT. This study argues that rather than debating whether quotas are the right way to increase the number of women on boards, the focus should be on how the ICT investment

1 The APEC economies including 19 countries, namely, Canada, Australia, the United States of America, Vietnam, New Zealand, China, Malaysia, Indonesia, Hong Kong (China), The Philippines, Thailand, Singapore, Peru, Mexico, Russia, Chinese Taipei, Chile, Japan and Republic of Korea.

Table 2: The increase percentage of women directors to boardroom

Country	Percentage of women directors 2009	Percentage of women directors 2015	Increase in percentage from 2009-2015
Australia	8.3	20.15	11.85
Malaysia	6.1	11.7	5.6

Source: 2015. CWID: Corporate Women Directors International

Table 3: Proportion of companies in each sector split by number of women on board (end-2011)

% in each sector	Number of women on the board				Total
	0	1	2	≥3	
Healthcare	26.7	35.1	24.4	13.7	100
Financial	32.2	27.3	23.1	17.4	100
Utilities	33.1	19.5	29.3	18.0	100
Consumer discretionary	37.7	27.2	20.2	14.9	100
Consumer staples	38.5	15.5	23.5	22.5	100
Telecommunication services	40.0	21.1	21.1	17.9	100
Energy	46.8	28.1	18.1	7.0	100
Industrials	48.4	24.3	17.2	10.1	100
Materials	52.5	22.1	16.7	8.7	100
Information technology	52.5	26.3	13.8	7.4	100
Total	41.2	25.0	20.3	13.6	100

Source: Credit Suisse Report (2012)

can be valuable for the company through the contributions of both genders. It is understood that the participation of women directors to the boardroom can contribute significantly in supplementing discussions with a different perspective as their leadership style can lead to more innovation and collaboration in the company (Keefe and Krawcheck, 2015). However, several researchers found that women were less likely involved in ICT team workforce (Barker et al., 2014). As depicted in Table 3, the 2012 Credit Suisse Report revealed that the higher proportion of women’s participation at the board level was found in Healthcare and Financial sectors. Surprisingly, the survey results showed that more than 50% of the IT and Materials sectors had no women involved at the board level. As reported by Zarva (2016), based on recent survey to more than 750 CEOs in the technology industry, more than half of the CEOs believed that the issue of gender diversity on boards was not important. About 68% of the CEOs rated a specific expertise to the board were much more important as it can be used to generate attractive investment returns.

3. CONCLUSIONS

The findings from the empirical evidences have indicated that for the ICT investment to be worthwhile, firms need to emphasize the importance to have board with diverse ICT expertise in the boardroom. Board diversity of ICT expertise is believed to have the ability to analyse further its relationship with ICT investment. With board diversity of ICT expertise, firms are predicted in a stronger position to plan for the future, manage risk, make prudent decisions of ICT investment and take full advantage of opportunities offered by new technologies, especially ICT to enhance their business operational performance.

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