CIO and CTO Nexus: Empowering Organizations with IT Governance

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Abstract--**Over the past few years, businesses have started focusing more on governance than simple management of their IT infrastructure. It could be argued that businesses are realizing that IT implementation, operation, and maintenance are strategic activities and that they must be aligned with the overall objectives of the organization. It is therefore important to account for the impacts of implementation, development, and maintenance of IT-related decisions regarding organizational goals, processes, people, and technology on a strategic level. However, in practice there is a lack of synergy between the roles of CIO and CTO, which results in divergent management, control, and performance management of IT infrastructure. This paper reports the findings from a case study and highlights that IT governance is not just only IT management but it also contributes to an enhanced operational planning/management and strategic performance of the organization.**

I. INTRODUCTION

According to the international business potential growth, organizations draw high attention in developing their businesses ahead their rivals in Information Technology (IT) to gain more commercial opportunities and survive their businesses in the economics of competitive markets [1]. This leads organizations show more interest in IT globally. Moreover, organizations invest in Information Systems (IS) comprehensively and frequently [2] to augment more value in lessening costs, increasing labor productivity, developing operations and decision making [3]. Furthermore, IT is considered as remedy of IT vulnerability and IT misuse in resources which protects the business from unexpected situations and risks by influencing organizations gain benefits with less risk and less costs [4]. It is not only IT vulnerability and IT misuse in resources, but IT incidents in data-stealing risk, data-fraud, data-hacking, internal attacks, and all types of breach with high level of severity are also in the main focuses of executives and board of directors who pay closer attention to IT in protecting the business [1]. Therefore, they seek various forms of IT to mitigate fallibility of organizational management effectively.

Throughout the business oversight, IT governance is one of the top concerns which is always discussed in the meetings regularly between finance and IT senior managers [1]. Further, IT governance has become a strong focus which operates as an instrument to align IT strategies with the entire business strategies [5, 6]. IT governance is a module of IT implementation and utilization which involves IT infrastructure, IT architecture, unique requirements of IT applications, and other IT-related investments [7, 8], organizational structure, size, experience in governance issues, business strategy [9, 10]. Due to the numerous IT involvements, organization has to select the responsible person in IT who is designated as the CIO/ the CTO and collaborates with other executives, especially the CEO. Meanwhile, they frequently communicate to promote the IT convergence by achieving a mutual understanding in IT which affects to positive impact within the organization [11]. More particularly through the CEO' lens, IT is concerned as the organizational top strategic tool [12], and important to deliver corporate strategy [1]. Because of the impact of organizational IT management, their capability empowers to strengthen the business. Obviously, the CEO is willing to discuss with the CIO/ the CTO due to understanding IT value. Then, the increase of IT knowledge management in senior managers moves forward continually as they have more confidence in effective IT governance by observing from the growth of IT governance maturity in organization and less IT problem in staff [4]. Moreover, effective IT management provides strong support to organizational competitiveness by understanding the right person and the right responsibility to achieve effective performance in the right job [6, 13].

With regard to the IT convergence between the CEO and the CIO/ the CTO, it empowers the IT and business knowledge synergistic integration [14], which in sequence enhances the progress of strategic IT applications [15], along with, the CIO/ the CTO nexus under different contingencies. Concentrating on the effectiveness of IT, it is discussed in the foregoing research and studies at strategic level [16, 17] and operational level [16, 18]. Basically, there are two domains to focus: (1) strategic impact of IT (organizational agility) and (2) operational impact of IT (operational IT effectiveness in the development of business operations) [19]. Exceptionally, (1) business strategy, (2) IT strategy, (3) business infrastructure, (4) IT infrastructure, are the top four factors which IT and business managers must collaborate to improve a better relationship together to meet strategic objectives [20, 21]. Yet, IT implementation and utilization builds more opportunities and delivers more benefits to organization as it is a meaningful object to support enterprise-wide with full of standards and governance through all departments [22]. With actively moving forward in IT, the use of IT provides more wide-ranging development plans and incorporates numerous ways to support senior management which emerges to gain top maximum abundant potential in IT using [23]. Moreover, the maximum potential of IT has been implemented in an organization (or individuals) work structure [24], which provides few guidelines for improving consistent measures [25], delivers improved measures of how extensively IT is utilized in an organizational environments [26], presents enriched theoretical analysis and effective measures which full of reliability or parallelizability [27-29].

At first, this paper is motivated by the perspective that the CIO and the CTO nexus should be considered to empower organizations with IT governance and study IT-related circumstance by purposing the importance of managerial participations and the main impacts in the IT implementation, which are presented in the literature. Following this line of reasoning in this paper, it seeks to propose the findings from a case study and highlight the CIO and the CTO nexus which empowers organizations with IT governance at ABC bank by reporting on how IT governance contributes to an enhanced operational planning/ management and strategic performance of the organization. It examines the impacts of implementation, development, and maintenance of IT-related decisions regarding organizational goals, processes, people, and technology on a strategic level.

In the next section, this paper presents the combination of factors including: (a) CIO and CTO, (b) IT governance, (c) IT strategy, (d) IT infrastructure and IT resources, which reinforce the CIO and the CTO nexus and impacts in divergent management, control, and performance management of IT infrastructure. In sequence, it discusses the research methodology and case study with research findings. Finally, the conclusion is described at the end of this paper.

II. LITERATURE REVIEW

A. T*he CIO and the CTO*

In the 1970s, organization recruited the chief technology officer (CTOs) to provide full assistance in specific technology management roles [30]. The CTO is considered as the top leader in technology department [31]; acts as one of the main leaders in the organization who works in numerous tasks in technologies [32-35]. In terms of technology functions of the CTO, there are three levels of technology leadership which increase levels of strategic responsibility; (1) functional leadership, (2) strategic leadership, (3) supra-functional leadership [36].

Functioning in leading innovation, it is the critical role of the CTO who positions on the executive committee with the chief executive officer (CEO), the chief financial officer (CFO), and other top management [31]. According to the functional leadership, it concerns to the leadership of innovation [31, 37-41] which discusses the role of the CTO [33, 34, 36, 42-45] by ensuring the effective operation to meet the criteria of IT investment, IT resources, and IT capability [36]. Next, strategic leadership concentrates on the alignment of business and IT strategies. Finally, supra-functional leadership involves strategic development which is not only technology function but strategic execution also manages in all departments of organizational operations by focusing on the overall of the organization [36]. Thus, it is crucial to implement the role of functional leadership, strategic leadership, and supra-functional leadership effectively to maintain high level of the CTO which certainly can impact on organizational strategy and operation [31]. However, there is less consideration in strategic and supra-functional roles of the CTO which the CEO and board of directors should pay more attention [46-49], and affects to the lack of synergy between the roles of the CIO and the CTO by resulting in divergent management, control, and performance management of IT infrastructure.

These are the following expanded group of the CTO's responsibilities within organization: (1) searching for imperative and innovative technologies for organization, (2) observing business development and technology selections of business rivals, (3) conferring on strategies with the CEO and executives, (4) acquiring, using, and developing technology selections in strategic and cross-sectional management across business division [30]. Therefore, the CTO concentrates on internal responsibilities and external business environments. In doing so, the CTO operates technological developments through all internal departments by focusing on the technological management issues and open innovation processes. Meanwhile, the CTO also pays high attention on the external business environments.

Similarly, the chief information officer (CIO) was originally initiated and has a significant role in information technology (IT) in the last 15 years. Based on the growth of IT, the responsibility of the CIO is essential in the corporate structure to support the business and achieve its business objectives by operating from the tactical/ operational level to the strategic/ management level progressively [50]. Focusing on the CIO's involvements, the relationship between the CIO and the CEO [51, 52], colleagues and top management [53-55], is important and leads to the use of IT and IT relationships. Moreover, there are different responsibilities of the CIO which are business planning meetings participation, business objectives establishment, top management engagement, and regular communication with the CEO operations to a shared vision, a mutual understanding, and develop knowledge about the contexts, business, and IT [7, 11, 56, 57]. Hence, sophisticated business and IT knowledge emerges the relationships and interactions between executives and the CIO which leads to analyze information content in products and processes through modification of IT strategies and the rapidity of decision making at the transformation of contexts.

Apart from tactical errands, it is essential for the CIO to have high knowledge in innovative achievement and IT awareness to overcome the complexity of the technology in the business [58, 59]. By doing so, it is vital to the CIO in sharing knowledge in IT planning to the CEO, involving an IT steering committee, providing knowledge about IT usage of business competitors, contributing knowledge about IT opportunities within organization, and managing IT resources [51, 60, 61]. Furthermore, the CIO also involves in choosing, presenting, and delivering IT to organization, along with, achieving strategic value by understanding how IT fits into strategic plan of organization and providing training of new IT systems and services. [59]. In relation to this, the CIO has to provide technology which supports the complete strategy of the organization and operates as a basis of day-to-day operations [50]. Looking at the relationship between the CIO and IT governance, the CIO mainly concerns in IT systems

and services allocation in particular projects which must be met and aligned with the estimated budgets, strategic plans, and planning methods by keeping pace of advanced technologies to fit the nature of business and solve the existing business problems [59]. In addition, it is compulsory to top management to understand that IT governance is considered as their responsibilities [1].

B. IT Governance

In the competitive business of this period, the CIO always encounters limited resources with high pressure to measure outcomes of the business. So, the CIO will be imposed to adopt dynamic processes to examine IT investment and evaluate the performance of systems by implementing IT governance [50]. IT governance was originally developed from IS strategy and has been used widely as a subset of corporate governance [62]. Besides, it is considered as the core of decision making in IT-related processes within an organization by focusing on managerial responsibilities and control that influence in the IT resources utilization and implementation [5]. Moreover, it is described as an essential component of enterprise governance which embraces the executives and organizational structures and processes to sustain the organizational IT and prolongs the organizational strategies and objectives [63]. Further, it identifies the decision rights and accountability structure to embolden desirable behavior in the use of IT [64]. Basically, it defines the relationship and interaction between business and IT within the organization which business department allows IT department to implement and execute assured IT services to gain effective IT governance mechanisms in achieving satisfactory behavior and effective relationship [65].

Effective IT governance integrates the objectives between business and IT to gain the best practices in business operations [4]. In doing so, it supports organizations to strengthen business vision, sophisticated risk management, superior business value delivery through IT, and improved IT resources management [63], value creation in the business through IT [1]. Therefore, IT governance provides better IT supports to organization robustly in achieving business objectives, optimizing business in IT investment, managing opportunities, mitigating IT-related risks.

C. IT Strategy

Strategy is a vital component of IT governance implementation to gain the benefits and better understanding in the change by managing different commitments across organization in challenging the compulsory change and investing in stakeholders' training and education [66]. Moreover, strategy is operated by top level of management through foundation level of management, along with, consensus which is implemented by strategy in taking the lead of change, activating widely, clearing up disagreement and integrating processes [67]. Structure, processes, people, training, and commitment will be driven successfully, if strategy is established effectively [68, 69]. Further, there are three types of strategy: (1) Information Systems (IS) strategy concerns the alignment of business requirements and IT, (2) Information Technology (IT) strategy concentrates on technology policies which are technical infrastructures and methodologies, (3) Information Management (IM) strategy focuses on IT management and control aspects [70, 71]. Likewise, organizational strategy and IT integration leads organizations successfully in the use of IT [72].

According to IT governance, the CEO and board of directors are people who manage organizational strategy [7, 71]. Meanwhile, the CIO has to develop an IT strategy by aligning the objective of business and IT, particularly concentrating on returns on investment of concrete business cases [50]. Generally, the CIO originates business objectives and integrates strategy of IT and business [73-75] to raise organizational understanding and verify corrective actions implementation [76], which realizes as business-IT alignment [70, 73, 77] to raise the organizational capability to operate effectively in environmental variations and build competitive advantage. To gain enriched integration of technical and business knowledge, it is compulsory to the CIO and other executives to draw high attention in the business planning meetings [78]. Moreover, IT strategies are formulated in pragmatic attempts and can truly operate business sensibilities and lead to achieve better alignment [12]. The collaboration between the CIO and the CEO can build improved IT strategies as they always concern about organizational information and also anticipate to have more strategic IT alignment processes [79]. There are more opportunities and outcomes of such collaboration from a growing IT strategies and IT infrastructure investments [80]. Therefore, the CIO should pay more attention and spend more time to understand business initiatives. Whilst, The CEO should have a closer look and open more opportunities in IT. Particularly, organizations should manipulate strategy of IT and business robustly to keep them working closer in alignment to gain success business [81]. The frequent communication between the CIO and the CEO lead to have better strategies based on their responsibilities which build more effective strategic alignment between business and IT [82]. Therefore, IT strategies have been originated and developed by the CIO in having regular meetings with the CEO about IT agendas which meet the business requirements, overcome the business weaknesses, strengthen the business processes, execute and develop innovative technologies, create benefits and wealth in the organization. These processes will result more effective business and IT alignment.

D. IT Infrastructure and IT Resources

Yet again, the CEO, the CIO, and other executives always make decisions to have technology investments in implementing innovative technologies or cutting-edge technologies to gain expected outcomes and profits [50]. Hence, the importance of IT infrastructure competence is gradually becoming sophisticated which leads to achieve real time business collaboration, business processes reengineering and work across organization locally, nationally and globally

[83]. Then, IT is considered as significant organizational resources which are receptive and productive to a forceful business environment [84, 85].

Focusing on IT infrastructure, it is a key component which leads and implements technology successfully [86]. Moreover, IT infrastructure is a primary structure which differentiates practical performance of organizations and therefore becomes the main focus of IT management [83]. It is divided into two areas which are (1) technical area (hardware, software, application, computer network) and (2) people-IT area (IT knowledge, IT skills, IT labor, IT services, IT capabilities) [87-92], including personal and professional development skills training and knowledge sharing [93]. Further, the range of IT infrastructure involves the business activities by sharing and assisting IT working processes within and across organizations [90]. Even more, IT activities with technological infrastructure support organizations by developing capabilities of using technology and assisting with different methods to learn with knowledge revolution [91]. Thus, IT infrastructure allows customizing, observing, analyzing and cooperating to support business processes by integrating business process-reengineering projects to direct fundamental developments of organizational performance [94]. Likewise, the integration between IT infrastructure, IT capabilities, and the demands of existing business requirements can result and influence on organizational performance [95]. Therefore, all the above mentioned factors are significant to the management and operation in the business. In doing so, there is further explanation in the business by starting from the recommendation of the CEO.

Apparently, the CEO leads executives to understand the use of IT and encourages them to participate in business processes by aligning IT and business to acknowledge the benefits in IT using [51]. Further, effective IT using embrace with operational IT effectiveness and organizational agility [96]. Therefore, the business management runs by IT-driven business process. Subsequently, executives draw higher attention to IT resources in enterprise-wide management which are essential to the business processes by making decisions in sharing further services, recruiting more people, outsourcing extra vendors, developing improved skills, achieving higher maturity and capability levels of people, investing more trainings, and other human capital management concerns [50]. In addition, some opportune organizations have on-hand IT experts and superb IT skills which can definitely empower more effective IT performance, more productivities, higher velocity, and better quality of service delivery [4, 97].

III. RESEARCH METHODOLOGY

This paper employs a single case study [98]. A case study was created to recognize and examine the factors which are applicable to IT governance effectiveness and IT implementation success. This paper concentrates on single-organizational environments and contains the performance goals of IS success [28, 99, 100], and scrutinizes the alignment of business and IT strategies [100-102]. Although these researches are in the environment of single organization, they involve in the range to multi-organizations [103], and their insights are possibly relevant in multi-organizational contexts [99].

Researches are involved in the analysis which described on IT governance at ABC bank. This research reports on how IT governance contributes to an enhanced operational planning/ management and strategic performance of the organization. The eventual objective of this research is to propose the findings from a case study and highlight the CIO and the CTO nexus which empowers organizations with IT governance. This paper encourages accounting for the impact of implementation, development, and maintenance of IT-related decisions regarding organizational goals, processes, people, and technology on a strategic level. Therefore, the targeted terms comprises with the combination of factors containing: (a) CIO and CTO, (b) IT governance, (c) IT strategy, (d) IT infrastructure and IT resources. Prominently, this paper presents a profounder understanding of the certain strategic activities in ABC bank which could strengthen synergy between the roles of the CIO and the CTO of other organizations and could result in divergent management, control, and performance management of IT infrastructure.

An interpretive case study approach is applied to reveal the diversity of issues involved in IT governance implementation, operation, and maintenance of IT-related decisions [104, 105]. To understand the impediments of the organization in reality and the challenges encountered over a time period [106], this paper applies an interpretive approach employs an in-depth information to examine the CIO and the CTO nexus which empowers organizations with IT governance. This approach concentrates on the shared implications and experiences of the participated people [107]. Likewise, there are interpretations from the perceptions of the individuals themselves by indicating different pragmatisms which emerged in the organization and has been improved by their experiences and executions. Further, a case study research concentrates on emphasizing the 'how' and 'why' questions [105] by selecting an organization which already has IT governance implementation in-place. Data was collected by using an incorporation of semi-structured interviews and observation in the meetings as IT governance was implemented at ABC bank, along with, structured questionnaire surveys.

A mix-method approach is presented for this paper [108] by using approach of qualitative and quantitative. The qualitative approach was selected to collect data from participating organization as single-organizational contexts and the participants were asked to verbally discuss their responses to current situation of IT governance by face-to-face meetings, email and telephone follow-up. Based on the qualitative approach, this paper employed the Critical Incident Technique (CIT) [109] to gain in-details explanations from interviewees. Meanwhile, interviewer obtained their specific behavioural descriptions as insights of required information by acknowledging the influencers and

outcomes of the whole reality. Besides, the findings from the qualitative study were used to support the quantitative approach by strengthening the quantitative questionnaire surveys. The collected data from surveys will be used to validate the research model by using Structural Equation Modelling (SEM) and Partial Least Square (PLS) to analyse.

Research in an ABC bank in Thailand, it was conducted over a period of two months with 8 interviewees in face-to-face sessions. The informants were senior IT strategy and policy specialist, senior software quality assurance specialist, head of IT strategy and policy, head of software quality assurance, senior IT architect specialist, senior regulatory and policy compliance specialist, senior information systems auditor, and senior IT resource and portfolio management specialist.

According to data analysis, data was collected from all interviews in a repetitive process which contains the empirical data, the theoretical views, and the relevant literature [110]. The narrative strategy contains the audio recorded transcription from the collected data [111]. This research provides the whole pictures of informants' utterances by inserting in the quotation as it is the significant information which has been acknowledged from interviewees [112]. In this way, it is potential to create a mind mapping strategy to establish the experiential data [113]. Then, the whole pictures of informants' utterances and mind maps were analyzed with the theoretical perceptions. This data analysis process was remained through the completed situation which explained the overall findings of the case studies broadly [110]. The qualitative data is analyzed by using within-case analysis for this paper. In addition, the analyzed results with narration are presented in the case study section with the findings from the quantitative questionnaire surveys.

IV. CASE STUDY

A. Background of the ABC bank

ABC was established in 1945 and it has about 16,000 employees and a registered capital of Baht 30,000 million (USD 99 million) with return on assets (ROA) in the first half of 2011 that has been assessed at 1.7%. It has been indexed with the bank of Thailand which operates as the central bank e.g. designating monetary policy; examining financial systems; supporting banking assistance to the government and financial institutions; releasing securities and new prints of banknotes; and controlling the foreign exchange rate in Thailand. ABC is named as one of the major local commercial banks in Thailand and has been listed in SET (The Stock Exchange of Thailand) since 1976. The bank is ranked as one of the five largest commercial banks in Thailand as determined by the total assets, loans, and deposits, and has 16% of market share. In addition, there are over than 800 branches across Thailand with 8 overseas offices in USA, Hong Kong, Cayman Islands, China, and Japan. Currently, there are over than 7,000 of automated teller machines (ATM) all over Thailand.

B. IT governance at ABC bank

ABC always considers the technologies which are suitable to the business requirements of ABC's environment and also those that can be applied to ABC truly and appropriately. By doing so, IT adoption in ABC is investigated, operated, and controlled by the IT architecture department in Systems division. This department is responsible for carefully considering all kinds of new and stable applications and technology in the market prior to adopting them within the ABC. All established and unchanged applications and technologies will be implemented and will be used in ABC. One senior IT Strategy and Policy Specialist commented

> *"We won't apply all the latest versions or the newest applications immediately, because we want to wait and see what happens when the situation become clear, settled, and stable; prior to us implementing these systems. We are seriously concerned to make sure we choose applications which suit our business environment. We, therefore, can ascertain that the latest versions or the newest applications truly work effectively before we adopt them. ABC is regarded as the most innovative bank in Thailand. In Thailand, I consider that we are in between "pioneers" and progressive adopters by mostly adopting technologies which are mainly used and sold in the market. On the other hand, ABC is in the middle-rank of pioneering banks in comparison to banks around the world."*

Figure 1 outlines the IT organization structure of ABC which depicts a centralized operation. It comprises 14 key IT operating subordinate departments. The Chief Information Officer (CIO) is the top management person of the Systems Division. He is the responsible person in this department who executes and controls all IT functions which are related to all business activities in every business division and each subordinate department throughout ABC. IT operation services in ABC is divided into two areas of responsibility which are corporate IT and divisional IT. In terms of corporate IT, it operates IT operation services under the "IT Planning Department" in relation to the use of IT at the strategic level only. On the other hand, Divisional IT focuses on the IT operation and maintains all IT activities and services in the business division levels including all subsidiary departments and branches. Therefore, "Systems Division" is the IT division which handles and looks after all IT concerns and operates all IT activities in relation to all business transactions. The systems division is located at the head office which leads and dominates all in-house and outsourced IT operations within the head office and through the branches all over Thailand.

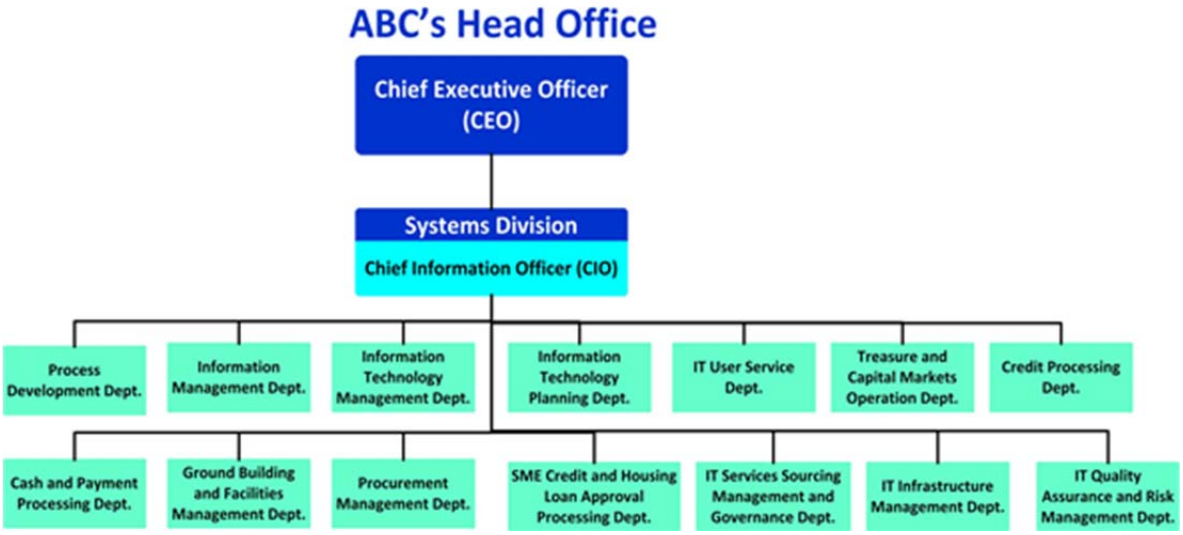

Fig. 1: IT Organization Structure of ABC bank

Through this research, it has become clear that personnel in ABC have divergent opinions about IT governance. There are respondents who believed that IT governance is about the allocation of decision rights and accountability structure to encourage desirable behavior in the use of IT. Others believed that IT governance is an arrangement of processes to direct and control the organization in terms of risk management and productivity by utilizing the IT assets. Although, not to the same extent, there is substantial support for IT governance as the force that plans, shapes, and controls IT capabilities.

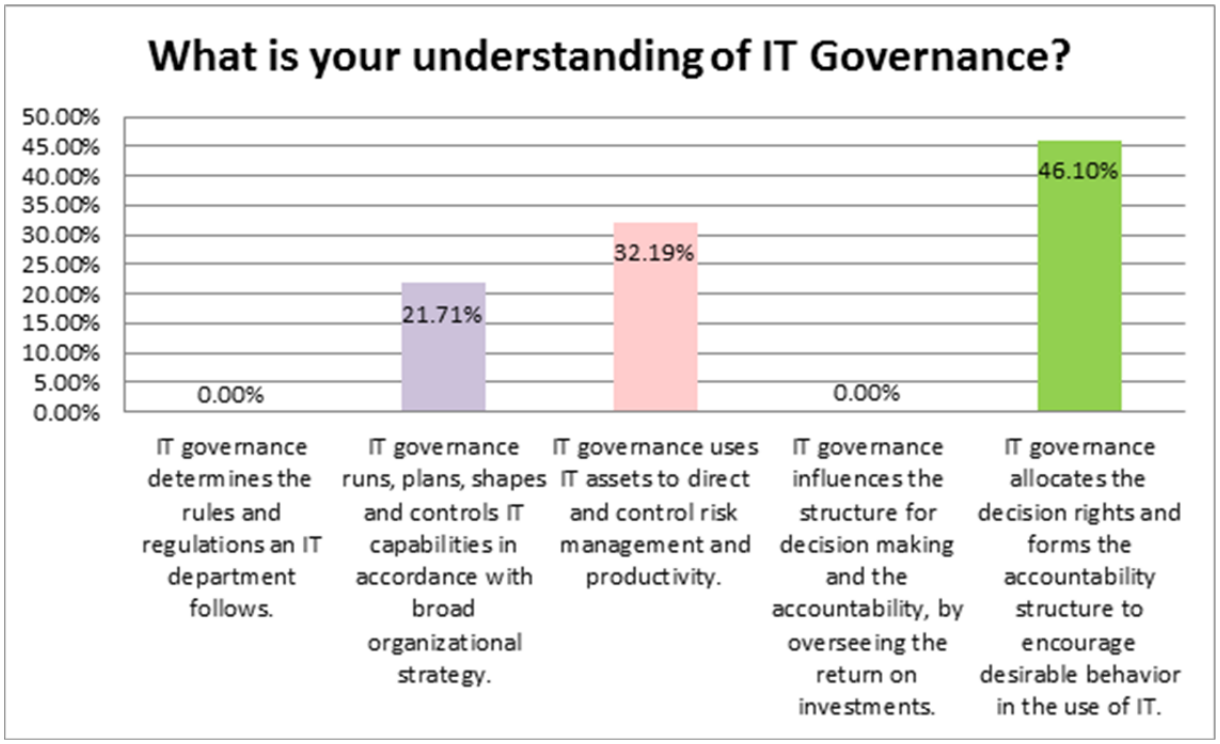

Fig. 2: Perceptions of IT Governance

According to figure 2, these responses show the perception and definition of IT governance from different people in the organization. As a result, there are contrary respondents with a big percentage difference between the highest and the lowest fraction of answer. Based on the overall result, it seems that the senior management did not convey the proper reasons for which IT governance was to be implemented or initiated, which is why we see different approaches or different perceptions and ideas about IT governance and its constituent methodologies within the organization.

C. Strategic Alignment at ABC bank

Strategic alignment is vital to the accomplishment of top performance of any team, function, department, division, or organization. It is about achieving the mission and goals of business of which the main key is to promote organizational performance. It is a positive to have correct and harmonious strategic alignment. Organizations will certainly attain clear direction, approved agreement, vision, values, strategic direction, culture, exceptional market position, a dynamic process, and periodical assessments measuring gaps between targets and results and thus also accounting for shortfalls.

According to the view of the planning/ management level, business and IT alignment, together with, better relationships are the expected outcomes from IT department. The Senior IT Strategy and Policy Specialist supposed

> *"It is the inability to measure the outcome in figures and numbers. However, it supports the need to align business and IT, gain better decision making in investment, and save on the budget. It is easier for us to recognize and realize the problems of the business departments which always conflict with the IT department. We gain better relationships and higher alignment. We can realize this once we present the IT strategy in the meeting. We will know easily whether the business department agrees with us or not. They are more opened-minded and let us know more issues that they seek help in regarding particular areas and with less conflict. Therefore, the results mainly show in the alignment area by gaining better relationships, understanding, and communication after hearing more opinions."*

In conjunction with data in figure 3, IT alignment and business processes are the main components which improve the future of the economy in any industry. As seen in ABC, the maximum figure demonstrates that it is normative in terms of the alignment of IT with business processes. It looks common and happens in any organization. Yet, the alignment between them has been less than impressive. ABC may well be tempted to become more technologically emboldened, but it may have missed the ordinary alternatives which could arise from communication, knowledge, and understanding. Furthermore, there is a sense of knowing about this result so that senior management executives don't take a closer look at the ways to align business and IT together. On the other hand, they are more focused and show more interests in technologies to invest in, in order to gain maximum profits in the long run. For top management, they should pay more attention and seek the appropriate way to make them align with each other closely and efficiently. This, in turn, might indicate that perhaps, they can gain and achieve more than they expected which means not only higher returns, but also the attainment of a better corporate conscience, corporate citizenship, social performance, and sustainable responsible business. It does not concern only money, but it is worthwhile in terms of morals, more value for customers, but also is difficult to evaluate in impression.

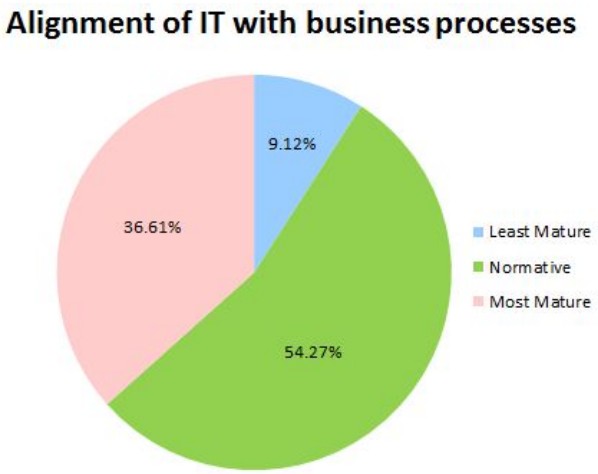

Fig. 3: Alignment of IT with Business Processes

D. Resource Management at ABC bank

Resource management is the process which aims to use the resources of an organization wisely and in the most effective way. It is important to manage employees more efficiently by allowing them to realize and employ the resources in the organization more effectively. These resources comprise goods and equipment, applications, financial resources, and the labor resource, along with ideas, information, and knowledge resource repositories. Resource management also concerns itself with service delivery systems to allow IT to optimize the bank's infrastructure and human resources by realizing optimal investment, appropriate management, and those crucial IT resources.

Similarly, people at the operations level consider outsourcing vendors are very helpful and provide effective assistance to ABC at all business levels. However, they must follow ABC standards and guidelines which are built by the IT infrastructure management department of ABC. A Senior Information Systems Auditors explained

> *"We have a team which provides training and service support to internal staff who are the super-users of different departments. There are training road maps for different teams such as the IT team, and IT audit team. Different teams train their own people to perform particular skills and applications. These training sessions must meet the requirements and situations of the*

organization. In terms of IT infrastructure, we hire outsourcing companies. However, the IT infrastructure management department always directs them by controlling and leading them to follow handbooks, checklists, and all procedures including updating the IT infrastructure deployment."

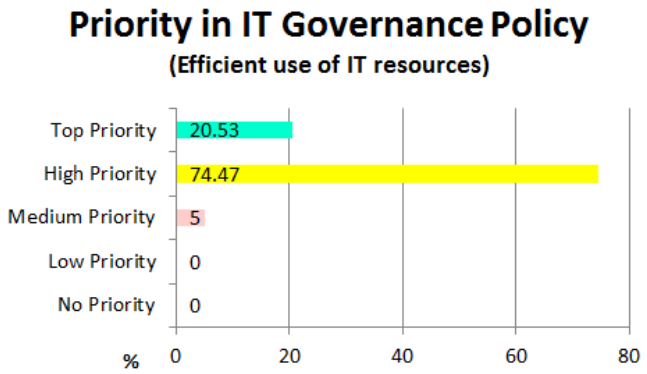

Fig. 4: Priority in IT Governance Policy (Efficient Use of IT Resources)

Figure 4, it depicts the efficient use of IT resources achieved by allowing people to indicate their view of the priority in IT governance policy. Significantly positive, the majority of people selected high priority. This means ABC intensely emphasizes efficient use of IT resources. Moreover, people in ABC also recognize that IT resources are very important and they have to use them wisely. It is a good way to train them to not waste the consumables and resources. This also helps to reduce costs with fewer expenses. Apart from that, ABC gains more savings and more earnings in the meantime. Particularly impressive, ABC employs this technique to capitalize on opportunities in cautiously applying IT resources and strategically preparing itself for improved economic conditions. Even though, there are a small number of correspondents selected, this answer has the top priority. It indicates that there are few people who are very seriously concern to the use of IT resources. Particularly it emphasizes how trainees' cohesion and staff members' collaboration lead to efficient use of the IT resource. This is a good sign of ABC's overall positive view because only a few staff members are highly trained at first in the use of IT resources in IT governance policy.

E. Performance Measurement at ABC bank

Performance measurement is important to an organization so that it can determine the best way to fit and align performance measures with business strategy, structures, and corporate culture, the type and amount of measures to use, the balance between the qualities and costs of presenting these measures, and the way to run the corrective measures actions. These lead to decisive outcomes being employed, produced and achieved. Performance measurement evaluates the achievement of a work cluster, program, or organization's effort by defining, prioritizing, and comparing the relevant information [114]. It is the use of statistical measures of capacities, processes, and outcomes to determine development toward specific aspects of activities which are the defined organizational objectives [115].

In consequence, executive management and subordinate staff from lower management levels have similar concerns and are willing to develop, review, and update IT governance relating to these deficits. They consider that it is very helpful to the work operation to run systematically and transparently. This makes it relatively simple to follow up where the processes and projects have so far reached. However, it requires people in ABC to review and update the systems periodically to ensure that methodologies/ frameworks are still being utilized properly and have been updated to avoid unexpected situations and calamities. Moreover, they also encounter problems in all management levels which are not risky and are able to be handled straightforwardly and readily. Therefore, the overall problem of ABC is in the scope of common issues with some obstacles which need more patience, more understanding, more harmonization and sharing, effective teamwork, and the highest quality of assistance.

According to IT infrastructure, performance measurement in ABC needs to meet business requirements, and retain people in different management levels to achieve the best outcomes. Different departments monitor their own risks and solve problem for themselves and rarely have to discuss these topics in meetings unless they can't find solutions to the problem internally. The head of Software Quality Assurance noted

"For the overall assessment, we always concern and align our performance with the scorecard. Basically, we always measure monthly IT in a detailed view, in different IT units, and in different issues such as, the availability of systems, incident management, and we also follow up on what happened in operational meetings. If the measures concern the overall strategic level, they will be measured and identified in the balance scorecard and will be tracked by IT Strategy and Policy department."

As seen in figure 5, the chart shows the biggest hurdle in ABC in terms of IT project failure is to deliver expected value. Lack of planning is the most common choice. Even more, there are three selections of approximately the same rank. Those people had different opinions. Some chose ineffective change management as most important. On the other hand, costs to implement were too high, was also picked. And lack of planning is the third option chosen at this same level of ranking. Thus, they are the main issues with IT performance in ABC that top management must consider closely and need to do something about, in order to clear up these concerns and gain a better IT performance.

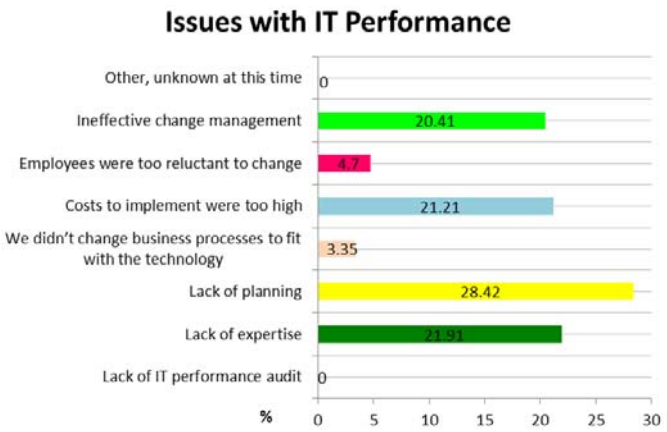

Fig. 5: Issues with IT performance

V. CONCLUSION

This paper sums up the IT governance examination at ABC bank which defines how IT governance contributes to an enhanced operational planning/ management and strategic performance of the organization. This paper aims to propose the findings from a case study and highlight the CIO and the CTO nexus which empowers organizations with IT governance. This paper significantly focuses on the impacts of IT implementation, IT development, and maintenance of IT-related decisions regarding organizational goals, processes, people, and technology on a strategic level. It takes the targeted factors into the account in the area of the CIO and the CTO, IT governance, IT strategy, and IT infrastructure and IT resources by considering and investigating their roles and their involvements in IT governance at ABC bank which affect to the entire organization. This case study has illustrated that these factors and relationships integrate to achieve effective IT implementation, operation, and maintenance which are strategic activities and also align with the overall objectives of the organization. Combing together, this paper indicates the organizational view of the potential for IT factors in strategic activities, especially the higher level of the CIO and the CTO nexus in strategic decision making, the sharpened level of IT knowledge at the executive level, the responsibility in integration between the optimal capability, the changing business environment in shifting from technological/ operational to strategic/ management to elevate the CIO and the CTO role securely in relationship to other top-level executives, as well as, empowering organizations with IT governance and the stronger synergy between the roles of the CIO and the CTO.

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