Qualitative Research on Female Boards IT Investment Decisions in A Males Homogeny Environments

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Abstract

The primary objective of this paper is to investigate the level of IT decisions accuracy between female and male directors on board. The research uses qualitative studies by interviewing four directors (two females and two males) who are in charge of making IT investment decisions. Furthermore, the data analysis uses Leadership Theory, Decision Quality Theory and Analytic Hierarchical Process. The outcomes of this study indicate that gender plays a pivotal role in shaping board directors' conduct in an IT investment decision-making where male and female leaders have specific attributes that will contribute to a successful IT investment decision-making. Moreover, the results also can be used as a fundamental for enterprises to change their policy regarding gender equality in a workplace to create a more diverse working environment. This research becomes significant considering the number of females on IT and board remains limited for several years despite women emancipation being encouraged across many platforms.

**Keywords:** IT investment; decision-making; gender; female directors; decision quality.

1 Introduction

Information technology (IT) has served as an essential component of enterprise capabilities and can generate a sustainable competitive benefit [1], [2]. Based on the report written by Forrester, IT expenditure is one of the most prominent element of the overall expenditure created by a major company [3], which impacts productivity by reducing costs, improving quality, and intensifying value for clients [4]. Expenditure in IT has been commercialized and has shown a prominent contribution to the economic development of many developed countries [5]–[8] as well as in promoting economic growth and poverty reduction in developing countries. (International Monetary Fund, 2001). Hence, a considerable amount of companies invest a huge amount of money in the IT sector [4]. According to research conducted by Ravichandran and Liu in 2011, IT investment grew at an annual rate of more than 20% throughout the 1990s, where this figure will continue to increase given the current digitalization era.

Nevertheless, not entire firms could grab the benefits of the IT investments spent by their companies. A huge number of projects in IT do not meet the prior expectations, which will lead to an IT paradox. The IT Paradox is defined as a case where an IT investment that was initially expected to be profitable does not produce results in line with initial expectations [9]. There are several conditions in which a company will experience an IT paradox, namely: (i) miscalculation of inputs and outputs, (ii) poor IT management, (iii) redistribution of IT benefits, and (iv) delays in learning, adjustment and restructuring [10]. The number of failures experienced by companies in executing the IT causes an exceptional emphasis on the management in considering the risks and results calculated by IT expenditure [4]. It is argued that IT can only benefit the company if its implementation is accompanied by other resources [11] with the help of a solid and independent board [12]. Influential decision-makers rationally analyze their choices and use intuitive judgment to support risk-taking to determine business flow and leadership style [13]. Failing in executing the IT in an organization is oftentimes sparred a controversy because of the incompetence of the boards assessing the IT concerns [14], [15]. One of the critical issues in the spotlight in current corporate governance applications is the variety of boards in the IT field [16].

According to several researchers, the issue of gender diversity on the board of directors has emerged as the most observed attribute [17] apart from other general traits such as race, ethnicity, age and nationality [17]. The problem of gender disproportion on the board is an assured reality displayed that men fill more seats in the board of directors (90.2%) than women do (9.8%), as proved by the latest investigation held by the Corporate Women Directors International (CWID) in 2015 with 19 APEC1 countries. Several professional argue that the diversity of boards will enhance the company's performance through enhancing corporate governance applications, process of decision-making and gaining decent financial returns [18]. The 2012 Credit Suisse report has highlighted some of the benefits of a gender-diverse board for companies which include: (a) Better signals for company performance; (b) generate more collaborative efforts among boards; (c) better balance in leadership skills; (d) assessing the wider talent pool; (e) better reflection of consumer decision-makers; (f) improve corporate governance; and (g) risk aversion. Gender diversity makes better decisions than the decisions in a undiverse groups [18].

Nevertheless, several researchsits have discovered that women are less likely to be entangled in IT teamwork [19]. The report from Credit Suisse in 2012 showed that woman's participation at the board level was discovered higher in the Health and Finance sectors. The study indicates that the board diversity in the Materials and IT sector is low because no more than 50% of the IT and Materials sector does involve women. The statistics indicate that there are only one technology specialists are women out of six technology specialists in the UK. Also, there is only one IT leader is women out of ten IT leaders. Based on an investigation held by Silicon Valley Bank that indicates that only one startup are founded by women out of four startups, which in those startups only 37% have at least one woman on their board, and 53% have at least one woman in the executive position.

This condition is in stark contrast to the research conducted by Cabeza-Garcia, where the variety of gender or the existence of women on a boards would resulted in more preferable decisions [20]. This assumption is consistence with research conducted by Mirza that stated the presence of a female leader on a firm's boards will enhance the value of company [21]. In their roles as directors, women are considered more independent individuals than men, so companies involving women in TMT will improve the performance of a company [22]. The variety of gender would promote a more distinct ideas and creativity which will lead to better decisions [20]. Having women on a boards would also increase the level of contact networks and the resources that would be helpful for enhancing the quality of decisions that will influence the growth of a firm [20]. This declaration is also supported by the study held by Biga-Diambeidou, which expressed that firms with the variety of gender in their boards have lower corporate risks and offered more preferable performance [23].

Based on the background and problem formulation, this study aims to determine the accuracy of the quality of IT investment decisions made by the female board of directors. In addition, this study also seeks to determine the difference in the accuracy of the quality of IT investment decisions between female and male leaders.

2   Literature Review

A.   IT Investment

Previous studies have highlighted the various driving factors why companies invest in IT. IT is seen more as a support function than a strategic tool [24] that can help companies to streamline and optimize their business processes [25] to increase their business profitability to reflect better the company's performance [26]. IT investments made are intended to contribute to the performance of an organization [27], in line with Gunasekaran (2001) that IT investments are aimed at improving business operations to reduce costs and increase company profitability. Recent studies have shown that investment in IT has led companies to better performance in terms of their profitability [28]–[33], productivity [28], efficiency [28], [34], [35] and innovation [11], [36], [37].

The need for IT investment for companies is for their sustainable profit and to improve their business operations to function more efficiently, leading to sustainable growth [38]. In addition, IT investment through the acquisition of IT equipment also helps companies increase their competitive advantage [38], [39]. However, some studies argue that relying solely on IT is insufficient to meet sustainable benefits unless its implementation is complemented by other strategic business resources [11]. Since IT acquisitions require a large amount of investment [40], companies need to ensure that

all decisions made for IT, including its direction, strategy, and assets, are managed to align with their plan [41].

B.   Leadership Styles

Several literatures about strategic management indicates that strategy and organizational effectiveness portray the cognitive foundations and values of critical decision-makers in organizations [42]–[44]. In specific, the certain background, demographic, and the behavior of top level management would show the difference in how they formulate strategy and how their performance showed [44]–[47]. Since power comes from top management leadership, it is obligatory to grasp the behavior of corporate leader in formulating their strategy [48].

The leadership questionnaire developed by Bass and Avalio called the Multifactor Leadership Questionnaire (MLQ) had identified four dimensions of transformational leadership. These dimensions consist of the idealized influence, the individual consideration, the intellectual stimulation and inspirational motivation. In addition, MLQ has also identified three dimensions of transactional leadership: contingent reward, management by exception (passive), and management by exception (active).

C.   IT Investment Evaluation

There are several IT investment evaluation frameworks where each framework has a variety of different assessments. Based on research conducted by Clemons and Weber (1990) wherein the framework there are several principles in evaluating IT investments, namely: risk of loss and opportunity, ability to be broken down (divisibility), ability to be developed (expandability), internal system marketing, value time, and the value of flexibility and options [49]. Meanwhile, Irani and Love (2001) classify technology management, which explains the three main benefits of IT investment: strategic, tactical, and operational. The three categories of benefits are then broken down into 23 IT value metrics [50]. In addition, Bannister (2001) also proposes categorizing IT values for public (non-profit) organizations. These values are grouped into six categories: foundation, policy formulation, democratic, service, internal, and external. It is then broken down into 30 metrics that describe each benefit category [51].

Gunasekaran, Love, Rahimi and Miele (2001) and Chou, Chou and Tzeng (2006) propose consideration criteria for evaluating IT investments where these criteria must be met for IT investments to be successful. Gunasekaran, Love, Rahimi and Miele (2001) proposed five criteria for consideration and one criterion for benefit [26], while Chou, Chou and Tzeng (2006) proposed four criteria for review and one measure for help [52]. Then when the two are added together, there are a total of ten and nine metrics for evaluating benefits [26]. Azadeh et al. (2009) proposed an IT evaluation framework that gave input and output criteria [53]. This framework is similar to the research conducted by Gunasekaran, Love, Rahimi and Miele (2001) and Chou, Chou and Tzeng (2006). The input has the same purpose as the consideration criteria. The output is the benefit of IT investment. Furthermore, the information and outcomes are categorized into strategic, informational, and transactional benefits. A list of nine benefit metrics from IT investment is identified under the output criteria [53].

Later, Stewart and Mohamed (2002) proposed evaluating IT investments using business value and risk criteria. His research identifies four business values: return on investment, strategic fit, competitive advantage, and strategic architectural alignment. Then the four business values can be broken down into 15 business value metrics [54]. In addition, Nasher, Kalantarian, Akbari, Suzangar, Kajbaf, and Madani (2011) propose a decision making criteria with a ranking of importance. This criterion combines consideration and benefits criteria [55].

Ross and Beath (2002) proposed a concept in which there are four types of IT investments called: Process Improvement, Experiment, Renewal, and Transformation. Process improvement depends on the operational results of existing business processes. They explain that companies need a steady stream of business and technology experiments to learn about the capabilities and limitations of new technologies. They think that renewal investing trades old technology with newer, more intense, or more profitable technology. Regarding transformation, they clarified that shift intentionally changes the company's infrastructure to enable and usually requires process changes [56].

Specialist/Practitioner Rau and Bye (2003) draw an alternative view of IT assessment. They initially characterized four IT value ranges: Expenditure Control, Process Improvement, Customer Excellence, and Talent Leverage. They also isolate each into three important subcomponents: Capital and Operating Expenditures, People, and Innovation [57]. Later, Lee (2004) combined IT investment with business process design and suggested IT assessment techniques in four stages: Strategic investigation, business process improvement/redesign, IT configuration, Performance evaluation [58].

D.   Decision Quality

Decision making is a process of determining options by identifying decisions, gathering information, and assessing alternatives. A traceable and controlled decision-making process can help a company make wiser decisions. Therefore, the term Quality Decision Framework (Decision Quality/DQ) emerged. This framework increases the possibility of companies choosing the most profitable alternative for the company [59].

Decision quality is divided into six elements, namely: (1) the appropriate framework (Appropriate Frame), (2) creative alternatives (Creative Alternative), (3) relevant and reliable information (Relevant and Reliable Information), (4) clear values and tradeoffs, (5) sound reasons, and (6) commitment to action. A good decision has a high DQ value for each element. When these six elements are met, it can be said that the quality of the decision has reached DQ or is a high-quality decision. If one of the elements is not met, then a conclusion can be said that it does not have a high-quality value.

3   Research Method

This qualitative study used semi-structured key informant interviews with women and men leaders in educations settings. This methodology was chosen because it allowed us to examine their self-described behaviours and practices, their experiences as leaders, and their perceptions of leadership when faced with an IT investment.

The process of selecting participants in this study was carried out using the concept of purposive sampling. This concept is used in qualitative research where the technique used in sampling with various considerations is adjusted to the research objectives [60]. The researchers identified men and women leaders responsible for formulating IT investments at several universities across Indonesia to begin the recruitment process. The idea of purposive sampling, there are several strategies for obtaining samples, one of which is to use the Criterion Sampling technique. This technique looks for individual candidates who meet the criteria previously set by the researcher [60]. Four criteria were used to measure experienced leaders at framing an IT investment. The first was the participants' positions have to be at least in the highest ranks at the university (Has a minimum position as Vice-Chancellor). The second criterion, the participants' responsibilities should be only in finance and information technology. The third criterion is that the participant should serve as the leader in their respective university for a year. The last criterion is that the participants have to be technology literate. In addition, because the research aims to determine the difference in decision quality between female and male leaders, the selected informants will be divided into two categories based on gender. Our final sample included four potential participants, who were sent a recruitment letter or message that described the nature and purpose of the research and requested their participation in the study. All four participants responded by providing a written letter indicating consent, and all four completed the interviews. All of the participants interviewed were identified from professional networks. The majority of the research was conducted online based on the pandemic that is still happening in Indonesia.

Data collection in this study was generally carried out in two stages, namely the main interview and the second interview. The primary interview was used to explore the data needed during the research process. Meanwhile, the second interview was used to verify and validate the informants' answers during the primary interview process. The researchers conducted the first interviews with all the participants over five months (April 2021 to August 2021), one in person and the rest are online. Once they agreed to participate, leaders were sent an informed consent form which included the purpose and what the researcher would be asking about. Then, the participants would be asked to review it and return it before the interview. We used a semi-structured interview guide (see Table 1 for major topics

and questions). These questions were designed to understand each participant's perception of IT investment. Then, questions were also intended to explore better their thoughts and perceptions about the characteristics of a good leader. The purpose of these questions is to identify these participants into two types of leadership, namely transformational or transactional leadership. The rest of the interview guide included open-ended questions designed to explore more about their past experiences when framing an IT investment decision. The main purpose of these questions is to find their quality IT investment decision. Therefore, they would be used to find the correlation between the first questions about the IT investment, their leadership styles and their behaviour when faced with an IT investment decision. The second guide interview is designed to get the validity and reliability of the qualitative data. The interview was lasted for 45 – 60 minutes and was audio-recorded, and some crucial points will be recorded in a note. The time for the interview process also varied, starting from 8 a.m; to 8 p.m. Other than the interview, the researcher also used a questionnaire to know their priorities when framing an IT investment decision. The results then will be analyzed using pairwise comparison.

Tabel 1. Participant Statement for Each Domain

Domain	Statement
Innovation in IT investment	Statement about your perception of innovation in IT investment.
Risk in IT investment	Statement about your perception of risk in IT investment.
Uncertainty in IT investment	Statement about your perception of uncertainty in IT investment.
Leadership style	Statement about how you describe a good leader.
	Statement about which of those represents who you are as a leader.
Decision quality	Statement about how you frame an IT investment decision start from the beginning to end.

4   Results and Analysis

The participants are mostly from Java, and one participant is from Kalimantan where three participants come from Eastern Java, and one participant is from Central Kalimantan. All participants are vice-chancellors from different departments and backgrounds. Although they are from various departments and have experience, they still have responsibilities in IT investment decisions. One participant is a vice chancellor for general administration and finance who is responsible for carrying out activities in financial administration, personnel administration, employee welfare, publishing, business units and IT. Two participants are vice chancellor for finance in charge of various fields such as IT and human resources. The last participant is a vice-chancellor responsible for digitalization and international cooperation. This participant has a target to build digital infrastructure and culture for the community. These participants also come from different backgrounds: industrial engineering, informatics engineering, accounting, and nursing.

A.   IT Investment

Women leaders think that innovation in IT investment is important. However, it comes back to the needs of the organization and the readiness of organizational resources to face the invention. All participants realized the importance of innovation in an IT investment, but what made the difference was the right time for organizations to formulate an innovation into IT investment decisions. This is supported by the statements from women leaders which said that *"…This is also an era where technology continues to develop. Usually, the innovative ones like this will be the pioneers. But the question is, can we all be pioneers? It all comes back with the organization itself".* Another women leader also added the same opinion about innovation in IT which said *"… we have sufficient resources…"* which means that women leaders tend to see the condition of the organization whether it is possible to implement the innovation in IT.

On the other hand, the male participant thought that innovation in an IT project is necessary for the organization to gain as many values as possible. This is supported by the statements from one male leader which said *"… why should you be afraid if there is an opportunity to invest in an innovative IT investment …".* But it should be supported by big adjustment from the organization to implement the innovative IT investment that they have planned. Another statement from male

perspective is that innovative IT investment is a must and he should be start thinking a solution in a creative and innovative way and whether the technology will be trending in the future or not.

Besides, when it comes to risk in an IT project, all participants think that risk is one element in an IT project that needs to be calculated more seriously to get the results they want. This is supported by either male or female participants which said *"... if the risk is too big, I'll skip it. I will look for other investments that may be less risky but provide the same great value ..."* with a supporting statement from another participant that said *"... if we cannot minimize the risks that exist, maybe we will postpone the innovative IT investment at another time ..."*.

Lastly, all participants almost have the same perceptions regarding the uncertainty on an IT project. Similar to risk, uncertainty is also a matter of the right calculation. If the organization can calculate this uncertainty, the risk automatically becomes smaller, and therefore the probability of an IT project becoming successful is also increasing. This is supported by the statements from the participants in this research whether it is male or female leaders which said "… every IT investment, there must be some elements of uncertainty *"... which also supported by another statement which said "... we will not be able to stay away from uncertainty when it comes to IT..."*. This element of uncertainty in an IT investment needs to be maintained in order to the better implementation of an IT investment which is in line with the statement from a participant which said *"... just a matter of how we can handle this element of uncertainty ..."*.

Therefore based on the participant's perception regarding innovation, risk and uncertainty in an IT investment, there are some differences in innovation thoughts where female participants think innovation is not as important as the organization's requirement. In contrast, the male participant think otherwise. Furthermore, all participants have the same perception regarding risk and uncertainty in IT investment.

B. IT Investment Evaluation

Based on the pairwise comparison, there were some differences between the results of the female and male participants. Female participants number one, when deciding to invest in an IT project, prioritize more on resources, value, and risk. Female participant number two, prioritize risk, result, and value. The two elements that seem to be the same for these female participants are they willing to prioritize risk and value more than the other elements. Besides, cost and innovation seem to be on the lower rank. Opposite to females, both male participants prioritize innovation and value when deciding on which IT project to implement. The element on the lower rank for both of these male participants is the result resources.

Tabel 2. Priority of Each Participant Regarding IT Investment Evaluation Elements

Criteria	INF1		INF2		INF3		INF4	
	Priority (%)	Ranking	Priority (%)	Ranking	Priority (%)	Ranking	Priority (%)	Ranking
Value	22.7	2	15.2	3	28.5	2	24.8	2
Cost	11.2	4	15.1	4	6.1	5	17.4	3
Resources	35.2	1	6.2	5	3.3	6	3.0	6
Innovation	2.7	6	2.4	6	44.7	1	47.3	1
Risk	22.0	3	41.4	1	10.7	3	3.7	5
Result	6.1	5	19.8	2	6.6	4	3.8	4
Consistency Ratio (CR) [CR<10%]	9.8 (Consistent)		5.5 (Consistent)		9.6 (Consistent)		7.2 (Consistent)	

C. Leadership Styles

According to the interviews, all-female participants tend to lean more toward transformational leadership, showing which they showed behavior of idealized influence on their organization. This is supported by the statement from one particular female leader which said *"... will develop a sense of trust in us ..."*. These female leaders because not only they consider each individual's needs and always motivate them to think differently, but also motivate them inspirationally which supported by the statement from another female leader which said *"...We also accommodate advice or criticism*

from our subordinates to feel appreciated…" and another one that said *"…I always encourage my fellow lecturers to do research often in a way that I also often research the end. Let them feel inspired. That's the goal…"*.

In contrast with their male counterparts, male participants in this research lean more towards transactional leadership. Their subordinates often anticipate rewards and work which supported by their statements which said *"…rewards is important to get my co-workers out of their comfort zone…"* and therefore male leaders said that *"…I will give some kind of reward for employees who work well…"*.

Also, there seems to be less trust between the leaders and their subordinates about their works, resulting in these male participants often having to intervene in their subordinate works even when little problems arise. Contrast with their female leaders' counterparts who have different ideas regarding intervening with their work which is supported by one statement from one female participant in this research which said *"…there are times when I have to intervene directly when a problem arises, yes, but that's not always the case. I usually trust my subordinates more. I communicated my complaint to him later let him solve it. It's up to how he wants to do it. I believe in their work…"*.

According to the interviews about the participant's leadership styles, each participant has some similarities and differences. All-female participants tend to be more similar in how they lead their subordinates. In comparison, male participants have slightly different approaches in their leadership styles. The big difference is how they earn trust from their subsidiaries, whereas female participants made it by communicating and motivating each individual. In contrast, male participants earned their trust by giving rewards to the subordinate who had done a great job. Hence, in terms of their leadership style, female participants tend to be leaning more toward transformational leadership. In contrast, male participants also lean more towards transformational leadership, but they also have some elements from transactional leadership, which is the contingent rewards behaviour.

D. Decision Quality
    a. Appropriate Frames
        Based on the interviews, all participants realized that before formulating an IT investment decision, it is very important to know the purpose of the IT project. This is evidenced when all informants stated a goal to be achieved before designing a system. This goal was disputed because of the problems that arose in the informant's organizational environment. Three participants inform most of the issues that occur because the current system is still manual and requires a plan to get an integrated system that can provide complete information and facilitate the organization's operational activities. This is supported by the statement which said "…there was no integration at all, there was a lot of data misinformation. A lot of manual data was lost, it wasn't stored properly…". Another one also said in the beginning about how a problem was a source for their IT investment proposal which is supported by the statement from two participant which said *"…everything was done manually…"* and *"…data was still relatively not comprehensive and not well integrated. So it takes a lot of time…"*. Meanwhile, one participant stated a slightly different thing where the purpose of developing a system they got was because of the demand to improve the quality of customer service (in this context, the intended customers are students and the community). This is supported by the statement from this one particular participant which said *"…We formulate a library system to improve the quality of our service…"*. Although each participant has different problems regarding their reason to invest in an IT investment, they still think that goal is one of the most important things in designing a system.

        Furthermore, all participants realized the importance of different perspective in formulating an IT investment decision. All those perspectives have to have the same vision regarding how the organization will invest in an IT investment. Hence, at the beginning of planning an IT investment, all participants invited all their co-workers who will be affected by this IT investment implementation. This is done to synchronize their perceptions of the goals and possible IT solutions. This is supported by the statement from participants that said *"…we have an initial meeting first, who join the meeting will be depending on what IT solution we want to propose…"* and *"…Inviting these who affected to share perceptions…"*.

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Then, based on the interviews, all-female participants are more aware of the limitations that need to be made with the current top priority IT solution being implemented first. Meanwhile, other IT solution that are not currently a priority can be applied later. This was done because of the limited funds owned by the organization, as stated by one participant which said *"...can't do it all at the same time. Considering that our funds are also limited..."*. Meanwhile, all-male participants said boundaries had not been considered when designing a system. When they need a system, a complex and detailed system will be created and carried out as much as possible within the specified timeframe. This is supported by their statement which said *"...We make the system as detailed and complete as possible where in the long term there is no need for additional features..."*.

b. Creative Alternatives

Based on the interviews, all participants are less aware of the importance of creative alternatives. It was proven that all participants stated that the solutions they came up with were not out of the box. They often looked at other universities that had successfully implemented a similar system. In this case, all participants stated that the alternative they proposed only revolved around the choice between buying a system from a third party or building a system from scratch. This is supported by statements from all participants that said *"...We have two alternatives. We can hire people to build the system, or we can build the system ourselves..."* and *"...the choice is to buy from an ordinary IT consultant who already has a lot of trusted main portfolios. Or we can buy other options from other universities..."*.

c. Relevant and Reliable Informations

Based on the interviews, all participants realized that some information was needed to support the design of a system. However, the information required by some of the participants is slightly different. All-female participants stated that the information they needed would be more focused on the system's needs where the information would support the initial goals to be achieved. This follows what was stated by one participant when they needed a lecturer system where the system would calculate the performance of each lecturer. So, the information required to focus on is how the implementation of lecturers will be calculated. The information will be taken based on the vision and mission of the lecturers' tri dharma and simlitabmas, a research management system developed by the Indonesian Research Agency (BRIN). This is supported by statement from the female participant which said "…We have data on the decline in lecturer performance from HR. We feel that we want to motivate lecturers to continue to increase their performance. We make a measurement system for the lecturer's performance system, referring to the lecturer's operational position data, which he refers to the measurement of the lecturer's performance load...".

Similar to another female participant, which states almost the same thing where when she needs an academic system to manage student educational data. Therefore, she is looking for information about the number of existing students and the number of students who may enter in the next few years. This information is intended so that the server used can match the existing student quota so that there will be no errors when the system is accessed at the same time.

It differs from male participants where the information they need focuses on trending technology that people have used the most this generation. This is supported by the statement from the male participant that said *"...we will find out from our IT team, because they will also know more about the system we will implement and the trend. For example, they suggest using the cloud. Later our IT team will also provide information about how much it costs to use the cloud, which provides the service, how much is the monthly fee, plus and minus what cloud use..."*.

In addition, all participants are also aware of the importance of reliable information because all the information they get is based on trusted sources such as from the other universities that apply the same system.

d. Clear Values and Tradeoffs

Based on the interviews, all participants know the value and sacrifices that the organization needs to be thought of when choosing to invest in an IT solution. This is evidenced by the existence of a mitigation plan that they have thought in order for the tradeoff that they sacrificed. This is supported by the statement from the participant that said *"...if we buy the system from the third party, the level of our dependence will be high and therefore the cost will be even higher than if we build the system ourselves. If we build the system ourselves, we are free to build it according to the conditions that we want..."*. Even so, one participant added that supported prior statement about having to create the system ourselves without the third party is there need to be some adjustment in terms of the resources such as *"...The IT team has to work harder. To start of, we began to tighten the recruitment of IT teams who are good in their fields. We also have a training that be held every few months to train the IT staff..."*.

e. Sound Reasoning
Based on the interviews, all participants still did not show a coherent and reasonable attitude in designing a system where all decisions have a clear basis and are supported by sufficient information to create a system per the organization's initial goals. The majority of participants still use gut feeling in determining a system to be implemented in the organization. This is also supported by information that other universities have successfully implemented the same system. This proves that if other universities can implement the system, there is no need to worry about implementing the same system. This is also evidenced by not using decision tools that can facilitate organizations in choosing alternatives that are by the goals desired by the organization. The use of decision tools is proven temporarily only by one female participant. She uses a decision tree as a tool to determine alternative systems to be implemented.

f. Commitment to Action
Based on the interviews, all of the participants are aware of the commitment needed in the successful implementation of a new system. All participants stated that before implementing a new system, they explained that various projects had planned an implementation plan. Therefore, it was found that there were differences between each participant (See Figure 1). Female participants have INF1 and INF2 codes, while male participants have INF3 and INF4 codes in the figure.
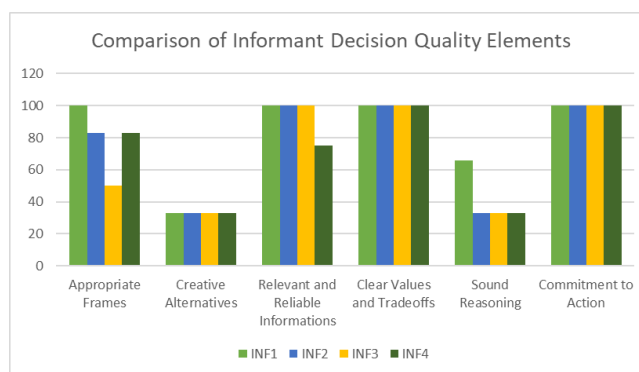

Figure 1. The comparison of decision quality of each informant

The following are the findings and essence of the research that has been done. Each of which is explained as follows:

1. IT investment affects a person's leadership style.
    Based on the results of interviews conducted with informants, it is known that all female leaders in this study have behaviours that show a transformational leadership attitude following research [61] states that women mostly own transformational behaviour. However, there is one element in their transformational leadership style that they do not have, namely the aspect of intellectual stimulation where they think it is important to encourage every staff in their organization. Still, it all goes back to the conditions and goals of their organization.

This is also in line with when this female leader is faced with an IT investment decision. A female leader in this study also does not show behaviour that does not lead to the intellectual stimulation domain. This shows the behaviour of diagnosing a problem using a new method. This is also evidenced by the results of pairwise comparisons where all the results of innovation priority rankings for all female leaders have the lowest score, namely, rank six. In addition, based on the quality of IT investment decisions expressed by female leaders, some of the alternatives they propose in formulating IT investment decisions are not some set of creative options other than others.

The same thing is also shown by male leaders based on the results of interviews. It shows that male leaders also show more behaviour that juts into transformational behaviour where they also offer one element of the transformational leadership style, namely intellectual stimulation. This element indicates a behaviour in which a person feels that it is important to encourage co-workers to think innovatively and differently in advancing the organization.

This is also in line with when the male leader is faced with an IT investment decision. The male leader in this study also does not show behavioural differences where they continue to show transformational behaviour by showing intellectual stimulation behaviour. This is also evidenced by pairwise comparisons where all the results of innovation priority rankings for all-male leaders have the highest value, namely ranking one. However, based on the quality of IT investment decisions expressed by the male leaders, the results of the interviews show contradictory things to those previously stated by the male leaders. The difference lies in that some of the alternatives they propose in formulating IT investment decisions are not some set of creative options or others. Behaviour change with the presence and absence of an IT investment decision is per research [62], which states that one of the factors that drive a change in one's leadership behaviour is technology. Therefore, based on the previous explanation regarding leader behaviour before and after the IT investment decision, it can be concluded that IT investment does influence one's leadership style. However, this fact only applies to male leaders. Before being faced with an IT investment, they mentioned that innovative thinking is one of the elements they pursue in leading an organization. But, when formulating an IT investment decision, the alternatives to the IT investment decisions they prepare are not yet a creative set of other options.

2. Gender will affect a person's leadership style

Based on the results of interviews regarding the leadership style of the participants, there are several similarities and differences in each participant. The same thing between female and male leaders in this study is that all leaders exhibit a transformational leadership style. This is per research conducted by [61], which suggests that transformational behaviour is more likely to be carried out by a woman. However, the behaviour of male leaders who show a transformational attitude slightly contradicts research conducted by [63] which states that transactional behaviour is more likely to be carried out by a man. However, based on the results of interviews that have been conducted with male leaders, they also show several elements of the transactional leadership style, namely aspects of contingent rewards and management by exception (passive). This proves the influence of gender on a person's leadership style. The most visible difference between the two genders is how they gain the trust of their subordinates, where female leaders get it by communicating and motivating each individual.

In contrast, male leaders earn their trust by rewarding subordinates who have done a good job. Therefore, female participants tend to be more inclined towards transformational leadership in terms of their leadership style. In contrast, male participants are also more inclined towards transformational leadership, but they also have some elements of transactional leadership at their disposal, namely contingent rewards behaviour. According to research, several male leaders did this due to the desire for power possessed by men [63]. This is also evidenced by the difference in the mention of the term subordinate by the male leader. In this study, during the interview process, the male leader referred to his subordinates as 'subordinates'. In contrast, female leaders often referred to 'subordinates' as 'friends'. The mention of subordinates shows that they build a

wall between superiors and subordinates, while the term friends can break down the barrier between superiors and subordinates.

3. A person's leadership style will affect the quality of decisions

   Based on the results of interviews regarding the quality of IT investment decisions for all informants, it was found that there were several differences in the quality of IT investment decisions expressed between female and male leaders. This is under research conducted by [64], which suggests that a person's leadership style affects their decision-making style. Although based on the interviews, all of the informants in this study showed a transformational attitude. All male leaders showed several elements of the transactional leadership style. IT investment decisions formulated by female leaders proved to have a better decision framework than male leaders. This is evidenced by the limitations acquired by female leaders in developing an IT investment decision.

   However, one of the reasons women leaders are considered leaders who are more concerned with the right elements of the framework is when the informants try to define the boundaries that need to be formulated when formulating an IT investment decision. Male leaders argue that boundaries do not need to be defined first when preparing an appropriate IT investment framework. On the other hand, boundaries are an important element to be formulated in the early stages of acquiring an IT investment decision. Female leaders tend to set good boundaries by the goals developed previously.

   In addition, the information obtained between female and male leaders in formulating IT investment decisions is quite different. The information obtained by female leaders is more diverse, ranging from problem data to data about the system to be implemented. As in the case of INF1, where he expressed what information he got when he was going to formulate a lecturer performance measurement system, the information obtained by INF1 varied from data on initial problems to data about the system itself. It's the same with INF1, where INF2, who is also a female leader, said that the information she got when formulating a student academic system was quite complete—starting from data that supports IT investment goals and data on the system itself.

   It is different from the information obtained by male leaders when formulating an IT investment decision where the information only covers the system itself. Male informants in this study have not explored the data supporting the initial purpose of preparing an IT investment decision.

   In addition, one of the prominent differences is the sound reasoning element in the formulation of IT investment decisions where all informants show a reasonable attitude of consideration in deciding an IT investment decision. However, female leaders are slightly superior because, during the IT investment decision-making process, female leaders use decision aids. On the other hand, male leaders use gut feelings and previous experience in making IT investment decisions.

4. Female leaders show more risk-averse attitudes

   Based on the quality of IT investment decisions made by female leaders, it was found that the decision framework, information and thinking made by female leaders was slightly better than that of male leaders. The quality of the IT investment decision framework created by female leaders shows an average of 91.5%. This is because female leaders formulate limitations before deciding on an IT investment. In addition, the quality of information obtained by female leaders also shows a fairly high number, which offers an average number of 100%. Coupled with the quality of sound reasoning carried out by female leaders also indicates a higher number than male leaders, namely at an average rate of 49.5%. This proves that female leaders carry out risk-averse behaviour.

   Along with the limitations on an IT investment decision, it will automatically minimize the implementation risk of the intended IT investment. In addition, the behaviour of female leaders who use the information needed will also reduce the risk of the IT investment decision in question. The more information obtained, the risk of any IT implementation will be calculated and minimized. In addition, the use of decision aids made by female leaders can also help someone

decide an IT investment decision. In contrast, these tools can help someone see the risks and results from related IT investment decisions. The greater the risk indicated by an IT investment decision, the greater the probability that the IT investment decision will not be made.

Therefore, it shows that female leaders have little prudence in setting limits on IT investment decisions. This is following the theory expressed [20], [21], [71], [22], [23], [65]–[70] which shows that women leaders are more careful in formulating a decision to get results per the initial plan. This is also under the pairwise comparison conducted by the female leaders in this study, where the element of risk in evaluating IT investment is one of the elements in the top three rankings. This shows that female leaders think that risk is an important element in the success of an IT investment.

The existence of this risk-averse behaviour has resulted in the expertise of female leaders in formulating an IT investment decision so that IT investment is always efficient and the organization does not feel that there is a lot of loss. In this case, female leaders are more concerned with implementing IT investment decisions that directly answer the previously formulated goals. Meanwhile, other features that are not a priority will be implemented later if the required resources are met. However, this also results in a less creative formulation of IT investment decisions. It also contradicts the nature of IT investments which usually require a leader who can look ahead to the opportunities that may come in.

5. Male leaders show more courage in deciding an IT investment decision
   Furthermore, on the element of rational reasoning, overall, all informants, both female and male leaders, have shown a fairly logical and coherent way of thinking in formulating an IT investment decision. This is evidenced by the flow of thought of all informants in preparing an IT investment decision. All informants can analyze even though they only use gut feelings and available information in choosing IT investment decisions by the organization's needs. What makes the difference between female and male leaders is the use of decision tools used by female leaders in analyzing the results of IT investment decisions. This is also comparable to research conducted by [20], [21], [71], [22], [23], [65]–[70], where the study states that there is an element of prudence in formulating an investment decision. This element of sense causes women leaders to use all kinds of information and decision aids so that the decisions taken by women leaders can become an IT investment decision that runs successfully and is following the needs of the organization, and will not cause overinvestment.

6. Female leaders have a more efficient attitude in formulating an IT investment decision
   The overall behaviour of female leaders above proves previous research which states that women have more risk-averse behaviours. This behaviour results in the expertise of female leaders in formulating an IT investment decision so that IT investment is always efficient and the organization does not feel that there is a lot of loss. However, this also results in a less creative formulation of IT investment decisions. It also contradicts the nature of IT investments which usually require a leader who can look ahead to the opportunities that may come in.

7. Male leaders show more attitudes that will lead to over-investment in IT
   The difference between the elements of the decision framework, information and thinking between female and male leaders is what causes male leaders to show a more courageous attitude in deciding an IT investment decision. This is per the theory expressed by Sheerin, Rigg, Reutzel, Cabeza-García, Mirza, Shin, Biga-Diambeidou, Bobe, Taylor, Schumell, and Delgado-Márquez, which shows that male leaders show courage in making decisions. Bold behaviour in making this decision has several advantages and disadvantages. The excess of this attitude can lead to aggressive action in deciding an innovative IT investment decision. However, it also has a drawback that it can lead to overinvestment.

8. Organizational conditions affect the level of innovation in IT investment decisions

It was found that on creative alternative elements, the value between female and male leaders did not show a difference where all women and men had not formulated several alternative creative IT investment decisions. This may be because all of the informants' universities are the same universities in the same institution. This can refer to every higher education institution having rules and regulations that recommend all universities in their institutions to use the same information technology. Also, several universities may deliberately imitate information technology adopted by other universities in one institution. This is indeed possible, considering that several larger universities sell information system development services for smaller universities where the system adopts an information system that has been implemented previously. This has proven to be very helpful for small universities where their resources are still limited compared to larger universities.

9. Organizational conditions affect a person's leadership style
   This research was conducted on several university vice-chancellors at a religious institution in Indonesia, where this institution usually still holds fast to the stance that the existence of a female leader is still considered taboo. This is evidenced by the results of research on the five best universities managed by the institution (Based on webometrics ranking - https://muhammadiyah.or.id/alhamdulillah-5-ptm-enter-100-besar-rangking-universitas-se-indonesia- version-webometrics/) throughout Indonesia. Based on finding number two, which shows that there are differences in behaviour between female and male leaders, it is also found that organizational conditions also affect the behaviour of leaders. It is stated that only three of the total 29 leaders are female. This was also evidenced by a personal chat with INF1 where she said, "*Indeed there is no written rule that women cannot be leaders here, but there are still unwritten rules like that every time a woman comes forward to become a leader. Especially if the chancellor is rarely there if the rector is a woman here."* Therefore, this can be the cause that the difference between female and male leaders lies in how they place their subordinates where male leaders allow a wall between superiors and subordinates. In contrast, female leaders try to break down the barriers between directors and associates to create a more comfortable working atmosphere. Harmonious and not rigid.
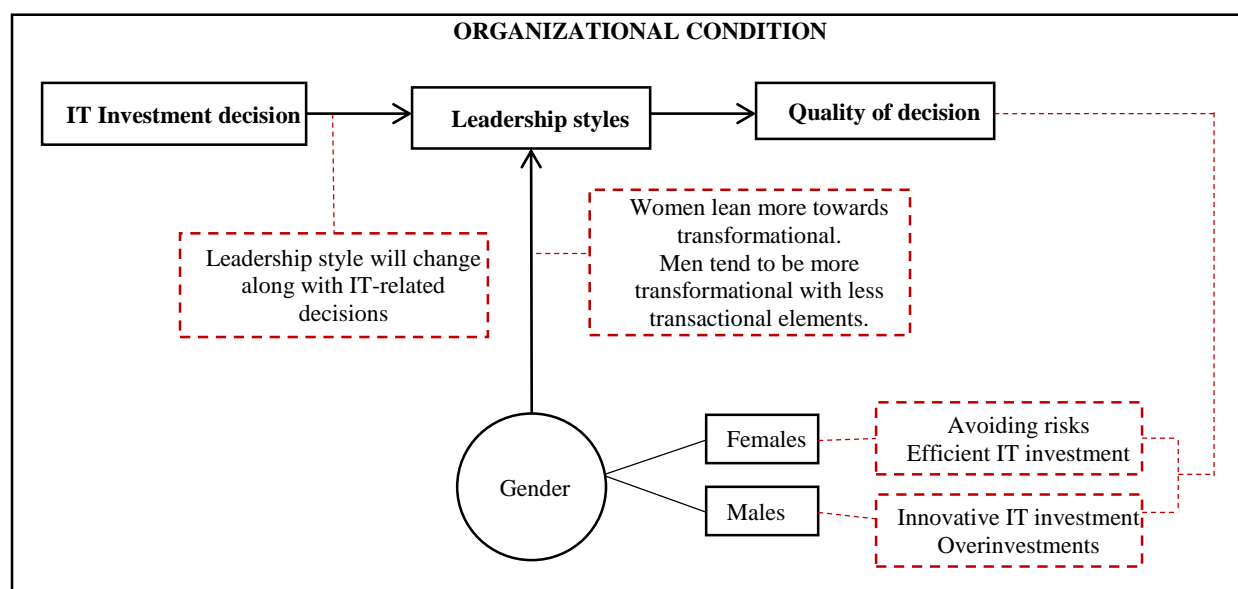

Figure 2. The relationship between IT investment decision, gender, leadership styles and the quality of decision

In qualitative research, the level of validity of research data is emphasized based on data obtained at the time of conducting research. The significant influence on data from research results can be seen based on checking the validity of research data. In this study, researchers used a review of informants as a means of feedback and validated data using triangulation techniques. The

triangulation used by the researchers in this study uses three types of triangulation where. Three types of triangulation methods used are triangulation of data sources, triangulation of techniques, and data collection time. These three types of triangulation will check the convergence, complementarity, and divergence of qualitative data.

Data triangulation based on source is carried out to check the convergence of qualitative data. All informants have diverse educational backgrounds, namely industrial engineering, computer science, accounting science and nursing science. The informants come from different backgrounds with the hope that the results of the interviews expressed by all informants have a level of similarity that is not much different from one another.

Tabel 3. The Results of Data Triangulation Based on Data Sources

Participant	Interview Excerpt
INF1	*"Yeah, that's fine, in my opinion. This is also an era where technology continues to develop. In my opinion, yes, they are – those who invest in innovative IT have a vision that maybe not everyone has. Usually, the innovative ones like this will be the pioneers. But the question is, can we all be pioneers like that, right? Come back again. Yes, we will return to the organization. Is it possible to implement it with high innovation investment? Can be seen in terms of costs or resources. The problem is that if it's not worth it, whether it's as modern or as good as technology, it definitely won't work, or it will stop in the middle of the road. So the money is wasted."*
INF2	*"For me, it's 50:50. Yes, there are pros and cons and this innovative IT investment. The pros are clear. Our competitors are increasingly seeing us. We would have added value in customers' eyes if we used this system for customer service. The cons are that we have sufficient resources. Yes, it's like it's useless. Our system is already very sophisticated, but what makes people are still Pentiums if it's analogous to a computer processor. Then we also have to look at the goal at the beginning, why did we decide to invest in this technology earlier. If you don't answer the question, what's the point? Sometimes the solution to a problem doesn't need something massive. Something small can also solve our problem. It will be more efficient than having to implement such a massive system."*
INF3	*"Some people are afraid of IT. But I think differently. I mean, why should you be afraid if there is an opportunity to invest in that direction. But what needs to be noted is that it is clear that we must be good at arithmetic so that this IT can run properly. Yes, there needs to be a big adjustment on our side, but as long as the IT runs smoothly, the value we will get will be far more than the amount of adjustment we will make."*
INF4	*"For me, yes, it has become a necessity for now. We have to start thinking innovatively in any way. Look for a solution that is different from the others where the solution does not only solve the existing problems but also has to be in the future. Will this system still be in trend?"*

Based on the interviews about perceptions of IT investment decisions, it was found that all informants are aware that an innovative IT investment decision is one of the elements needed by the organization. Even though each informant has their perception of the priority of innovation on an IT investment. This proves that all informants have the same perception of IT investment even though they have different educational backgrounds.

Triangulation of data collection techniques was carried out to check the divergence of qualitative data where the researcher re-checked the data on the same respondent but using different methods. This was done to prevent the informant's understanding of the questions posed by the researcher. If both questions get the same or almost the same response, it shows that the informants understand the researcher's questions, and their answers can be accounted for.

Data triangulation based on time is carried out to check the convergence of qualitative data. There are two sets of data from two interviews that happened at two different times with the hope that all informants' results are not far different.

Tabel 4. The Results of Data Triangulation Based on Techniques and Time

First Interview	Second Interview
What do you think about IT investments with a fairly high level of innovation?	Give your perception about innovative IT investment.
May 31, 2021, 08.45 WIB (Morning) at the informant's office	04 September 2021, 15.00 WIB (Afternoon) at the informant's house
"For me, it's 50:50. Yes, there are pros and cons and this	*"As needed, come back again. We build the system as*

innovative IT investment. The pros are clear. Our competitors are increasingly seeing us. We would have added value in customers' eyes if we used this system for customer service. The cons are that we have sufficient resources. Yes, it's like it's useless. Our system is already very sophisticated, but what makes people are still Pentiums if it's analogous to a computer processor. Then we also have to look at the goal at the beginning, why did we decide to invest in this technology earlier. If you don't answer the question, what's the point? Sometimes the solution to a problem doesn't need something massive. Something small can also solve our problem. It will be more efficient than having to implement such a massive system."

needed. For example, if we only have 100 data, do we need to use a data mining data warehouse? It's not right. It's just using Excel. So that's what I mean. It also depends on your needs and resources. So if you ask, is it important? It's important, but back to the requirements, what is it like."

Based on the technical and time triangulation results above, it can be seen that even with the use of different question sentences, the informant (INF1) still answers questions with the same essence where, according to him, innovation in IT investment is one of the important elements. Important compared to the element of innovation itself where the organization must already have a mature readiness to innovate in IT investment. Still, its implementation in the organization is much more difficult.

5   Conclusion

It is found that there are two domains, namely the characteristics of IT investment and the priority elements of IT investment evaluation, both of which will influence one's leadership style. In addition, a person's leadership style can also be influenced by a person's gender. This can later affect the quality of a person's decision, which will make a difference in the behaviour of a leader in formulating an IT investment decision based on gender.

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