Risk Management Analysis for ICT Strategic Plan by Using PESTLE: A Case Study

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Article History: Received: 10 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 20 April 2021

Abstract: There are many advantages of having an ICT Strategic Plan (ISP) in place such as allowing organizations to prepare and strategize for their future accordingly and to take necessary precautions steps if any unfavorable scenarios happened. Unfortunately, currently, many organizations fail to plan and execute their ICT projects as their proposed plan. It has been identified that monitoring and evaluation in a project play important role in ensuring the success of a project. Hence, risk management and analysis can be used to measure such aspects. There are many ways how risk management and analysis could be done. Therefore, this paper presents a case study on risk management analysis for ISP by using the PESTLE model. PESTLE stands for political, economic, sociology, technology, legal, and environment. All of the findings related with the existing, emerging issues, challenges, impact, threat, and risk to the ISP plan are centralized in a dashboard. Furthermore, risk measurement and risk matrix are produced for this case study. In future, this paper could be used as guidance for other researchers with the same interest.

Keywords: Risk Management; ICT strategic plan, PESTLE analysis; Dashboard

1. Introduction

ICT strategic plan (ISP) offers advantages to an organization, when it is properly developed and executed [1,2]. ISP considers local and international policies, standards and guidelines, implements emerging technologies and aligns with organization's objectives. Besides, it allows ICT systems to be integrated from different departments across the organization and establishes a positive partnership between the stakeholders and ICT departments, which ensures adherence to the ICT strategy [3,4]. Every organization has a plan for its sustainability and development. Each plan brings a huge impact on the organization so it needs to be planned well. ISP is proposed so that the management can be done smoothly and to ensure there is always ways of solving problems and procedures to be done regardless of any situations [5-7]. To make ISP successful, risk management analysis could help an organization to analyse the threat, risk, impact, and propose solutions to mitigate any of the threats and risks in ISP. This can help the organization sustain itself better [8]. PESTLE is an example of a method to identify risk in an organization. The PESTLE analysis is a method for evaluating the main factors affecting an institution from the outside (political, economic, sociological, technical, legal, and environmental). It provides individuals with an insight into the global forces surrounding their organization. PESTLE has been widely used by many organizations nowadays. Hence, this paper presents a case study on risk management for ISP by using PESTLE. This paper is presented based on the following sections. Section 2 discusses the related works, Section 3 discusses the methods and followed by Section 4 for the finding. Section 5 concludes this paper together with future work.

2. Related works

Risk management is an ongoing management mechanism aimed at detecting, assessing, and evaluating possible hazards in a system or an operation. This is also often used in helping to remove or minimize potential harm to individuals, the environment, or other properties utilizing control steps. Risk management is a systematic and comprehensive approach for determining the best course of action in the event of uncertainty and also to tackle risk [9,10]. Risk analysis requires the systematic use of the knowledge available to identify the threats for persons, properties, and the environment, and to estimate them. Because it is primarily concerned with potential accidents, the risk analysis is always assertive. Quantitative risk assessments (QRA) can improve policymakers' ability to differentiate between significant and insignificant risks and to some degree increase their capacity to prioritize, determine pollutant tradeoff, and allocate public resources accordingly [11,12].

Researchers extended awareness of strategic planning fifty years ago. An American: Francis J. Aguilar was one of these researchers. He joined Harvard Business School in 1964 as a professor. He wrote a critical novel

three years later with the title of "Scanning the Business Environment". The book of Aguilar opened communication and analytical lines [13]. The founder of PEST analysis was accredited to him but started as ETPS, which encompasses four major environmental factors: Economic, Technical, Political, and Social influences. Later it evolved day by day to better suit the situation. PESTLE brings the meaning of Political, Economic, Social, Technological, Legal, and Environmental issues.

Organizational leaders may use a variety of models to help them make decisions in various situations. PESTLE is one of the popular models that is used throughout the world for analyzing the external condition affecting business operations. Although it is mainly used for business, it can also be used for other purposes. Although managers cannot influence external factors, a PESTLE review will enable them to establish strategies and focus on their internal resources and tactics [14,15]. By implementing this model in assessing the external environment aspect, estimation of the best way to encounter risks can be made.

3. Method

The analysis of risk management (RM) is a review of existing risk management strategies in terms of their effectiveness as a decision-making method for water quality management concerning the assessment of point source contamination risk. RM analysis is an important management tool and can contribute to decision-making. It is handy as it contributes to setting goals on a comparative basis and is particularly useful in assigning capital and resources expenses. Implementing the PESTLE model can help in estimating the internal risk and allocation of resources. The RM analysis is based on ISO 31000: PESTLE (External Risk). Figure 1 shows the overflow of the risk management process. The data consist of tools and methods used for assessing the ISP in an organization. One organization has been selected for this case study. We went through their ISP and ran RM analysis (refer Figure 1). While, Figure 2 shows the process of using the PESTLE for this case study.

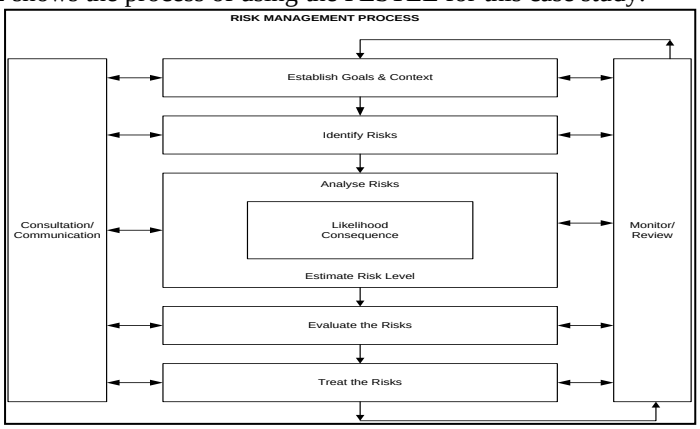

Figure 1. Risk management process

Figure 2. Flow of PESTLE analysis

4. Findings

PESTLE is the abbreviation for six field element of analysis which is politic, economic, social, technology, legal, and environment. Each of these fields plays a role in determining the root of a problem within the same situation. Determining the actual risk is the vital action that needs to be made to produce an excellent risk assessment. The findings as follows:

- Political: Implementation of outsourcing a third party for development makes it hard to monitor and evaluate the project. It exposed the project to the risk of not fulfilling the user requirements.
- Economic: A huge amount of funds needs to be invested if the project demanded the use of cloud-based storage or hybrid. If the software wants to be implemented for a long interval of time, various mitigation ways need to be developed to counter mishap during contingencies.
- Social: Manpower is a source that can be seen as the main factor to ensure a system can operate well. Although there are many developers, there is still lack of experts. This problem can lead to a situation where a developer is needed to handle multiple jobs by himself.
- Technological: Either using physical storage or cloud-based storage, the database is the most important thing that needs to be concerned. Information in these databases needs to be handled well. Uncertainty problems might occur in the process of migrating data between databases leading to loss of data and errors.
- Legal: Certain standards, policies and guidelines need to be followed to ensure the continuity of the project and achieving the desired outcome.
- Environment: Due to the usage of buildings for data storage, there will be wastage produced from the process. Isolated and special building needs to be allocated to ensure the safety and confidentiality of the information stored. This will consume space and contaminate the surroundings if not being taken care of.

While Table 1 is referring to the summarization for the risk management and the impacts for the ISP evaluated. Based on Table 1, Table 2 is developed.

Table 1. Risk Management and Impacts

Issue	Risk	Impact
Storage • Physical type of storage consume space and needs more human power to handle. • Cloud type of storage license is too costly to sustain in a long run. • Hybrid type of storage makes handling tougher.	• Accidents happened due to natural phenomena or electrical failure. • High cost for maintenances. • Many manpower is needed to handle hybrid storage.	• Total loss of data • Unable to sustain for future use.
Database • Type of database used	• Uncertainty problem when migrating data from another database.	• Loss of data and errors.
Human capital	• There are not many developers to handle the system.	• A single developer handles twice the workload. • Work becomes redundant and mistakes happen.
Costing	• Sustaining the system for a long time need a huge amount of fund to be invested.	• Cannot update or patch the system regularly. • Unable to sustain the system in the future.
Outsource the third party for development	• Security concern • Full coding handover • Monitoring & evaluation	• Software not fulfilling user requirement • Software will not be used by the organization.

Although the impact needed evaluation on assets of the organization, this general risk measurement method still can be used as a proper way to indicate the threshold or priority needs to be given on certain aspects. For example, a risk with a probability of 0.1 / 10% chance to happen with an impact of 3 only brings a low risk to the organization. This can help the organization to classify which type of risk needs to be focused on first before the insignificant ones.

Table 2. Risk measurement matrix

		Impact on a Project Objective				
		1	2	3	4	5
Probability	0.9	0.9	1.8	2.7	3.6	4.5
	0.7	0.7	1.4	2.1	2.8	3.5
	0.5	0.5	1	1.5	2	2.5
	0.3	0.3	0.6	0.9	1.2	1.5
	0.1	0.1	0.2	0.3	0.4	0.5

Risk Measure = Probability x Impact

Stakeholder Threshold/Priority:

Low
Medium
Significant
High

A risk matrix (refer Table 3) is used to describe the level of risk during the risk evaluation by considering the category of likelihood or probability concerning the category of consequential severity. This is a clear method for increasing risk visibility and helping management to make decisions. The risk matrix contains two important things which index parameter and probability or likelihood of the risk to happen. The index parameter is categorized based on the severity of the risk. The severity ranges from lowest to highest. The higher the severity, the more it is inclined to the right side of the table. The risk on the rightmost side is the disastrous impact that might from the risk faced. This is later compared to the probability of the risk to happen at the right bottom of the table. The intersection of both parameters will indicate the level of risk faced by the organization.

Table 3. Risk matrix

			Index parameter				
		Storage (SDEC)	Minimal or <5% risk of data loss due to accidents	10% risk of data loss due to accidents	15% risk of data loss due to accidents	20% risk of data loss due to accidents	25% risk of data loss due to accidents
		Database	Minimal risk of unsynchronized data	Need further surveillance for risk of data unsynchronized	Demand further surveillance and observation on data management	Data unsynchronized and lead to various problems	Data loss and data recovery problems
		Human capital	Low minimum requirement for manpower	Need additional manpower	High requirement for manpower	Double workload on single developer	Work redundancy and excessive work load
		Costing	5% risk of impact on monthly cash flow	10% risk of impact on monthly cash flow	15% risk of impact on monthly cash flow	20% risk of impact on monthly cash flow	25% risk of impact on monthly cash flow
		Outsource third party for development	Low requirement for monitoring process	Need appropriate measure for development	High monitoring and evaluation process needed	Software does not meet user requirement	Software will not be used by organization
			Not important	Less important	Intermediate	Important	Very important
	12 months later		1	2	3	4	5
Probability parameter	0.9	High probability to happen	Very high	Medium	Significant	High	High	High
	0.7	Expected to happen	High	Medium	Significant	Significant	High	High
	0.5	Can happen	Intermediate	Low	Medium	Significant	Significant	High
	0.3	Might happen	Low	Low	Medium	Medium	Medium	Significant
	0.1	Might not happen	Impossible	Low	Low	Low	Low	Low

Quadrant that can be formed from the risk matrix. The risk is categorized into the six elements of PESTLE. Table 4 shows the quadrant that has been made in the relation between the PESTLE and the risk matrix that is done. The probability and impact of the risk are done by assumption due to restriction on calculating the impact on assets.

Table 4. Relationship between PESTLE and risk matrix

Risk No.	Risk Description & Effect	Risk Type	Probability (P)	Impact (I)	Risk Measure

					(P x I)
1	Outsourcing third party for monitoring and evaluation	Political	0.6	5	3
2	A huge amount of funds needs to be invested that can affect monthly cash flow	Economic	0.4	3	1.2
3	Single developer handles multiple works at a single time	Social	0.2	4	0.8
4	Uncertainty problem when migrating data from another database	Technology	0.1	2	0.2
5	Guideline needs to be followed to achieve harmony	Legal	0.3	5	1.5
6	Consuming space and contaminating the surrounding	Environment	0.9	1	0.9

5. Conclusions

Based on the case study conducted, PESTLE model helps organization to evaluate existing ISP. It very beneficial in monitoring the ISP either it is successful or otherwise. A well-planned ICT Strategic Plan (ISP) allowing organizations to prepare and strategize for their future accordingly and to take necessary precautions steps if any unfavorable scenarios happened.

Acknowledgment

The authors would like to express their gratitude to Widyatama University, Indonesia and Universiti Sains Islam Malaysia (USIM) for the funding, support, and facilities provided.

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