

Management of Risk in New Product Development (NPD): Comparison between Japan and Malaysia Small Medium Enterprises (SMEs)

新製品開発(NPD)におけるリスク管理：日本とマレーシアの中小企業（SME）における比較

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Abstract The ability of SMEs to innovate and successfully develop new products is crucial for both survival and the continuity development of country's economy. Developing new product thus needs to initially identify risk, manage and then possibly mitigate or reduce it. Comparatively each country has differences in business environment. This study henceforth investigated on Japan and Malaysia SMEs on management of risk in NPD. It is expected to see differences in risk management of developed and developing country. Findings discovered that both countries manage risk in NPD practically similar. However, there are two main variables that are highlighted on adoption of Standard, and information technology (IT).

1. Introduction

The importance of small medium enterprises (SMEs) is widely recognized to be part of national economic development whether in developed or developing countries and they form the very basis of every country's economy. Their role as an engine in creating job opportunities and contribution to economic growth put them in one of main national economic policy. One of primary success of SMEs to sustain in competitive market and contribute to economic growth is through developing new product, in other word is developing and commercializing innovations. Both SMEs in developed or developing countries are vital for being part of economic growth. Factors that determine SMEs drive to innovate are important in developed economies as well to developing economies (Radas et.al, 2009).

This comparative study selected Japan, as developed country and Malaysia as developing country to analyze NPD. Starting point of this paper will briefly describe

differences of SMEs responding on managing risk in categorization of SMEs in each country on the following point.

1-1 SMEs in Japan

In Japan the term SME is clearly define in SME Basic Act formed in 1963 and amended on 3rd December 1999. The definition of SMEs is outline further detail in the following table.

Table 1: Categorization of SME in Japan

Industry type	SMEs		Micro Enterprises
	Stated capital	Number of Regular Employees	Number of Regular Employees
Manufacturing	Up to ¥300m	300 or fewer	20 or fewer
Wholesale	Up to ¥100m	100 or fewer	5 or fewer
Service industry	Up to ¥50m	100 or fewer	5 or fewer
Retail	Up to ¥50m	50 or fewer	5 or fewer

Source: METI, Japan

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Japan SMEs are the backbone of Japanese economy.

Back in 1996 the number of SMEs in the non-primary sector in Japan stood at 6.6 million and SMEs had 44 million employees. To put these numbers in perspective, SMEs accounted for 98.8 percent of total number of firms and they employed 77.6 percent of total employees. The 2012 Economic Census for Business Activity by METI, SMEs made up to 99.7% of all enterprises in Japan and forms the very basis of Japanese economy. Approximately 87% or 3.34 million are micro businesses out of 3.864 million SMEs in Japan (METI, 2012). Despite stagnant and volatile economic conditions, SMEs in Japan still survive and stay resilient for the past two decades. One of their success factors is due to its numerical dominance, which in total accounted for 4.2 million. By international standard Japan has a relatively large number of SMEs per capita, compared to other developed countries. They play a part in revitalizing local economies and boosting employment opportunities. They created employment demand thus maintaining low employments rates that provide stability forces for Japan economy (Shimizu, 2013). SMEs alone provide employment to 11.92 million workers, which account about 26% job employment to workforce. A document publishes by Japan Small Business Research Institute (JBSRI) under Ministry of Economy, Trade and Industry (METI) of Japan called ‘white paper’ reports comprehensively on SMEs annually. It is reported that SMEs contributed approximately ¥519 trillion of sales in 2015 made up almost half of contribution by large businesses.

Even the contributions from SMEs look promising to economic development, however it does come with challenges. Japan is currently having aging and shrinking population thus making local market shrink as well. Another challenge highlighted in 2014 White Paper is on aging of micro business proprietors. Nevertheless, the government has taken proactive actions to overcome this issue (JSBRI, 2014).

1.2 SMEs in Malaysia

Since 2005, a common definition for SMEs endorsed by the National SME Development Council (NSDC) has been adopted across Ministries and agencies, financial

institutions and regulators involved in SME development programs. The definition is divided into two main categories. The first is manufacturing (including agro-based) and manufacturing-related services with sales turnover of less than RM25 million or full-time employees of less than 150. The second category is manufacturing (including agro-based) and manufacturing-related services: sales turnover of less than RM25 million or full-time employees of less than 150. Given that there have been many developments in the economy since 2005 such as price inflation, structural changes and change in business trends, a review of the definition was undertaken in 2013 and a new SME definition was endorsed at the 14th NSDC Meeting in July 2013. The newly revised definition of Malaysia SMEs is outline in the following table.

Table 2: Categorization of SMEs in Malaysia

Sector	Enterprise Size		
	Micro	Small	Medium
Manufacturing (including manufacturing related services and Agro based industries)	Sales turnover <RM300,000 OR Full time employees less than 5	RM300,000 < Sales turnover <RM15m OR full time employees between 5 and 75	RM15m < Sales turnover <RM50m OR full time employees between 7 and 200
Services, Primary agriculture and ICT	Sales turnover less than RM300,000 OR Full time employees less than 5	Sales turnover between RM200,000 and less than RM15m OR full time employees between 5 and 30	Sales turnover between RM3m and less than RM20m OR full time employees between 30 and 75

Source: *SME Corp Malaysia*

In 2011 an Economic Census Report by Department of Statistics Malaysia reported that SMEs accounted for about 645,136 companies or 97.3% out of 662,939 overall total establishments Department of Statistics Malaysia, 2011). Concentration of SMEs establishments

comes from service sector accounted for 90% and most are microenterprises which forming about 77% of total SMEs. In 2014, indicates contribution of SMEs to overall GDP (gross domestic product) has increased to 35.9% an increase by 33.5% from previous year. Albeit challenging year ahead due to global economic turbulence, Malaysia SMEs are expected to continue to expand their GDP contribution by 5% to 5.5%. When the definition of SME changed in 2014 it has put about 8,000 large firms into medium enterprises category. A strong performance of economic sectors came from service and construction sector contributed the most to SMEs share in GDP. An annual report published by SME Corp Malaysia in 2014 highlight challenges and obstacles in SMEs sector. SMEs still lack of access to finance especially from financial institutions until now. Even though credit conditions have relaxed they still have difficulty to access funding through banking institutions. SMEs are encouraged to explore other alternative sources of finance without depending on government to ensure a sustainable growth. Even though credit conditions had become more relaxed, bank lending to SMEs are still difficult to access. Another issue has been a concern it is found that most SMEs don't have business continuity planning. Lack of awareness for intellectual property (IP) adoption is also another concern. SMEs perceive the process of getting IP can be cumbersome and take a long time to get approves, thus making them not to acquire IP. Large businesses take the opportunity to snatch ideas from SMEs, which can be devastated to them as a lot of resources being put to innovate and develop new product or services (SME Annual Report, 2015).

2. Theoretical Background and Literature Review

NPD is a process in which ideas or technologies are materialized, managed, and finally moved to market. Technology, organization, and marketing are the three most indispensable NPD process components (Mu et.al, 2009). When developing a new product, risk management should be integrated into development

process. Risk may occur in any stage of NPD. The objectives of risks management are to minimize the negative impacts and maximize the positive impacts for new product development while corresponding to the organization's management system (Park, 2010). The goal of the risk management is to establish the feasibility of the project within the organizational management structure, technology level, human resource capability, financial situation, and within the production and marketing level that limit its own business. By identifying main sources of risk, NPD can be more manageable (Mu et.al, 2009). Thus adapting three sources of risk namely, operational, technology and marketing will elaborate more on the following points.

2.1 Operational Risk

Operational risk involves firms dealing within internal operation and management or organization. The source of operational risk comes from diverse sources. One of main sources of operational risk is human resource availability. In NPD limitation of employees with adequate skills and knowledge also can become a hindrance for firms in beginning of NPD projects. It then will increase uncertainties and risk before companies decide to compete for the scarce resources such in obtaining skill and knowledge worker in relating area. One way of reducing this kind of risk is by integrating a firm's capabilities into the environment, their business strategy and organizational process. Another way is by utilizing existing networks. Firms can learn best practices and share knowledge and capabilities since external networks have been regarded as important factors in enhancing innovation (Kim and Vonortas, 2014).

2.2 Technological Risk

Perceived technological risk means a firm's inability to completely understand or predict some aspects of technological environment related to NPD projects. The source of technology risk can come either form inside or outside of organization. The higher the complexity and sophistication of technological environment the higher the technology risk is. Firms might not foresee the rise

of new technology or predict when technology becomes obsolete.

Another identified technological risk is capability. When companies are about to engage in the process of NPD, often firms might lack the technical capabilities. Therefore, in order to mitigate technical risk, firms might consider finding outside experts. However, that is not the case for small firms due to their constraints and lack of resources. Instead small firms improve their new product success rate by avoiding hiring from outside the organization for the purpose of procuring new technologies. Hiring outside experts is only encouraged when the technological uncertainties are very high and the company has very good reason to proceed with the NPD project (Yap and Souder, 1994). A study also found that the higher young companies perceived technology risk, they will likely to extensively engage in networks especially for knowledge-intensive sectors (Kim and Vonortas, 2014). The study also agree that firms will introduce new products or services to the market and by not hiring outside experts but rather set up formal R&D and engineering and technical studies departments to deal with technology risk. Companies with strong technical competence in the NPD team can ensure the success rate of a new product both in small and large companies (Kim and Vonortas, 2014).

It is empirically proven that technology oriented adoption can reduce uncertainties and risk in NPD process. Together with customer and technology orientation strategy, it will create dynamism that can lead to achieving far more superior performance in uncertain market (Gatignon and Xuereb, 1997). It is also recommended to small-technology based firms to adopt only one key growth-sustaining technology and avoid high levels of diversification in developing new product. This strategy may put SMEs in better position by mitigating risk and develop learning curve in core technology, thus better understanding of technology in product or service introduce to customer (Meyer and Roberts, 1986).

2.3 Marketing Risk

Market risk refers to uncertainty about customer

perception of product functionality, changing needs of customer, predicting market developments, competition with rival companies, and price elasticities (Ogawa and Piller, 2006). Much of the existing research evidence suggests that failure of NPD may largely be due to improper marketing. Market risk is high when consumers have had little consumption experience with a product, thus making product requirements difficult to define. Unlike technology risk, market risk is external to firms, and it is the least controllable risk factor in NPD (Park, 2010; Kim and Vonortas, 2014).

The causes of marketing risk can be numerous. First is customer perceived risk in which customers feel uncertain or fearful and doubt whether a new product can meet their needs and expectations. The second is changing needs of customers. Customer's needs may change according to the latest trend and their lack of understanding of a new product in the market. The third is predicting; it is becoming difficult for firms to forecast and predict potential sales volume of new products (Ogawa and Piller, 2006). The prediction of future revenue and possible profit depends not only on forecasting the total quantity that can be sold, but also on forecasting future costs of production, prices and price elasticity. Market competition volatility makes NPD success more unpredictable. Potential moves made by competitors might pose a threat and risk to small firms.

Marketing risk still can be managed although it seems difficult and complex. A better and more precise understanding of customer's needs and behavior has been proven to lead to success in NPD. Studies have found that timely and reliable knowledge about customer preferences and requirements is among the most important types of information for product development (Cooper and Kleinschmidt, 1995). A strong correlation between market certainty and new product success was found for the small firms, suggesting that external factors had a substantial impact on the outcomes of projects. The study also affirmed the need of small firms to pay close attention to their customer's needs (Nicholas et. al, 2011).

3. Research Methodology

To carry out this study, researchers adopted questionnaire data collection method that found to be most suitable to reach the study's objectives. A set of structured questionnaire is constructed through three identified variables. Three identified dependent variables mentioned before operational, technology, marketing risk with each items are developed to represent each variable. In total about 16 items are placed in the questionnaire. Respondents were required to rate each items based on multiple choices given. Once the questionnaire completely developed we conducted pilot test to check the reliability of the questionnaire. The questionnaire was given to two academicians for reviewing who are expert in questionnaire development. In the end minor changes were made by eliminating unnecessary items and reworded while retaining its original meaning.

3-1 Sampling and Data Collection

Samples are selected in industrialize zone in each country. In Malaysia, SMEs from central area Selangor is selected. According to 2011 Economic Census, most SMEs establishments are located in Selangor that represents about 19% of all SMEs establishments and has about 125,904 (Department of Statistics Malaysia, 2011). Meanwhile in Japan, the city of Nagoya is selected to distribute survey, as it is the third largest incorporated city in Japan that house many renowned manufacturers. The one of the main criteria chosen are, each SME's company at least has to have experience in developing new product thus have the ability and capacity to answer the survey given. Questionnaires are distributed in two types of method. One is using conventional method by mailing out survey form and respondents expected to return to us. The second method is using online survey form which is much more convenient. Targeted respondent are being called upon and requested to participate in our study. If the respondent agrees to participate we will then email the respondent link of our online survey form.

4. Analysis and Results

Within four months' period of data collection yielding about 90 return questionnaires. About 45 surveys from Malaysia and 45 surveys from Japan managed to be collected and analyzed. In total, the return rate is more than that consider acceptable to be analyzed. The data are analyzed using descriptive analysis. Descriptive analysis refers to the transformation to describe a set of factors that will make them easy to understand and interpret. This study is expected to shed some light on how SMEs in both countries manage risk in NPD process. Data were collected on demographic variables are processed and reported in percentage through the descriptive analysis. Another test is also conducted to figure whether there is a difference in NPD performance between Japan and Malaysia SMEs. The test is McNemar's test that assesses the significance of the difference between two correlated proportions. It is used to determine if there are differences on a dichotomous dependent variable between two related groups, in this case NPD performance of Japan and Malaysia SMEs.

4-1 Operational Risk

4-1-1 Product Development Team

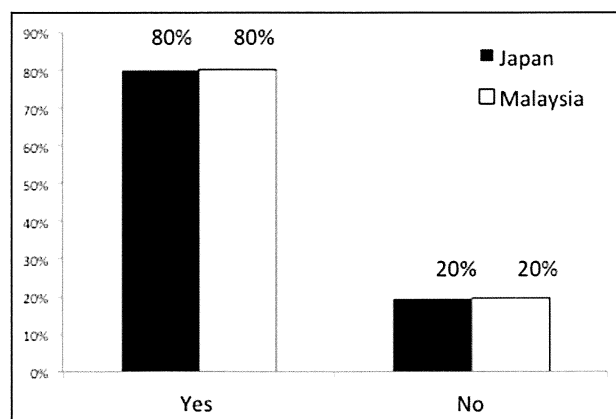


Figure 1: Product Development Team

As shown in Figure 1, both countries have the same respond in having product development team made up about 80% of all respondents. Only 20% in both are not

having product development team. However, part of 80% of having product development team in both, Japan has 25% informal team whereas Malaysia only 15%. This shows that Japan slightly prefer to have informal team as long as they reach their company's objective. Perhaps the likelihood behind formation of informal team is the need to accelerate new product process. Informal team allows decision making and flow of information can be made much faster between different functional group. It is also consistent with findings in a study found significant correlation of organizational structure with project success (Yap and Souder, 1994). Specifically, high volume information flows through diverse interdepartmental integration found to eliminate conflict, engender cooperation, and foster new product commercial success. Moreover, informal team creates flexibility by enabling the team to move forward without being tied to structure and existing bureaucratic system compared to formal team. Nonetheless whether it is formal or informal team formed in the company helps to accelerate new product process but rather early commitment and involvement of various functional groups in new product development may assists to reduce risk in later stage (Owens, 2007). Furthermore, strong technical competence in NPD team also proved contributes to success rate both in small and large firms (Cooper and Kleinschmidt, 1995).

4.1.2 Experts Advice on NPD

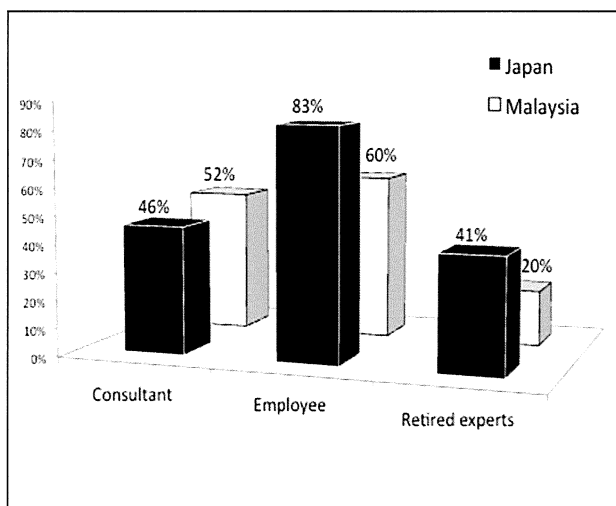


Figure 2: Taking advice on NPD

Part of reducing risk and uncertainties in NPD process is by seeking advices from several sources. From the survey, most SMEs in Japan chose employee suggestion to improve their NPD process. But they also seek expertise by using consultant and advice from retired experts shown in Figure 2. In Malaysia, suggestion from employee also regarded as most valuable and does not require a lot of cost compare hiring outside consultant. Unlike their counterpart Japan, Malaysia SMEs are less unlikely to seek advice from retired experts.

Relating to percentage in hiring consultant, more than half companies opted for this for both countries. It is rather confounding that SMEs in both countries hired consultant considering the nature of SMEs lacking in resources. Unless acquiring needed technology in NPD is high technical uncertainty, and the benefits outweigh organizational disruption then hiring outside experts is recommended (Yap and Souder, 1994).

Both countries chose suggestion from employees the most in improving product development process. Most well-known continuous system originated from Japan called Kaizen involving employees to contribute suggestions for ongoing improvement in product development process as well. Starting from small ideas and improvements that can be implemented immediately. This process in a way will reduce risk during the NPD process.

Shifting analysis on getting retiree experts in NPD process, Japan are more likely to choose this source compare to Malaysia. As Japanese employees are highly experienced, skilled and knowledgeable, thus making employer reluctant to let them leave even after retiring from the company. As most experienced workers have tacit knowledge, the risk of losing them may cause non-monetary loss to the company (Gilmore et. al, 2004). Malaysia SMEs on the other hand still facing lack of skilled and talented workers, which affects the quality of production as well as efficiency and productivity, which reflects in the graph on hiring retired experts (Saleh and Ndubisi, 2006).

4.2 Technology Risk

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4-2-1 IT Adoption

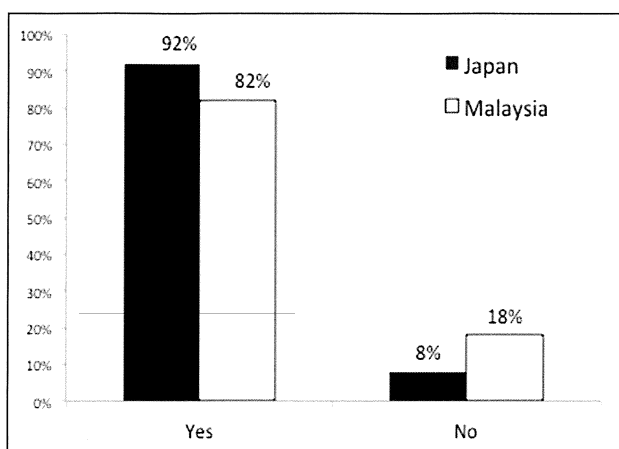


Figure 3: Use of IT

Both respondents from Japan and Malaysia agreed that using information technology (IT) in their NPD process reduces risk with both represent 92% and 82% respectively shows in Figure 3. In Japan, high level of IT adoption is an evidence of government success in implementation of policy to promote the diffusion of IT among Japanese businesses. In year 2000, the Japan government implemented strategy to reverse stagnant economy. In December 2000, the Basic Law on the Formation of an “Advanced Information and Telecommunications Network Society” was enacted and in January 2001, an “IT Strategy Headquarters” was established in the public sector and then an “e-Japan Strategy” was announced. A large-scale study involving 6,432 SMEs from various sector conducted in Japan to analyze the relationship between IT and innovative activities in Japan, as well as the relationship between IT and profitability, and the impact of firm size on both productivity and firm performance (Morikawa, 2004). The study found that the use of computers by Japanese SMEs has a positive relationship with innovative activity with evidence found that firms whose use IT to be more likely to engage in R&D activity. The study thus supported high adoption of IT among Japan SMEs and implying the achievement of government approach on encouraging IT diffusion.

However not all SMEs agree upon using technology to minimize risk particularly in NPD process. Relatively

only small percentage of respondents did not agree. Comparatively 18% of Malaysia SMEs seems did not agree on the adoption of IT, which higher that Japan up to 10%. This finding coherent with a study on the major reason of lower rate IT adoption among SMEs in Malaysia. It was due to sense of lacking in security despite the cyber laws available to protect the business environment (Sin Tan et. al, 2009). The SMEs either have no confidence or have no idea of their existence in view of their indifference in the uncertainties of ICT law. Most SMEs perceived the barriers of implementing IT into their business operations as rather expensive, risky, complex procedure and lack of technical expertise. This lead to their ignorance on the usefulness of technology identified as a factor leading to lower rate of technology adoption. Most Malaysia SMEs perceived the barriers of implementing IT into their business operations as expensive, risky, complex procedure and lack of technical expertise (Alam and Mohd Kamal, 2009). Another research also highlighted one of the fundamental problems among SMEs in Malaysia were low adoption of modern technology (Ong et. al, 2010).

4-2-1 ISO Standard/Guidelines Adoption

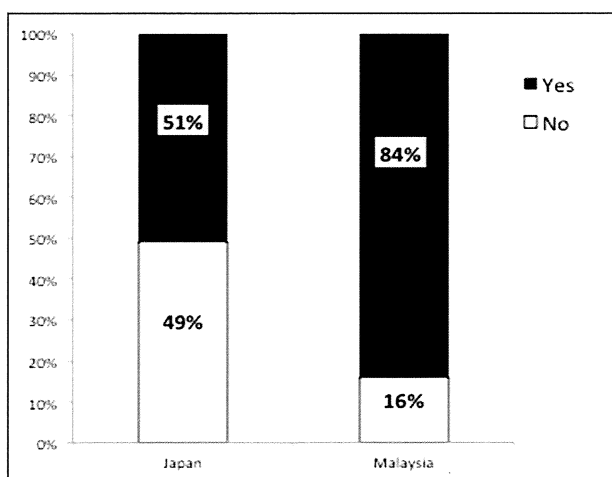


Figure 4: ISO/Guideline adoption

From Figure 4, there is a vast difference in adoption of whether ISO or Standard guidelines. In Japan approximately more than half of the respondents adopted ISO, and another half didn't, which represent 51% and 49% separately. One of the underlying factors of low

adoption in Standard is because perhaps Japan SMEs practice their own existing standards without even getting certification. Supporting this outcome probably because of the existing nature of business environment in Japan. SMEs act as subcontractor for large enterprises especially in manufacturing industry. And most small Japanese firms favorable towards working as subcontractor to large firms (Kimura, 2002). SMEs therefore will follow guidelines and standards established by large firms in order to maintain quality.

Malaysia SMEs on the other hand mostly adopted ISO that represents 84%, and only 16% didn't adopt ISO guidelines. Malaysia SMEs believe that by adopting ISO guideline it will contribute more advantage and credential to their customers especially when they gained certification. In 2003 a conducted research on Malaysia SMEs discovered that there are significant differences in performances between certified and non-certified firms, supporting the hypothesis that ISO 9000 certification contributes to a higher organizational performance (Sadiq and Hoong, 2003).

4-3 Marketing Risk

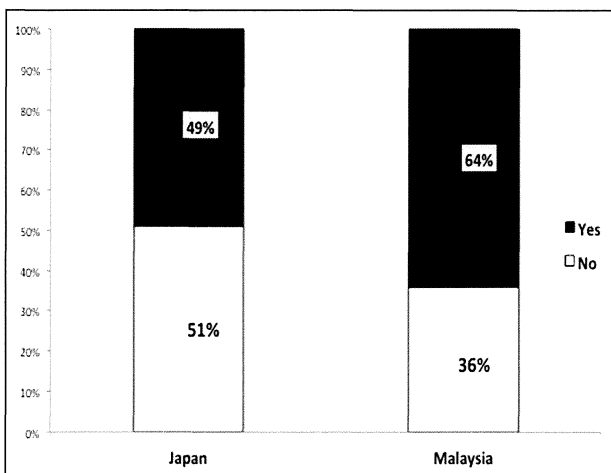


Figure 5: Usage of Customer Relationship Tools

Marketing risk in NPD is consider complex but still can be managed. In order to success in NPD, firms need to have accurate understanding of customer behavior and choosing appropriate marketing strategies that can be attain through customer relationship tools. However surprisingly findings from this study found that only

49%, shown in Figure 5 that not more than half of Japanese SMEs utilize customer relationship tools to reduce risk in NPD process. This yet should not come to a surprise, as most SMEs in general do not have the resources to explore their own markets. Instead, the Japanese SMEs depend heavily on their trading partners for marketing of their products, within the framework of local production networks and subcontracting relationships (Itoh and Urata, 1994).

Almost 36% of Malaysia SMEs didn't use customer relationship tools to assist them in gaining knowledge about customer preferences and requirements. Another 64% did use it to help them retain their customers. The option to adopt Customer Relationship Management (CRM) tools maybe influence by management characteristics (Nguyen et. al, 2013). SMEs reluctant to invest in such tools, as they believe it don't provide benefits. Some SMEs have experienced high failure rates when it comes to CRM adoption, as it is not easy to integrate this business philosophy into everyday business.

4-4 Type of Risk

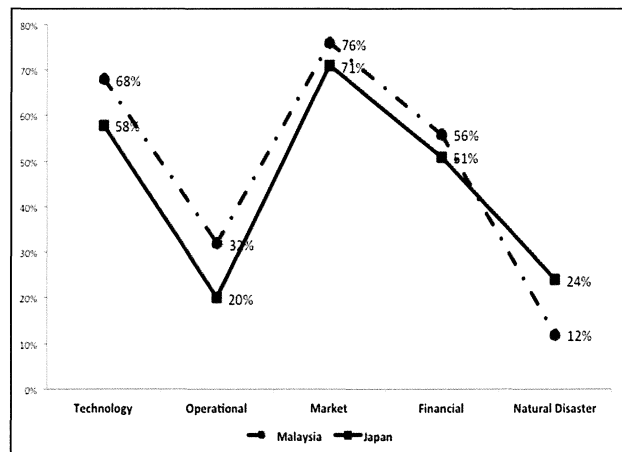


Figure 6: Type of Risk

Referring to Figure 6, SMEs in both countries have the same pattern in identifying risk in their company. Mostly perceived market risk as their major concern Looking at the proportion, both concern on marketing risk 71% and 76% for Japan and Malaysia SMEs. This is understandable since market risk is external to company it's beyond their control. Furthermore, market risk is the

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least controllable risk factor in NPD. There are three main sources of market risk in NPD, customer perceived risk, changing need of customer and forecasting the market (Mu et. al, 2009).

4.5 NPD Performance

McNemar's test is conducted to observe whether there is difference in NPD performance in both countries. Because of small sample and dichotomous scale for this item, McNemar's test is the most appropriate test to be used. Assumption is made there is no difference in both NPD performances of each country. A two-tail t-test is selected because the variance is not known and whether to accept or reject the following hypothesis null.

$$H_0 : p_J - p_M = 0$$

$$H_1 : p_J - p_M \neq 0$$

Outcome of the test is presented in Table 1.

Table 1: McNemar's Test for NPD Performance

	Japan	Malaysia
Mean	0.4667	0.8222
Variance	0.2545	0.1495
Observations	45.0000	45.0000
df	82.0000	
t Stat	-3.7523	
P(T<=t) two-tail	0.0003**	
t Critical two-tail	1.9893	

** Tested significant at 95 percent level of confidence

Result found in Table 1 shows that t value of -3.7523 is way outside the value of -t Critical. Therefore, we reject hypothesis null. The conclusion then there is significant difference between NPD performance in Japan and Malaysia

5. Conclusions

Managing risk in business activity no matter how big or small the business is should not be taken lightly. Failure to manage risk is something should not be compromise. Looking at the results discussed in previous points, we can conclude that SMEs in both countries practices managing risks mostly the same. The only dissimilarity is adoption of standardization.

Government involvement and policies established play important roles in choosing standardization strategy. From the preceding analyses, several conclusions can be drawn. It is true that SMEs are lack in resources that impede their development. To focus their efforts alone in managing risk in NPD will cost too much for them, either financially or operationally. However instead of putting their effort alone in managing risk in NPD they could integrate managing risk in their existing system. Further study is recommended to develop right measure in handling risk for SMEs.

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