



Organizational readiness for advanced manufacturing technology implementation by Malaysian manufacturing SMEs



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ABSTRACT

Nowadays, transformation in organization seem like a must for company to keep compete and sustain in business field. Because of that, it is important to devise the changes happen in organization so that it may reduce the obstacles that occur from the members and also might predict the future potential circumstances. Therefore, readiness organization should improve the effectiveness and efficiency in organization structure. Changes in organization should happen either in small or huge company. The aim of this research is to explore the organization readiness that influences the implementation of advanced manufacturing technology (AMT) among manufacturing SMEs in southern Malaysia. There are three main dimensions were study within this research include top management support, organization structure and organization rules. Total of 120 questionnaires were collected among Southern region in Malaysia embraced Melaka, Johor and Negeri Sembilan. The questionnaire was developed based on previous study. Then, the data were analyzed using Exploratory Factor Analysis (EFA) and regression. From the results, it indicated that organizational commitment which arise from combination of two components of top management support and organization structure present the strongest unique contribution (0.519) for the standardized coefficient value.

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1. Introduction

Nowadays, readiness seems like a critical issue to discuss about especially for small company that intends to implement with new advance technology. Readiness may occur when the staff, environment and structure are willing to facing upcoming changes (Holt et al., 2007). By assessing the readiness factors for change, the clearly and defining gap that could exist between actual expectation and the real situation might be eliminating (Holt et al., 2007). Readiness in term of organization in a small capacity is still relevant for that organization that proposes to speedy their production part. Checking how ready the small organization facing with obstacles in implementing advance technology may rescue the whole firm from making wrong assumption and lastly come out with failure. Implementing an advance technology for huge and established company does not see this as a dominant issue (Soosay et al., 2016). Nevertheless, for small

company like SMEs, they need a deep research before making any decision of adoption. This is because there are study that indicate more failure in implementing AMT had lower down the intention to adopt it (Murad and Thomson, 2010; Koc and Bozdog, 2009). Most of SMEs are aim for AMT implementation but because of financial, resources and less man power expertise make them stop to adopt and unfortunately failed in the middle of adoption.

Even though SMEs always facing with circumstances in developing their business, many studies show that SMEs are working as back bones to Malaysia economic growth (Kee et al., 2013; Khalid, 2012; Cheungsuvadee, 2006; Saleh and Ndubisi, 2006; Rosnah et al., 2004). This due to excellent performance by SMEs abilities in providing job opportunities for nations as well as encouraging new starter business to take their first step in business field. In Malaysia, SMEs can be defined based on their major sectors which are manufacturing, service and others (SME, 2016). Manufacturing SMEs recognized by sales turnover not exceeding RM 50 million or full-time employees not exceeding 200 workers. Though, sales turnover that not exceeding RM20 million with full-time

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employees not exceeding 75 are definite as service sector.

The objective of this paper is to identify the organization readiness that help the manufacturing SMEs which intend to adopt with advance technology usage. It also can act as guideline for small company such SMEs in making a due diligence before they realize that their company is ready for implementing new advance technology. Assessing the organizational readiness factors can serve as guidance for implementing AMT later. Using the literature review techniques, various journals and articles are collected to endorse the data and support the framework. Based on literature, the researcher come out with three dimensions that need to explore within this study which is top management support, organizational structure and organizational rules. From this kind of dimensions regression test were conducted to examine the most influence component for manufacturing SMEs to adopt with new advance technology which is AMT.

2. Literature review

Organizational is the mover of organization operation, communication and decision making process. The direction and strategic vision of the organization must parallel with new technology implementation (Abu et al., 2015; Thomas et al., 2008). Lacking of direction and strategic vision can cause the technology to under-utilized. The changes is included adoption of new technology within organization in order to keep sustain and act as competitive advantages in today environment (Abu et al., 2014). Even though changes that happen in organization is to increase competency and effectiveness, some obstacle that occur by organization members is a normal as they can predict the potential threat that might disturb future undertaking (Susanto, 2008). That is why member in organization is a critical factor that might impact the new activities in firm.

Organizational can be define as an authority of making decision, responsibility towards organizational roles and work procedures within the organization that been control by the organizational members (Teixeira et al., 2012). Others definition is a group of chain that connect all the organization roles. The other named of organizational can be called as authority structure, vertical differentiation as well as hierarchy (Grossi et al., 2007).

According to Bakkabulindi et al. (2009), organizational are being able to absorb the changes or in the other way appropriate for readiness when they feel the organization is reaching the level of changes. Managing changes in organization consists of several elements such as perception towards changes efforts, vision, mutual trust, initiatives offered, management support and how organization manage the changes. This seven elements had been explored in research conducted by Susanto (2008) in a case of manufacturing company in Indonesia. From the results, it can be conclude that readiness for

change can be easier to occur when the members is accept the change, had a clear vision on where the company goal can be achieve and also full commitment come out from management support that will educate others staff to understand changes.

Implementing AMT within the organization is a mutual integration. Both AMT integration and organization adaption is the best strategy for the long term benefits. In study conducted by Rosnah et al. (2004) found that the integration between AMT function in organization still in low level. Most of the AMT usage needed the collaboration of each team such as production and marketing, design and administration and so on. Lack of it may cause the implementation of AMT within SMEs cause the main hurdle.

Other research directed by Senarathna and Wickramasuriya (2011) indicated that organizational cultural give the higher relationship to e-commerce adoption. The characteristics of organization cultural were test consisting of adhocracy, hierarchy and to manager opinion. Adhocracy culture gives more influence to e-commerce adoption while hierarchy contribute negative significant. Manager opinion towards innovation also given positive relationship to e-commerce adoption.

From previous study, the researcher claim that organization is a critical factors that can catalyst the implementing of new technology such as AMT. Commitment that arise from each members can stronger the intention to adopt, so that company's mission and vision can be accomplish and create competitive advantages to keep sustain in industry.

2.1. Top management support

Defining top management support clearly describe that the effort of technology implementation is promoted by the top management of the organization (Raymond and Croteau, 2006). Management support that always creating much effort is significant for readiness of change. This clearly related with responsibility of leadership. An effective leadership involves observing change, making the necessary decision and knowing when to start a new vision (Susanto, 2008). Faces with the changes leader should learn more from the adaption of new technology. To exploit the new implementation of technology, manager should learn on how to adapt that technology whether it's fit or suitable enough for organization and its strategy (Rosnah et al., 2004; Thomas et al., 2008).

The availability of top management support will help in achieving the organizational benefits and encourage the other manager to aware of responsibilities towards technology implementation and use of it (Bradford and Florin, 2003). Moreover, top management support is the best catalyst for the adoption success (Jeyaraj et al., 2006). One of the strategies that the management support can provide is by working in the special team (Susanto, 2008). These special teams playing a role as researcher that

study the internal and external environment, identify uncertainty and reduce the gap before implementation take place.

Successful of top management support will encourage the others employees to accept the arrival of new technology besides, the manager will create a willingly resource of acceptance (Darbanhosseiniamirkhiz and Ismail, 2012). They need to monitor the employees' response toward the changes of new technology adoption (Ramayah et al., 2005). Before the implementation happen, top management need to be prepare by focus more on strategic plan, flexibility, responsiveness and quality (Darbanhosseiniamirkhiz and Ismail, 2012). Other than that, top management can be seen as the direct impact given in the technology decision process even though there already exist the qualified technical position within the organization (Ramayah et al., 2005). Ignoring the "hand-off" is crucial. Cooperation will act as an enzyme that will help the entire organization much depend in each of the member.

In some study completed by Borgman et al. (2013) illustrated top management as the crucial cause that influencing the adoption of cloud computing. By assessing TOE framework that consist of technology, organization and environment, top management seem like giving positive linked to decision making for adopting cloud computing. Top management support can be act as promoter by deliver the fertile environment by the way of verbal conveying and willingness to create tolerance with new existing technology.

Top management also can be examining in term of readiness. According to Susanto (2008) top management is one of the characteristics in organizational readiness to change. Top management support is reflecting of effectiveness leadership. Good leadership may able to monitor, managing correction and know when to initiate new vision. Other than that, performing a team that will do due diligence for internal and external environment that will influence changes.

In conclusion, top management support is needed in acceptance of changing in organization. If the top management is not ready to implement with new technology it is hard for entire firm to adopt with it. Top management assume as first line to understand about technology implementation, so that they can provide some strategies include training providing, financial solution and so on (Oliveira and Martins, 2011).

2.2. Organizational rules

Rules in the organization are categorized as the political aspect within the firm itself. According to Udoka (1989) state that the organization is the political combination and the entire executive in side it are the political broker. The rules in the organization is not a rigid but negotiated. The rules in an organization are different. It based on the coalition, altering that suit to the firm condition. When the condition is related to the new interest, if

necessary they will slightly modify the rules from the root of purposes.

The main purpose on rules requirement is to reduce the uncertainty. Because of that aiming, this uncertainty has the power to allocate resources and decision process that fulfill the organization's goals (Udoka, 1989). The rules stated are based on the form's capabilities. The new interest is cannot be carried out if the rules or political issue within an organization do not support the requirement intake unless the management agreed to compromise.

2.3. Organizational structure

Organizational structure can be defined as official system of functional interaction (Darbanhosseiniamirkhiz and Ismail, 2012). It means that a group of members will deliver an efficient outcome if they are providing with full guidance, enough information and able to complete every tasks based on accepted formal system. Other than that, organizational structure also explain the allocation of responsibility and power exist within the organization when work procedures control by organization members (Teixeira et al., 2012). Some illustrate as internal pattern of relationship include communication skills and authority.

In organizational structure, there are three main types that can be considered which are centralized, decentralized and integrated. Centralized is a structure were as the authority of decision making is transferring to the higher level of organization. Moreover, centralized also recognize when decision are mainly make only at one level of the firm as whole (Siggelkow and Levinthal, 2003). This structure mainly used for small company that operate their company solely on making decision and provide direction.

Decentralization refers to authority transferred to the lower level of branches or division for direction and decision making purpose. Autonomy is given more in lower level and bottom top approaches are suit to this structure. Decentralization facilitates the various decisions within the organization. Headquarters will cover operation that deal with human resource and financial while divisional manager will allocate the local activities (Fan et al., 2007). In other word, decentralization is when the decision making is divided into division and each make own decision (Siggelkow and Levinthal, 2003). Integrated refer to unstructured decision making authority which is each of the members able to present the idea. The manager needs to consider all the ideas before selecting the best decision. The solution might be come out not from the upper level of authority but just from the clerk.

In implementing with AMT the structure of company playing a critical factor. Choosing precise organizational structure could help the implementation of AMT, so that the company will grasp its advantages. Adoption of traditional structure may no longer relevant to new AMT and

also with internal environment. Basically, this ancient structure is depending on hierarchy management and specialization of task (Darbanhosseiniamirkhiz and Ismail, 2012). In SMEs itself, implementing AMT in company required several years when it comes with technology and structure.

In a study conducted by Shaw et al. (2013) that examine the organizational readiness for change in implementing intervention for improving blood pressure control. Hypertension Telemedicine Nurse Implementation Project for Veterans was implement previous but resulting unclear in term of effectiveness. This research ultimate focus on finding facilitators, barrier and contextual factors. Results indicates that the structure of organization include all stakeholder need to clearly understand about the intervention implementation includes the staff, nurses and patients. Intervention can be successful when entire organization get more knowledge and understand the goals that the firm need to achieve.

Some others study explore the organization structure in supply chain integration towards manufacturing performance by Teixeira et al. (2012). This study examines the organization structure in context of centralization, flatness, managerial specification and employee's specification. It explains that significant of organization structure is closely related to the supply chain integration such as for customer and suppliers. Later will cause the improvement in manufacturing performance.

Based on illustration above, the researcher can conclude that organization structure is a backbone to company successfulness. Organization structure that able to absorb changes and manipulate it into organization will help the company achieve goals and improve performance.

3. Methodology

This research applied quantitative method for data collection which means survey instrument was distributed towards the selected respondent. The questionnaire developed from identified variable in the literature review. Likert scale technique will be used to measure the items effectiveness. One to five scales will indicate each items in independent and dependent variables. All of the items were developed using the previous study conducted by Blackman et al., (2013), Ramamurthy (1995), Udoka (1989).

3.1. Population and sampling

The level of analysis for this study is on SMEs in Malaysia focusing in only one sector, which is manufacturing SMEs. The population of manufacturing SMEs were determined from SME (2016). It stated about 37, 861 SMEs are all over Malaysian region. This study was conducted only three main countries located in southern Malaysia included Johor, Melaka and Negeri Sembilan. According to the statistics from SME (2016) total of 7, 430 manufacturing SMEs detect within this region.

Sampling technique was examined based on Krejcie and Morgan table. Total of 120 questionnaires were managed to collect. This indicates that 33% of response rate were achieved. All the data were recorded in excel program, which later the file was transferred into SPSS to conduct the analyses.

4. Results and analysis

Total of 120 responses across four variables were extracted to minimize number of components. There are several criteria that need to examine during extracting the number of components. First is Kaiser-Meyer-Olkin (KMO) value with the index range is above 0.794 is a good consider accepted (Tabachnick and Fidell, 2007). Second is the items with low factor loading (< 0.4) and not clump with others components were deleted.

4.1. Exploratory factor analysis (EFA) results

EFA analysis was conducted for another three components allocated under Organizational factor which are top management support, organizational structure and organizational rules. There were 13 items were loaded to determine which items are domain to which group. From the results it indicates that value for KMO for items in organizational construct are 0.794, which is considered as accepted. While value for Bartlett's Test accounted at ($p = 0.000$). Besides, factor loading for all items was between range of 0.5 and 0.8 which is loaded above 0.40. These items were considered to be test in EFA. Table 1 showed the EFA result for organizational construct.

From this results, determining three components, which is not expected as the actual framework. These two components were accounting 43.483 % for variance indicated for component 1, and 16.163% of variance for second component. Collectively, the two components explained 59.646 % of the variance.

The factors analysis results for organizational construct show two different components that were shown as in Table 1. Within this construct only one item were eliminated (COR3-everyone in this organization know who his/her supervisor is. reporting relationship are closely defined) because of it combined with others items in wrong group. Component 1 loaded the combination of two district factors which are top management and organizational structure. Top management explains the responsibilities of the upper level of workers towards the intention to adapt with technologies. In addition, the top management is a group of people that have the priority for decision making and as controller. Besides that, organizational structure consist of all the internal asset which is employees who join together to make sure entire firm are well manage and run according to the plan.

These two components are merged together completely clarify that within the organization each of members have their own task and supposedly

they are crystal clear understand their job function. The factor loadings for the first component in Top Management and Organizational Structure construct

ranged between 0.546 and 0.884. As for that, this component is labelled as 'Organization Commitment'.

Table 1: EFA result

Selection Organization Items	Component	
	1	2
COT3-Most of the staffs understand of the impact of the AMT on their roles and responsibilities	0.884	
COT4-The leadership of the organization has put in place mechanisms to help in training facilities for the AMT implementation	0.871	
COT1-My organization's leader understand and support the implementation of the advanced manufacturing technology and it ready to facilitate the core team	0.748	
COS4-There was abundant availability of the required labor skills within our company	0.698	
COS5-There is a shortage of managerial talent to effectively run our company	0.687	
COS2-Decision on major changes to (including new introductions of) manufacturing process were made at the highest level	0.683	
COT2-Senior management need to involve in the AMT process frequently	0.677	
COS1-Marketing strategies and tactics to meet AMT implementing are diverse	0.656	
COS3-The technology involved to meet the needs of various lines was diverse	0.546	
COR2-Policies in this organization are reviewed by the people they affect before being implemented		0.867
COR4-Standard activities in this organization are always covered by clearly outlined procedures that everyone is expected to follow		0.861
COR1-This organization has clear rules and regulations that everyone is expected to follow closely		0.827

The second component composed the item that illustrates the regulation within the organization. Presenting of the law inside the organization will guide the entire firm with the standard that everyone needs to follow. Each of the matter should consistent with the manual that has been created before. This is because all of the activities within the organization have their limitation. It has their own policies that will filter back the new out coming circumstance such as technologies. The factor loadings for these items were from 0.827 to 0.867 and this component was labelled as 'Organizational Rules'.

4.2. Regression results

Multiple regression is a technique to explore the relationship between one continuous dependent variable and a number of independent variable (Pallant, 2013).

There are three major types of multiple regressions which are standard, hierarchical and stepwise. However, for this study standard multiple regressions are selected because it examines how much variance in dependent variable that is able to explain as a group or block. Because of that, these approaches also able to explain how much unique variance of organizational commitment and organizational rules that can be explain by organizational readiness factor.

According to the result show in the Table 2, Commitment factor point the largest beta coefficient which is 0.519. It can be explained as the most influence factor that contributes to the organizational readiness factors. However, Rules factor indicates less of unique contribution with scale of 0.069. Following by the significant assessment, Commitment factor specify 0.00 totals which can be measured as the most significant factor that give impact to the Readiness factors. In contrast, Rules factor is not made unique contribution and less significant towards dependent variable by pointed beta of 0.69 and Sig. of 0.402.

Table 2: Regression results (organization)

Factors	Standardized Coefficients	Sig.
	Beta	Upper Bound
(Constant)		0.003
Commitment	0.519	0.000
Rules	0.069	0.402

5. Discussion

This study examined on organizational readiness factors that duplicate from the previous study. There were three main dimensions that had been explored within this research which are top management support, organizational structure and organizational rules. The researcher assertions that intention to adopt with new advance technology in order to speedy the production part is closely related with well preparation inside the organization itself. Based on these three main factors, the major purpose of this study are to explore the organizational readiness focuses on AMT implementation among manufacturing SMEs. Using the questionnaire that already developed by previous researcher, a set of 120 survey had been distributed among selected manufacturing SMEs located along Southern Malaysia.

According to the result, exploratory factor analysis (EFA) was tested on this three organizational readiness factors using SPSS software. EFA test was running to eliminate those items which are not clamping into exact group and reducing those items to form smaller coherent subscales (Pallant, 2013).

Besides, to reduce the large miserable number of independent variables into most desired number of factors. As the results there are only two groups are clamped together. This is slightly different from the original framework that illustrates three main components in organizational readiness. Only one item is deleted due to allocate in a wrong group (COR3-everyone in this organization know who his/her supervisor is. reporting relationship are closely defined). Based on EFA result, the main two new components were utilized named

Organizational Commitment and Organizational Rules. Organizational Commitment was a component arises from the combination of Top Management Support and Organizational Structure. This innovative component illustrate the role of whole members in organization for together accomplish the firm's decision in implementing advance technology. Organizational Commitment is important due to technology adoption because each of the members need to fully understand their roles and work as a team that will support the entire organization operation.

After the data were screening using EFA analysis, then it is strongly enough to be tested in multiple regressions. Regression will explain how much the independent variables explained the uniqueness variance in the dependent variable (Pallant, 2013). Based on regression result, organizational commitment recorded the highest beta coefficient with score 0.519. Compared to organizational rules, it only pointed 0.069 for beta coefficient value. It explained that organizational rules create less unique contribution to organizational readiness to implement AMT.

From the regression result, it can be conclude that organizational commitment is really giving impact for those manufacturing SMEs that decided to adopt with ATM. This can be explain that changes implementation that happen within the organizational is much depends with the members that operate the organization's actions. Hence, all the members are compulsory to understand their roles and responsibilities so that the company's goals can be achieve.

Differs from the other one factor which is organizational rules. This factor seem like less impact to AMT implementation. Rules created by the firm are very adjustable. If the changes cause of advantages, rules can be alter so that technology can be implementing within the organization. Depending much on the rules could prevent the company's achievement.

6. Conclusion

In conclusion, this study aim to examine the organizational readiness factors that influencing SMEs manufacturing to implement with AMT (Rahardjo and Yahya, 2010). Using the previous study the researcher come out with three main components that related with organizational readiness which are top management support, organizational structure and organizational rules. Total of 120 set of questionnaire were prepared from the previous research then distributed to the selected manufacturing SMEs in Southern Malaysia. After that, all the data were going through EFA and regression test using SPSS software. The results show that new component was arising as for replacing the combination of top management support and organizational structure. This explains that all of the organization members include the lower and upper level are compulsory to take part in

AMT implementation. Each of them are encourage to give their opinion and struggle to understand the main goal of firm to accomplish their intention to adopt with new advance technology. Even though the other one factor also contribute to the organizational readiness, but then again organizational commitment cause the major impact for AMT adoption (Parasuraman, 2000).

Because of that reasons, this study is nearly significant for those manufacturing SMEs to implement AMT for their business operations. This implementing cannot be happen too if the technology itself is not giving any advantages, but AMT is very relevant for organization to adopt with it. Plus with excellent commitment from entire organization, AMT can be success and increase the firm's performance and sustainability (Small and Yasin, 1997).

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