

## Critical Factors Impacting Sustainability Of Continuous Improvement In Manufacturing Industries In Malaysia

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*The purpose of this research was to investigate the influence of six variables namely strategic focus, monitoring continuous improvement development, integration of continuous improvement, management of continuous improvement, involvement/engagement, and learning and knowledge sharing on sustainability of continuous improvement capabilities in the context of manufacturing industries in Penang, Malaysia. Data from the email survey on the variables introduced supported that strategic focus, management of continuous improvement and learning/knowledge sharing has positive influences on sustainability of continuous improvement capabilities in an organization. The implications of this study highlighted that the most effective predictor for sustaining continuous improvement capabilities among manufacturing industries in Penang was strategic focus.*

**Key Words:** Critical factors, Sustainability, Continuous Improvement, Manufacturing Industries, and Malaysia.

### 1.0 Introduction

Intense competition has resulted in shorter life cycles of new products. The pressures on companies wishing to achieve business excellence are intense. Business excellence will, among other things, be achieved by companies which can react quickly to new market conditions and customer needs and constantly looking for creative solutions and continuous improvements in products and processes. Today's companies must continuously adapt, develop and innovate (Martensen & Dahlgaard, 1999). Continuous improvement (CI) has become a very common practice in manufacturing industries throughout Malaysia. Many organizations have started CI practice in their daily functions such as process improvement, defect reduction and quality assurance. Concepts such as six sigma and lean manufacturing are very popular methods to implement CI. However, sustainability of CI is always the important and most difficult practice of all in the organization.

CI is a very critical tool in the manufacturing industries today to enhance customer satisfaction, to become the cost leader and also to remain competitive in the global world today. Companies such as Seagate, Agilent, Motorola and so on employ six sigma as the CI tool to improve product quality and also ensure customer satisfaction in their products and services. The reliability, timeliness, accuracy and perceived value of the products or services have become the keys to organizational

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success. The business environment has become turbulent, complex and even chaotic. At the same time business processes have evolved towards non-routine operations making project-type working increasingly common in every business (Haikonen, Savolainen & Järvinen, 2004). To meet these challenges organizations concentrate on their core competencies, outsourcing of less strategic activities, developing partnerships, and building networks essential to sustain business growth and success.

CI is defined as a collection of activities that constitute a process intended to achieve performance improvement. In manufacturing, these activities primarily involve simplification of production processes, chiefly through the elimination of waste. In service industries and the public sector, the focus is on simplification and improved customer service through greater empowerment of individual employees and correspondingly less bureaucracy. Strategic change can also be viewed as a process of logical incrementalism (Terziovski, 2002). The implementation of CI in an organization is not simple and involves management support, training of CI concepts and also change in organizational culture that focuses on customer satisfaction. Once implemented, the company will reap the reward of better productivity and even gain competitive advantage over their rivals in the competitive business environment today. Sustainability of CI is a very critical besides the implementation of the concept.

Organizations find that sustaining the CI culture is very difficult. It is more towards changing the employee behavior and mindset about improvement as a part of their daily functions. Factors that influence sustainability of CI in the organization, especially manufacturing industries is very important in order to produce the best product at the lowest defect and highest customer satisfaction. Though implementation has been commonly practiced, organizations find sustaining continuous improvement effort a challenge. Factors influencing the sustainability of CI will play a very critical role in making sure CI is sustained in the organizations business processes and even culture. Under this backdrop, it is important to identify the factors that will help manufacturing industries in Malaysia to sustain continuous improvement in their business processes and eventually transform continuous improvement concept as the organizational culture.

## **2.0 Literature Review**

The manufacturing sector globally has witnessed rather drastic changes in the later part of the twentieth century. These changes have left their unmistakable marks on the different facets of the manufacturing organization. In the process, manufacturing, strategy, technology, relations-to-markets and customers, as well as performance measurement have been altered. Today's manufacturing organization can no longer view itself as a closed system focused on efficiency. Rather, it must operate as an open system in order to cope with the dynamics imposed on it by a demanding global business environment. In this context, it must operate as a customer-focused, yet technology-based open operational system. The effectiveness of the performance of such an open operational system is not judged solely based on its ability to convert inputs into outputs. More importantly, however, the effectiveness of performance of such system is dependent on whether the customers value the

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output and the extent to which such value can be translated into a distinct competitive advantage for the organization (Gomes, Yasin & Lisboa, 2005). The focuses on the factors those are critical in sustaining continuous improvement (CI) in manufacturing industries in Malaysia. The factors that are identified can further enhance the training needs analysis implementation in helping organization to sustain CI in the organizational practices. The advantages of implementing CI in the business environment today had been well documented and methods to implement CI are aplenty in the market. This research is mainly focusing on the next stage of CI which is sustainability.

### ***2.1 Sustainability of Continuous Improvement (CI)***

Sustainability of CI or innovation efforts is critical in the success of a manufacturing organization today. Having differentiation through solely price alone will not ensure sustainable competitive advantage. However, by incorporated a sustainable innovation and creativity within the operation of the organization, the organization can sustain its competitive advantage and business. The term sustainable considers the protection of the attributes and resources that allow an organization to outperform its rivals in the same industry or product market have to offer over some usually undefined period of time into the future for the organization to maintain its competitiveness. Within this context, sustainable can assume a number of meanings depending on the frame of reference through which it is viewed. It can be interpreted to mean enduring, defensible, bearable, tolerable, liveable, supportable, passable, acceptable, justifiable, negotiable and penetrable (Chaharbaghi & Lynch, 1999). Sustainability can be viewed through a few factors such as (Escrig-Tena, 2004); durability, difficulty to imitate, and lack of incentives or inertia by potential imitators.

### ***2.2 Strategic Focus***

Following Berger (1997), some core principles of CI can be distinguished by using the ideal characteristics of Imai's kaizen (Imai, 1986). The first principle is process orientation. Before results can be improved, it is the central tenet of CI that processes must be improved. Good results will follow automatically when processes are both understood and controlled. The orientation is towards the activities and work methods and not towards the outcomes (Leede & Looise, 1999). The statement from Leede and Looise (1999) is actually consistent with the behavioral norm theory which states the importance of individuals and groups using the organizational goals to focus and prioritize their improvement activities. Only understood and controlled action will be useful to the organizational performance. Activities must be carried out as of the organizational goals which are on par with the overall organizational directives of future growth.

Customer-centered six sigma is a concept very relevant to strategic focus in sustaining continuous improvement effort in an organization. This is the beginning state of the overall transformation process. Recent empirical studies on supply chain quality management practices in Taiwan and Hong Kong also show that technical requirements for such an effort is the same irrespective of the environment. As a consequence, paying special attention to operational processes and supplier

participation programs if stakeholders' needs along the supply chain are to be met. The efforts would lead to improved organizational performance (Kuei & Madu, 2003).

### ***2.3 Continuous Improvement Development***

The CI development involves monitoring activities implemented to support CI and this includes the development of monitoring process to make it more effective. CI activities are critical to ensure success of the organization, hence having a good monitoring system of CI is equally important. The most effective means of improvement involves following a systematic procedure of planning, execution and evaluation. In order to accomplish this, it is essential to standardise the functioning of the processes, use different improvement tools, obtain indicators of performance, and gather information through benchmarking and self-assessment (Escrig-Tena, 2004). As a recent methodology of process improvement, Six Sigma has permeated business life. It is worth exploring as, a method of CI capability development because it has the potential to reveal the kinds of learning mechanisms for which researchers currently tend to search (Haikonen, Savolainen & Järvinen, 2004). Six Sigma is a commonly used statistical improvement method in most of the manufacturing industries today. Six Sigma consists of systematic methodology of how improvement activities can be carried out. Six Sigma methodology comprises of five steps in its process improvement. The steps are define, measure, analyze, improve and control (DMAIC). DMAIC calls for the identification of specific customer or stakeholder needs. Measure represents the identification of measurable, meaningful indicators and operation planning or implementation on a smaller scale whereas analyze represents the evaluation and determination of the critical success factors of the products or processes and the most likely causes of defects. The improve stage will follow that represents the opportunities and actions for getting the product or process better and removing the causes of the defects. Last but not least the control represents the implementation on a full scale. These step by step processes can well be referred to as an operational cycle.

### ***2.4 Integration of Continuous Improvement***

Regular evaluations are required to ensure that CI is integrated in to the organization culture. CI must be incorporated as part of the daily task or responsibilities of all the employees. This includes changes in organization's structure, systems, procedure as well as the methods and mechanism that are used to develop CI support and strengthen each other (Bessant & Caffyn, 1997). Integration involves managing the organizational changes to make CI a common practice. There are many methodologies available for CI such as six sigma, lean manufacturing concept, supply chain management and so on. These methodologies provide the organization ways and tools to streamline the organization's structure in terms of communication, motivation or employees and so on. Integration of changes must be managed appropriately to ensure that CI can be sustained for long term. Communication of changes in an organization and the purposes of such changes are important to ensure that employees know clearly the organization goals and align their process improvement to achieve the organizational goals. By doing so, sustaining CI will become easier as the organizational functions are aligned to CI activities. Any organization that tries to run its business without a quality system, such as ISO 9000,

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is failing to recognize the importance of quality as a driver to business viability, sustainability, and prosperity. Quality registration will provide organizational value as well as a distinct marketing benefit, but customers also believe that past performance, price, and delivery are more important. The motivating force for most is the demand from customers to obtain quality certification and the fear associated with losing business. Much has been written about the importance of quality management and continuous improvement in the current climate, but what is not recognized is that it repeatedly fails to provide any solid foundation for sustainable success (Johnson, 2003).

### ***2.5 Management of Continuous Improvement***

One way for organizations to become more innovative is to capitalize on their employees' ability to innovate. An organization that depends solely upon its blueprints of prescribed behaviour is a very fragile social system. Work has become more knowledge-based and less rigidly defined. In this context, employees can help to improve business performance through their ability to generate ideas and use these as building blocks for new and better products, services and work processes (De Jong & Den Hartog, 2007). Managers play a major, integrative role in linking activities and ideas between the operational, administrative and business aspects of the organization. The integrative role of managers is instrumental in shaping employees' attitudes and expectations about work and the organization. For example, the extent of managerial influence exists in structuring work performance through delegation of authority, participation and feedback, providing adequate rewards and working conditions (Brewer, 1996). To make CI successful, management engagement in the CI activities are very important and essential. Management involvement in the improvement projects will motivate the employees to put more effort into these activities. However, managers should act as a participant in the improvement process and allow freedom to all employees to contribute their ideas towards improvement. Management involvement can be through rewarding the improvement team through monetary or recognition. Interval communication can also be held to monitor the progress of the improvement activities and give input to the team if any team faced a roadblock in the project. Participative leadership involves the use of various decision-making procedures that determine the extent to which people can influence the leader's decisions and have the autonomy to design and perform their own tasks. Participative leadership can take different forms, including consultation, joint decision-making and delegation (Yukl, 2002). Such leadership has been identified as an antecedent of individual innovation. Giving employees operational autonomy encouraged an innovative culture. In a study among the employees of a manufacturing plant, Axtell, Unsworth, Wall, Waterson and Harrington (2000) found a positive relationship between participation and employees' innovative behaviour, measured using self-ratings of employees' suggestions and implementation efforts.

### ***2.6 Involvement/Engagement***

Involvement or engagement according to Bessant and Caffyn (1997) is that employees in the entire organization are proactively involved in CI. Getting employees to be involved in CI involves communication of the importance of CI and

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also establishing a common goals shared by the employees. This is based on the assumption that non-managerial employees can make important contributions when they have the necessary power and preparation. It holds that work efficiency increases if workers are more motivated, take on responsibilities and are allowed to take the initiative. What is emphasised, then, is the need to get members of the organization involved in CI. This entails promoting training, empowerment, teamwork or setting up channels of communication to obtain information and knowledge and make it known to people (Escrig-Tena, 2004). Employees can also invest considerable effort in developing, testing and commercialising an idea (De Jong & Den Hartog, 2007). This can be done through empowerment. Empowerment is important in two respects. First, granting autonomy to employees over aspects of their proximal work environment is an important indicator of management's trust in their workforce, which is likely to lead to greater employee commitment to the organization's goals. Second, autonomy allows workers to use their knowledge and experience, thereby will increase the motivating potential of jobs and enhance work performance. A similar role is to be expected for the level of work demands in jobs. Impoverished work, involving low levels of demand with monotonous and trivial tasks, not only denies workers opportunity to use their skills, but also offers little by way of challenge (Jackson, 2003). Powerful engagement process can help employees to connect with the change, overcome resistance to change and build commitment must be implemented, improved and sustained until the benefits of the change have been realized and new behaviours are firmly embedded into the culture (Miller, 2004). CI activities involve changes and powerful engagement by the improvement team members will ensure the effectiveness of the CI activities.

### ***2.7 Learning and Knowledge Sharing***

Learning is another very important behavioral norm introduced by Bessant and Caffyn (1997). Employees in the organization shall cultivate the learning initiative to learn from their own and others positive and negative experience. This will then be a guide for all the members of the organization to perform better or avoiding the same mistakes from occurring. Shifting from a blame culture to one of learning from mistakes, reflective practice, trying new things, innovation and creativity, risk taking and an action learning/research approach to new projects (Reed & Vakola, 2006). The learning organization is always equipped to handle any changes that are required to be able to stay competitive. The way in which an organization learns is also a key factor for its effectiveness and potential to innovate and grow. Strategic success can be based on key resources and capabilities of the organization rather than only concentrating on creating and sustaining market growth and position. Thus, the ability to learn, acquire, foster and integrate relevant knowledge within an organization into its value chain is recognized as one of the most important competences for a firm to be successful (Perez-Araos, Barber, Munive-Hernandez & Eldrige, 2006). Nonaka and Takeuchi (1995) established a dynamic model of knowledge creation, with the key assumption that knowledge is created and expanded through social interaction or knowledge conversion between tacit knowledge and explicit knowledge. It was suggested that explicit and tacit knowledge are not totally different, as they interact with and exchange into each other in the creative activities. The two fundamental approaches to knowledge management (KM): the tacit knowledge approach and the explicit knowledge approach have

important strengths and weaknesses and it is important to find the right creative combination of the two approaches for KM. Different factors have to be considered to find the right combination and balance of the tacit and explicit KM approaches: technology, competitive environment, knowledge intensity of strategy and operations, attitudes of knowledge workers, degree of geographical dispersion of knowledge workers and resources available to support KM practice (Perez-Araos *et al.*, 2006). CI culture will transform the manufacturing industries from a process oriented to customer oriented business. Satisfying customer requirements is the key to an organization's long term survival and growth. Organization develops organizational goals by understand what the customers want, communicate the goal, provide training and knowledge sharing and eventually cultivate CI into the organizational culture.

### 3.0 Research Methodology

The research attempts to investigate the relationship between the behavioral norms and sustainability of CI. Data was collected via manual and email survey, and from the past studies, the respondent rate of using online survey lies between 14 to 20 per cent. Taking this view, this study aimed to receive approximately 200 respondents, hence, at least 1000 invitation emails were required to get the desirable amount of respondents. The focus for the research is the employee of manufacturing industries in Malaysia, therefore, a sample of 1000 employees from manufacturing companies in the Malaysia, was selected randomly from the directory listed on Malaysia Central (<http://www.mycen.com.my/>) and Malaysian Industrial Development Authority, (<http://www.mida.gov.my/>).

To test the hypotheses, survey instrument was used to collect data. The questionnaire was published through the web and manual distribution. For the web survey, emails were broadcasted to invite the random employees to participate in the email survey, where respondents were directed to answer the attachment that contained the questionnaire. Cover letter, along with the reason for survey was also posted together with the email. Recipients were also requested to forward the invitation to the relevant person in their organization/workplace. Online survey method is chosen because it is convenient, time and cost effective to intact with the respondents who are dispersed in different geographical areas.

The online questionnaire included a variety of measures that assess the following concepts: i) existence of the six independent variables in the selected company; and ii) sustainability of continuous improvement in the company. All measurements are standardized to five-point scales, with 1 being 'strongly disagree' and 5 for 'strongly agree'. A total of 40 questions were asked, which were categorized into two sections: company profile, and the presence of sustainability of CI and six behavioral norms. The major attributes of respondents' organization profile are job title of respondent, level of respondent in the company hierarchy, age range, education level and income level. Organizations involved in the study remain anonymous. To determine the significance of the six independent variables introduced in sustaining CI capability in a manufacturing industry, the survey was constructed with questions related to the variables on whether the current processes in the respondents' organization consist of any of the norms. The survey would also measure the level of

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sustainability of CI capability. In constructing the survey items specific to the behavioral norms, a total of 30 items were asked to indicate whether behavioral norms are being practiced by the sample organization through the level of agreement by the respondents. Last but not least, the survey consist 5 questions on the level of sustainability of CI in the respondents' organization. All the questions of the dependent variable, independent variables in the questionnaire are adapted from Zairi and Whymark (2000), Chapman, Murray and Moller (1997) and Bateman (2005).

Based on the research objectives and literature review the following hypotheses were proposed:

*H1: The greater the strategic focus, the higher the impact on sustainability of continuous improvement.*

*H2: The better the monitoring of CI development, the better the sustainability of continuous improvement.*

*H3: The higher the level of integration of CI, the greater impact on sustainability of continuous improvement.*

*H4: The higher the management of continuous improvement, the better the sustainability of continuous improvement.*

*H5: The higher the involvement/engagement of employees in continuous improvement, the higher the sustainability of continuous improvement.*

*H6: The higher the learning behavior/knowledge sharing in the organization, the better the sustainability of continuous improvement.*

### 4.0 Survey Results

A total of 206 respondents answered and returned the questionnaire distributed though email and out of that 203 were acceptable returns with three respondents' results are rejected due to the answering of negative questions positively which contradicted with their other responses. All respondents are working in manufacturing industries in Penang ranging from multinational companies and also small medium industries. With total 203 acceptable questionnaires, the target sample size of 200 and above has been satisfied. The response rate to the email survey carried out in this study is 20.6% which is consistent with the general rule of thumb of response rate of 20%.

Generally, the respondents are working as executive level in the organizations which covered 87.7% and this statistics is reasonable as this is the group of employees that are actively involved in continuous improvement activities. The coverage of the survey included respondents from management level, 9.9% and senior management level, 2.5%. The respondents are from mainly in the age range of 26 to 30 years and are educated individuals. From the education level point of view, the respondents are majority degree holders which covered 82.8%, 14.8% post graduates and 2.5% with

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doctorate. These are the individuals that are the major driving forces of an organization and are also important to the sustainability of continuous improvement capabilities.

### 4.1 Reliability Test

Internal consistency for the dependent variable, sustainability of CI, four independent variables of the research were estimated using Cronbach's alpha. Using the SPSS for Windows reliability test program, the internal consistency analysis was performed separately for each of the variables of the CI sustainability model. Variable with Cronbach's alpha of lower than 0.7 shall be rejected as the survey rating is not reliable and will be excluded from the regression analysis. From the reliability test results illustrated in Table 2, all the variables are having Cronbach's alpha of above 0.7 except involvement / engagement. Hence, this independent variable was excluded from the subsequent analysis.

**Table 2**  
**Reliability Test Results for All Variables**

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
<i>Dependent Variable</i>			
Sustainability of CI	0.841	0.842	4
<i>Independent Variable</i>			
Strategic Focus	0.864	0.865	5
Integration of CI	0.921	0.925	4
Management of CI	0.914	0.914	5
Involvement / Engagement	0.382	0.401	2
Learning / Knowledge Sharing	0.787	0.792	2

### 4.2 Correlation Analysis

After determining the variables that are valid and reliable, correlation analysis was done to determine that there are linear correlation between the dependent variable (sustainability of CI capabilities) and the independent variables as illustrated in Table 3.

**Table 3**  
**Pearson Correlations of the Major Variables for Sustainability of CI**

		Sustainability of CI	Strategic Focus	Integration of CI	Management of CI	Learning / Knowledge Sharing
Pearson Correlation	Sustainability of CI	1.000	0.508**	0.324**	0.352**	0.477**
	Strategic Focus	0.508**	1.000	0.504**	0.326**	0.564**
	Integration of CI	0.324**	0.504**	1.000	0.537**	0.386**
	Management of CI	0.352**	0.326**	0.537**	1.000	0.168**
	Learning/Knowledge Sharing	0.477**	0.564**	0.386**	0.168**	1.000

\* p<0.05, \*\* p<0.01

There was adequate evidence to confirm all the independent variables at a 0.01 level significance, indicating the significant positive linear effects of strategic focus, integration of CI, management of CI and learning or knowledge sharing towards sustainability of CI capabilities in an organization.

#### 4.3 Factors affecting sustainability of CI

The regression analysis using SPSS was conducted for the remaining four independent variables after the factor analysis and reliability test rejected two variables, namely development of CI and involvement or engagement. Therefore, we could conclude that hypotheses H2 and H5 developed earlier were rejected. From the survey results, these two variables had no significant impact on sustainability of CI capabilities in the manufacturing industries in Penang.

**Table 4**  
**Regression Results of Sustainability of CI**

Variables	Standardized Coefficients	T	Sig.	Correlations			Condition Index
	Beta			Part	Tolerance	VIF	
(Constant)		4.746	0.000				
Strategic Focus	0.299	3.978	0.000	0.508	0.272	0.227	10.858
Integration of CI	-0.072	-0.954	0.341	0.324	-0.068	-0.054	13.969
Management of CI	0.244	3.579	0.000	0.352	0.247	0.204	19.784
Learning / Knowledge Sharing	0.295	4.212	0.000	0.477	0.287	0.240	21.040
R	0.596						
R Square	0.355						
Adjusted R Square	0.342						
F (df = 202)	27.268		0.000				

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Variables with significant value that was 0.05 or below was considered having a significant impact and the hypothesis would be accepted. Besides looking that the significant value, the condition index was monitored to ensure that variables did not showed condition index of above 30. Condition index of above 30 implies that collinearity is present and the variable would be rejected. The results of the regression analysis for the remaining four independent variables (H1, H3, H4 and H6) were illustrated in Table 4. There were no collinearities amongst variables in the model as all condition indices were below 30. The R square obtained through the model was 0.355. The R square rather than the adjusted R square could be used as the sample size is more than 30. The R square level was acceptable hence the model was reflective of the impact of the predictors to sustainability of CI capabilities.

The results of the regression analysis showed that strategic focus had a significant impact on sustainability of CI capabilities in an organization. This was proven through the significance value of 0.000 and beta coefficient of 0.299. From the correlation index of 0.508, strategic focus had the most impact on sustainability of CI capabilities. Hypothesis H1 was accepted since the regression results showed that strategic focus had a strong influence on the sustainability of CI capabilities. Strategic focus had the strongest effect on sustainability of CI basically due to the importance of employees in an organization to align their efforts to the common strategic goals set by the organization.

The results of the regression analysis showed that integration of CI had a no significant impact on sustainability of CI capabilities in an organization. The significance value of H3 was 0.341 as illustrated in Table 4.8. Since the significance value is more than 0.05, the null hypothesis, H3, that the higher the level of integration of CI the higher the impact on sustainability of CI capabilities was rejected. Integration of CI had the no positive impact on sustainability of CI basically due to manufacturing industries in Penang are used to the dynamic and changing environment. Change management was well implemented and had become a part of the daily task of manufacturing industries; therefore the respondents did not feel that it has impact on the sustainability of CI.

The results of the regression analysis showed that management of CI had a significant impact on sustainability of CI capabilities in an organization. This was proven through the significance value of 0.000 and beta coefficient of 0.244. The positive beta coefficient showed that management of CI had a positive impact on sustainability of CI. Hypothesis H4 was accepted since the regression results showed that management of CI had a positive influence on the sustainability of CI capabilities. Management of CI involved management participation in CI improvement activities which would act as a motivator to employees to focus on improvement projects. Therefore, it is concluded that the higher the level of management of CI the stronger the impact will be on sustainability of CI capability in a manufacturing organization.

The results of the regression analysis showed that learning or knowledge sharing had a significant impact on sustainability of CI capabilities in an organization. The significance value of 0.000 is lower than 0.05, hence the null hypothesis H6 was accepted and beta coefficient of 0.295 showed learning or knowledge sharing had a

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positive impact on sustainability of CI capabilities. From the correlation index of 0.477, learning or knowledge sharing had a strong impact on sustainability of CI capabilities. Learning or knowledge sharing had a strong influence on sustainability of CI due to the importance of knowledge management to employees in a manufacturing organization to sustain competitiveness and maintain technological leadership. Learning or knowledge sharing is important in an organization to have sustainable competitive advantage and enable continuous improvement on its processes and products.

### 5.0 Discussions

The research objectives are to determine the factors that will impact sustainability of CI capabilities in the manufacturing industries in Penang. From the data analysis, it is identified that the critical factors that impact sustainability of CI capabilities are: i) Strategic Focus, ii) Management of CI, and iii) Learning/Knowledge Sharing.

Strategic focus is the most important factor in the sustainability of CI in the model developed through the research. Strategic focus derives the importance of individuals and groups using the organizational goals to focus and prioritize their improvement activities. This is very important to create an aligned organization. Every employee from top to the bottom line needs to be sure of the goals and objectives to be achieved in order to have an effective improvement implementation. Employees will not see the importance of sustaining CI capabilities if this is not reflected in the organization's strategic goals. Organizational goals act as the standard guidelines to determine the level of performance of every employee in an organization. Aligned goals must be set within an organization's departments and employees from different level to ensure the success of strategic focus. An organization which has a top to bottom aligned goal will be directing the organization to the right direction and will ensure that all the activities performed are adding value for the customers. Management is increasingly aware of the importance of strategic focus and has taken progressive steps to inform employees about the goals set and the reason behind the setting such goals. Employees are able to access to the objectives set by their direct superior even the top management in order to set their own goals that are aligned to the organization's overall strategic strategy. For example, an organization that emphasized on time to market will invest heavily on technology and train employees to be creative and innovative to cope with the fast changing business environment today. The result of the research actually validated the studies conducted by Chaharbaghi and Lynch (1999) and Quin and Dalton (2007). According to Chaharbaghi and Lynch (1999), the ability of management to formulate effective resourced-based strategies was important to sustainability of competitive advantage. Quin and Dalton (2007) concluded that having sustainability goals and objectives encourages the employees to incorporate sustainability into their day-to-day activities. This actually was validated further by the result of the current research where strategic focus which involves goals and strategy setting as one of the critical factors that impact sustainability of CI capabilities that can be view as an organization's competitive advantage.

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Management involvement in CI activities is also very important in ensuring sustainability of CI capabilities in an organization. Traditionally, management team is not actively involved in CI activities. However, the changing trend today shows that management involvement ensures success of CI which was reflected by the result of the research. According to the findings of Bateman (2005), management focus and management involvement is very important to the sustainability of process improvement. It was found that strategy and supportive structure were important enablers for sustaining process improvement in the sampled engineers and members of improvement teams. One of main factors in these enablers was management focus and management involvement. Based on the interviews conducted by De Jong and Den Hartog (2007), leaders influence employees' innovative behaviour both through their deliberate actions aiming to stimulate idea generation and application as well as by their more general daily behaviour. The current research is actually in line with the findings of the previous studies with the focus more on the importance of management involvement in manufacturing industry in Penang. The results showed that management involvement in improvement is very important to enable sustainability of the CI capabilities. Management involvement can happen in many forms such as attending weekly improvement team update meetings, recognition systems for achieving improvement goals, having communication sessions with the project team leaders to understand the needs of the improvement teams and so on. Management involvement will actually motivate the employees to actively involved in CI projects and hence sustaining CI capabilities within the organization.

The learning organization is always equipped to handle any changes that are required to stay competitive. A learning organization is also able to sustain CI capabilities as observed in the research. Learning and knowledge sharing will motivate employees through skills development. The pervious study carried out by Martensen and Dahlgard (1999) confirmed that innovation and product development showed that the latest evolution stage of innovation processes represents integrated system learning and builds the concept of fast learning organizations. A more recent study conducted by Barber, Munive-Hernandez and Keane (2006) in a manufacturing environment found that knowledge management system to be very critical in initiating improvement processes. The KMS was shown to support CI initiatives through the utilization of available data already held within the company's management databases (production, quality and maintenance) including consideration of corporate strategic plans. The results of the current research actually further strengthen the relationship that learning and knowledge sharing is critical to sustain CI capabilities and through CI capabilities an organization is able to gain competitive advantage over its rivals through better quality, lower cost and added value to the products or services to customers. By having a knowledgeable workforce, an organization will be able to sustain its CI capabilities and to stay competitive in its business. Respondents from the survey showed that learning and knowledge sharing is a major factor in ensuring sustainability.

The findings of Bateman (2005) which conducted a study that targeted the Industry Forum engineers and change agents in companies showed that with measures used to monitor the improvement projects of the shop floors the improvement projects

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complies to the sustainability model. The results were further validated by the supplier development team of Nissan Motor Manufacturing UK to be fitting to their view of the continuous monitoring of process improvement as an enabler for sustainability. The current study had a differing conclusion compared to the previous study. Development of CI has no impact on sustainability of CI mainly due to CI models are already present in the sample organizations. Hence, respondents felt that development of CI is not critical to sustaining CI in their organizations. These contradicting findings can be further validated through more studies on the behavioural difference of employees in different geographic regions comparing Asian industrial culture and European industrial culture. Besides the cultural differences, the position that the respondents hold in an organization is also important in determining the significance of development of CI to sustainability of improvement. Employees under management level are decision makers that actually involve directly in monitoring of the development to CI in an organization. Hence, management level respondents might find that development of CI is highly significant to sustainability of CI capabilities. However, this will need to be further validated through studies segmenting on management level employees.

Integration of CI is also has no positive impact on sustainability of CI, this differed to the findings previous study. According to Quinn and Dalton (2007), it was found that leaders ability in communicating about the principles and practices of sustainability is essential to sustainability of a practice. Communication in the sample organizations came from formal channels, such as sustainability newsletters and websites. Communication also occurs on an informal basis, addressed in meetings and day-to-day interactions. The emphasis among respondents in the interview was that communication about sustainability needed to be consistent and integrated into everything the organization does. The differing findings might be due to the lack of involvement of executive level employees in the decision-making of change management in the sampled organizations. Change management are normally very well documented and implemented in a manufacturing based organization, hence the responses from the research indicates that it is not critical to the sustainability of CI. Manufacturing organizations are known to have good communication channels, as this is important for the organization to communicate process changes and product specification changes to manufacturing floor. With the communication channel properly in place, respondents will not see it as a crucial factor in sustaining CI.

## 6.0 Conclusions

The objective of this study was to identify the factors that have an impact on the sustainability of continuous improvement in the manufacturing industries in Penang. Strategic focus, management of continuous improvement and learning/knowledge sharing were found to be the most influential factors of sustainability of continuous improvement. The factor with strongest influence on sustainability was strategic focus followed by learning or knowledge sharing and management of continuous improvement. The results of the study are actually reflective of what employees from executive level in manufacturing industries in Penang viewed as important to sustaining improvement in their daily jobs. The three critical factors identified in this study shows that executive level employees viewed that understanding of

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organizational goals, management participation and a learning organization are crucial in sustaining CI. Hence, top management should focus on these three factors to ensure sustainable improvement capabilities. The other factors that are rejected can be explained that the organizations studied are currently having a very good practice in terms of monitoring of CI activities and also integration of CI; hence it was transparent and was viewed and insignificant to the study. Manufacturing organization should continue to practice good monitoring and communication capabilities in its daily operation and focus on the strategic focus, management of CI and learning or knowledge sharing amongst its executives to ensure sustainability of CI capabilities. The constructs of the study are focused on the factors that are critical to sustaining CI capabilities in manufacturing industries. However, CI is critical to all industries and can be further researched to service industries. Service industries are gaining pace in the market today and factors impacting CI capabilities in this industry are particularly under-researched.

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