Pertanika J. Soc. Sci. & Hum. 21 (S): 231 - 256 (2013)

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

A Study on Organizational Culture, Performance, and Technological Adoption Behaviours of Malaysian Food-Processing SMEs

Azmawani Abd Rahman[1]*, Nitty Hirawaty Kamarulzaman[2] and Murali Sambasivan[3]

[1]*Halal Product Research Institute, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia*
[2]*Faculty of Agriculture, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia*
[3]*Taylor's Business School, Taylor's University Lakeside Campus, 47500 Subang Jaya, Malaysia*

ABSTRACT

The present study focuses on the technological adoption behaviour of Malaysian food-processing SMEs that have the intention to adopt advanced technology for their manufacturing operation, but yet to adopt it. In particular, it investigates the relationship between organizational culture and firm performance as well as the relationship between firm performance and technological adoption behaviour. As these firms have yet to adopt advanced technology, the present study investigates their technological adoption behaviour in terms of perception on benefits and obstacles towards the technology adoption. Based on the data collected through a questionnaire survey, it was found that some organizational culture (specifically, group culture, and rationale culture) enhanced performance, while others did not. Meanwhile, performing firms are more favourable in terms of their technology adoption behaviour compared to the less-performing firms. Performing firms perceived more benefits and fewer obstacles related to knowledge and people compared to the less-performing firms. The study offers implications for both theory and practice.

Keywords: Technology adoption, culture, performance, food processing industry, Malaysia

ARTICLE INFO

Article history:
Received: 30 April 2012
Accepted: 30 September 2012

E-mail addresses:
azar@upm.edu.my (Azmawani Abd Rahman),
nitty@upm.edu.my (Nitty Hirawaty Kamarulzaman)
* Corresponding author

ISSN: 0128-7702 © Universiti Putra Malaysia Press

INTRODUCTION

Small and medium-sized enterprises (SMEs), which are considered the lifeblood of modern economies, dominate the food industry in Malaysia. Some of these SMEs are venturing into the export market, automating their production processes and undertaking their own product development. However, SMEs were the firms most affected by the economic downturn, as most of them had no capacity and capability to deal with a crisis of that magnitude (The Star, March 27, 2009). During the period of the Malaysian Third Industrial Master Plan (IMP3; 2006-2020), SMEs are expected to expand their capacities and enhance their competitiveness to meet domestic and international demands. In 2010, Malaysia's food exports amounted to RM18.2 billion and were exported to more than 200 countries (MIDA, 2010).

The food industry in Malaysia is dominated by small and medium-sized companies. There are a total of 548,307 (99.2%) SMEs currently operating in Malaysia. The four main categories of enterprises are processed foods (33%), wood products (24%), fabricated metal (15%), and building materials (9%) (Mohd Aris, 2007). More than 9,000 food-processing factories are operating in Malaysia, with 95% classified as small-scale. Food processing enterprises are generally perceived as agro-based industries, which have a strong backward linkage. These SMEs play a very important role in the Malaysian economy, especially in terms of generating employment. They also have a favourable impact on income distribution in the country (contributing to about 32% of GDP), and serve as a training ground for developing the skills of industrial workers and entrepreneurs (contributing to about 59% of total employment) (SME Annual Report, 2010/2011).

Small-scale food-processing enterprises show certain characteristics which distinguish them from their large-scale counterparts (Chee, 1986). Many small-scale food enterprises operate under a simple organizational structure with conventional business operations. Thus, the products they produce are often cheap and of low quality. Hence, in order to increase their competitive advantage and be able to compete globally, SMEs must have the capacity to produce products that are not only of good quality but inexpensive to produce. This can be accomplished through the adoption of improved technologies that can help SMEs to operate efficiently and optimize their resources.

Previous research, particularly in the SME industries, has provided a greater understanding of the benefits to organizations resulting from the adoption of new or advanced technologies. Amongst these benefits are improvement in accuracy, reduction in customer complaints, increase in efficiency, improvement in reliability, and improvement in overall performance (Liu & Barar, 2009; Swamidass & Kotha, 1998; Walters *et al*., 2006). Although the benefits are widely documented, not all firms opt for advanced technology in their manufacturing operations (Agarwal, 1997). It is not known whether these firms remain non-adopters because they fail to see the benefits of these technological innovations or because they perceive too many obstacles in implementing them into their manufacturing operations. As implementation remains an essential issue, an investigation of the perceived benefits of and obstacles to advanced technology adoption is a crucial initial step to further understand why some firms remain to hold their investment in advanced and new manufacturing technology.

Organizational culture has been found to be closely linked to attitude towards change, innovation and performance (Hilal *et al*., 2009; Jantan *et al*., 2003; Rashid *et al*., 2003; Rose *et al*., 2008). Each organization in Malaysia has a distinctive organizational culture (Rashid *et al*., 2004), and different cultural types may either permit or limit change, innovation and performance. Therefore, it is important to investigate whether these differences affect organizational performance amongst SME manufacturers. Organizational culture has been an important theme in management and business research for the past few decades due to its potential to explain a range of organizationally and individually desired outcomes such as commitment, loyalty, turnover intent, satisfaction and performance (Chow *et al*., 2001). Although organizational culture has been documented to explain many management issues, its use in technology adoption research has been limited (McDermott & Stock, 1999).

The purpose of the present study is to undertake an empirical and quantitative survey-based investigation to examine the relationship between organizational culture and firm performance, as well as the relationship between firm performance and technological adoption behaviour. The empirical data required for this investigation were collected from potential or future manufacturing technology adopters among food-processing SMEs.

LITERATURE REVIEW

Technological Adoption Behaviour

In order for a new technology to be adopted successfully, it must fit within existing manufacturing and use infrastructures, meet perceived needs, be nominally affordable, and be convergent with important cultural ideals (Croissant, 2008). Each of these five elements presents different barriers to adoption in diverse cultural, particularly, international context. A technically functional technology that disrupts important social processes or relies on scarce resources will not be adopted (Croissant, 2008). Within the context of this study, ‘adoption’ refers to the stage at which a manufacturing technology is selected for use by an organization.

According to Moore (1991), not all individuals or organizations want to participate in technology adoption since it is a costly, lengthy, and risky process that may not produce the desired results even after a significant investment. Moore (1991) has listed five categories of participants in the technology adoption process, including: 1) innovators who tend to be experimentalists and interested in technology itself; 2) early adopters who may be technically sophisticated and interested in technology for solving professional and academic problems; 3) the early majority who are pragmatists and constitute the first half of the mainstream; 4) the late majority who are less comfortable with technology and constitute the sceptical second half of the mainstream; and 5) laggards who may never adopt technology and may be antagonistic and critical of its use by others.

Perceived Benefits and Obstacles of Advanced Manufacturing Technology Adoption

One of the major thrusts on the technological adoption behaviour in the present study is the use of factors that are commonly cited in the literature as benefits in the implementation of advanced technology as perceived benefits for future adopters. McDermott and Stock (1999) stated that operational benefits are usually used to justify equipment purchases among upper management. Examples of operational benefits include increases in efficiency, productivity, quality, flexibility and cost reduction. According to Zairi (1992), operational benefits increase the organization's options in the marketplace and also provide advantages over competitors who have not implemented advanced technologies. Among the benefits expected from manufacturing technology were reduced production costs, consistent quality and the ability to meet delivery dates, as well as increased flexibility (e.g., the ability to offer a wide range of products or to more quickly develop new products) (Machuca *et al*., 2004; Swamidass & Kotha, 1998; Walters *et al*., 2006).

The usage of advanced technology calls for not only operational change but also managerial and organizational changes. In such changes, human factors and skills in managing change play a role as important as that of the technology itself (Schroeder *et al*., 1989). According to Dhar (1989), the majority of benefits do not come from the technology itself but from the organizational and methodological changes that must be made to support it. Examples of managerial or organizational benefits include improvements in communication, work flows, integration of work, lead time, and managerial control (Zairi, 1992). Ariss *et al*. (2000) also state that organizations aim to achieve management and organization benefits such as modernization of management philosophy, management exposure to modern technology, development of trainable and capable employees, and good management/labour relations. Other researchers who have identified managerial benefits in their studies include Chen and Small (1996), Sohal (1997), Zhao and Co (1997), Efstathiades *et al*. (1999), McDermott and Stock (1999), and Sabourin and Beckstead (1999).

Another outcome that may result from the usage of advanced technologies is competitive benefit, which includes market share, improved sales growth, and return on investment (Ramamurthy, 1995). Zairi (1998) suggested that advanced technology is introduced in order to gain not only economically but also strategically. Sohal (1997) stated that the most important benefits expected by firms implementing advanced technology are related to competitive advantage. Sohal and Maguire (1996) and Efstathiades *et al*. (1999) found that the main reasons for the introduction of advanced technology are to increase competitive advantage and maintain the existing market. Walters *et al*. (2006) also found that the competitive benefit gained from adopting advanced technology is the development of new business.

Organizations are more likely to adopt new technologies when the investment is financially justified, that is, when the benefit from the adoption outweighs the costs. Investments may not be financially justified if the costs for equipment, software development, integration or financing are too high relative to the expected stream of benefits. Unsurprisingly, the lack of financial justification is the most commonly identified obstacle in the literature. For example, Sabourin and Beckstead (1999), in their study on the development of useful indicators of science and technology activities, revealed that one of the obstacles that impedes manufacturing technology implementation is the lack of financial justification. According to the authors, lack of financial justification includes high cost equipment, cost of capital, cost of integration, cost to develop software and small market share.

There are also obstacles related to personnel. Adoption of new technology may require a firm to increase the skill level of its employees. For example, Yusuff *et al*. (2005) found that a lack of suitable skills at a number of levels will not only slow down the absolute rate of technology adoption but also limit the range of applications that can be made due to the lack of trained manpower to support the development of technology. Continuing education and training helps to ease the resistance to technology adoption (Beatty & Gordon, 1988). However, if firms choose to train, they may encounter resistance from employees who are unwilling to invest time to acquire new skills. Alternatively, if they intend to hire new staff, they may have problems finding and attracting individuals with the necessary skills. Successful adoption of manufacturing technology requires personnel to fully understand and direct factory automation projects to support the firm's strategic goals and objectives (Hottenstein & Casey, 1997).

Technology adoption is also influenced by the management competency. Management may be averse to risk taking. The introduction of a new technology into an organization may be met with resistance by the management itself, or the establishment may be unable to effectively evaluate the expected benefit from adoption. Ferraro *et al*. (1988) highlighted the fact that mismatches often occur among various levels of the organization. For example, a manufacturing manager with expertise in operations often may not have an adequate understanding of strategic issues. Conversely, top management may not have a full understanding of operational details. This often results in frustration as operation engineers are expected to meet the unrealistic demands of top management.

Manufacturing technology implementation may also fail as a result of inadequate planning (Kumar *et al*., 1996; Ramamurthy, 1995). Planning is essential to enable a careful assessment of the innovation's potential, the level of integration required, the functions affected, and all the necessary changes required. There is also evidence to suggest a need to involve various business activities in order to achieve overall business effectiveness. Maximum benefits will accrue if there is a fit between the capabilities of the technologies and the firm's business and manufacturing priorities (Gupta, 1996). Finally, external technical support may also influence the implementation of manufacturing technology. Sabourin and Beckstead (1999) found that the lack of an external support system may influence the failure of manufacturing technology implementation.

Relationship between Firm Performance Level and Technological Adoption Behavior

Technology adoption has been recognized by some researchers as a risky endeavour due to the possibility that the adopted technology may not yield the expected return. In fact, firms can fail as early as at the implementation stage (Gupta *et al*., 1997; Hottenstein *et al*., 1999; Sambasivarao & Deshmukh, 1995). This is because technology implementation is one of the most lengthy, expensive and complex tasks a firm can undertake. The challenges facing manufacturing firms, including those in many developing countries are adopting the right technology and using it efficiently (Jabar & Soosay, 2011). Frohlich (1999) warns practitioners that the threatening obstacles associated with technology implementation are not decreasing and may even be increasing due to the tremendous change in the complexity of technologies. Therefore, there is a possibility that firms with low performance level may hesitate to adopt new technology. According to threat-rigidity theory, performance below the aspiration level induces risk aversion (Audia & Greve, 2002), and orientation towards risk affects technology adoption decision (Fillis *et al*., 2004).

Therefore, this study applies threat-rigidity theory to behavioural determinants of technology adoption and predicts that low-performing firms will be risk-averse (Audia & Greve, 2002). Audia and Greve (2002) speculated that large firms would follow behavioural risk theory and that small firms would follow threat-rigidity theory because small firms focused more on the threats of failure. They found that performance decreases induce risk aversion in small firms but not in large firms. Similarly, Staw *et al*. (1981), Lopes (1987) and Sitkin and Pablo (1992) suggested that performance below the aspiration level heightens awareness of danger and leads to risk aversion.

However, some research has provided support to behavioural risk theory, including studies by Cyert and March (1963) and Kahneman and Tversky (1979), which argued that performance below the aspiration level heightens awareness of the need for improvement and thus stimulates rather than discourages risk-taking behaviour. Although the debate regarding the conflicting predictions of risk seeking and risk aversion has received considerable attention, it rests on limited empirical evidence (March & Shapira, 1987; Mone *et al*., 1998; Ocasio, 1995). Evidence of risk aversion when performance is below the aspiration level comes primarily from studies of risk behaviour in response to organizational decline such as in Greenhalgh (1983) and Cameron *et al*. (1987). Consistent with this argument, the present study theorizes that the level of a firm's performance will affect their perception of both the benefits and the obstacles of technology adoption.

Understanding Organizational Culture and Its Role in Supporting Change

Since the 1980s, organizational culture, which is also known as corporate culture, has become a popular variable in management studies (Hofstede, 1998). Culture is important because it comprises a powerful, latent, and often unconscious set of forces that determine both individual and collective behaviours, ways of perceiving, thought patterns, and values (Schein, 1999). In particular, organizational culture is important because cultural elements determine organizations' strategies, goals, and modes of operating (Schein, 1999). Due to its effects and potential impact on organizational success, organizational culture has received much attention in the last two decades.

Previous studies found that some organizational cultures have a positive impact on the performance of various organizational dimensions such as job commitment, job satisfaction, financial performance and innovativeness (Chow *et al*., 2001; Jantan *et al*., 2003; Lee & Yu, 2004; Rashid *et al*., 2003; Yiing & Ahmad, 2009). Within the scarce literature on advanced manufacturing technology implementation and organizational culture, it has been suggested that the right culture is needed to help organizations to face challenges, as well as to enjoy the benefits of implementation (Zammuto & O'Connor, 1992).

In order for organizations to be made more efficient and effective, the role of culture in organizational life must first be understood (Schein, 1999). Organizational culture was found to play an important role in the change process (Ahmed, 1998; deLisi, 1990; Pool, 2000; Rashid *et al*., 2004; Scheinder & Brief, 1996; Silvester & Anderson, 1999). Different cultures may either facilitate or inhibit organizational change (Pool, 2000), that is, any alteration in an organization's activities or tasks (Dawson, 1994). Kanter *et al*. (1992) define change as the process of analyzing the past to elicit the present actions required for the future. Organizational change may include changes in employees' attitudes, technology, performance, management, or infrastructure. One major issue in organizational change is determining the types of organizational culture that favour organizational change.

Several typologies have been developed to aid in understanding the concept of organizational culture. One of the earliest, developed by Wallach (1983), introduced organizational culture index (OCI) in terms of three distinct dimensions; bureaucratic, innovative and supportive. Later, Schein (1985) and Ott (1989) proposed the multi-level model of culture in understanding the concept of organizational culture, while Hofstede *et al*. (1990) developed an organizational culture model which focuses on six independent dimensions that describe organizational practices. Over the years, many more typologies have been developed and tested against various organizational variables (e.g., Christensen & Gordon, 1999; Cameron & Quinn, 1999; Goffee & Jones, 1998; Noordahaven *et al*., 2002; O'Reilly *et al*., 1991).

The present study uses the Competing Value Model (CVM) proposed by Quinn and Rohrbaugh (1981) and developed by Cameron and Quinn (1999). This framework was chosen because CVM is the most widely accepted conceptualization of organizational culture, apart from being used to examine various organizational phenomena and has been reported to effectively explain those phenomena (Deshpande *et al*., 1989; Dwyer *et al*., 2003; Quinn & Rohrbaugh, 1983; Sambasivan & Yen, 2010; Zammuto & Krakower, 1991). This framework has also been used to investigate the technology adoption environment. For example, Zammuto and O'Connor (1992) used this framework to study the role of organizational culture in gaining benefits of the technology. McDermott and Stock (1999) also used CVM to identify the relationship between organizational culture and technology implementation. In addition, many previous researchers used the CVM when defining distinctive culture types in studies relating to organizational performance (Deshpande *et al*., 1993; Deshpande & Farley, 1999; Dwyer *et al*., 2003; Henri, 2006).

The CVM consists of two dimensions: a flexibility–control axis and an internal–external axis. The flexibility–control axis emphasizes the desire to either change or maintain stability. A flexibility orientation reflects flexibility and spontaneity end, while a control orientation reflects stability, control and order end. The internal–external axis focuses on activities that occur either inside or outside the organization. The internal dimension reflects maintenance and improvement of the existing organization, while the external dimension focuses on competition with rivals (McDermott & Stock, 1999). The four quadrants of this framework reflect four types of organizational culture: group (internal flexibility), developmental (external flexibility), hierarchical (internal control), and rationale (external control). Fig.1 shows the CVM developed by Quinn and Rohrbaugh (1983).

Research Framework and Development of Hypotheses

Although many researchers have helped to identify the key success or failure factors of technology implementation, there have been few studies on the perceived benefits and obstacles of future adopters. In other words, studies have thus so far restricted their focus to the benefits and obstacles of technology implementation among those who have already adopted the technology, overlooking non-adopters' perspectives. Therefore, much remains to be understood regarding the relationships between organizational culture, performance and technological adoption behaviour, particularly in the SME environment. Based on the above discussion, Fig.2 proposes a conceptual model for this study:

There is a consensus among researchers that organizational culture is a management philosophy and a way of managing organizations to improve their effectiveness and performance (Boon & Arumugam, 2006). For example, Kotter and Heskett (1992) believe that organizational culture has a strong impact on the performance of the organization. Similarly, Van der Post *et al*. (1998) found that more financially effective firms differ from less effective firms with respect to the organizational culture dimension they predominately use. Deshpande and Farley (1999) found that entrepreneurial and competitive cultures perform better than consensual and bureaucratic cultures. Study by Rashid *et al*. (2003) showed that corporate culture

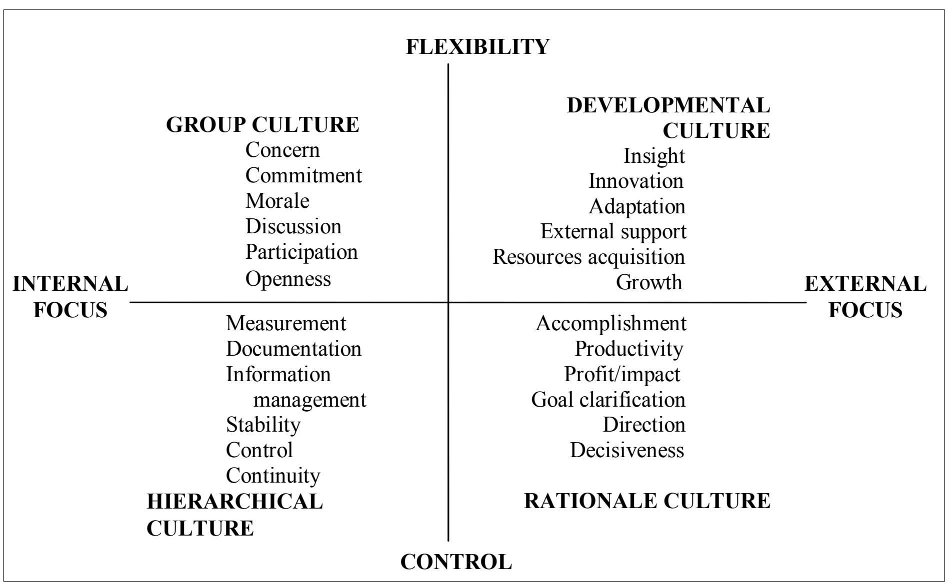

Fig.1: The Competing Value Framework (Source: Quinn & Rohrbaugh, 1983)

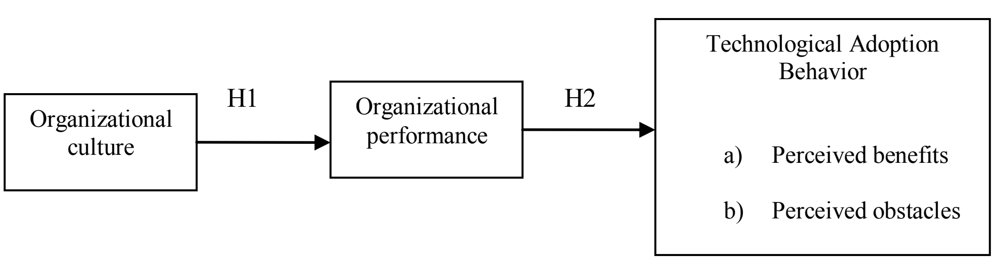

Fig.2: Conceptual Model

significantly influenced both return on investment and return on asset.

The above-cited literature suggests that organizational culture plays an important role in promoting organizational success, which could only be achieved by ensuring the development of an organization culture that matches the managers' values, attitudes and behaviour (Rashid *et al.*, 2003). Previous researchers have indicated that some organizational cultures support organizational change (Rashid *et al.*, 2004) and favour a higher degree of integration with suppliers, while others do not (Sambasivan & Yen, 2010). Zammuto and O'Connor (1992) found that the greater the organization's emphasis on control-oriented value, the more likely it is that the organization will experience technology implementation failure.

According to Yusuff *et al*. (2005), companies that are marked by a tradition of top-down control, in which supervisors are controllers rather than team leaders, may experience more conflict when introducing technological change, which in turn may limit organizational performance. Therefore, this study predicts that there is a relationship between organizational culture and performance. In line with the above discussion, it is hypothesized that:

Hypothesis 1:

There is a significant relationship between organizational culture and organizational performance.

As discussed earlier, there are two conflicting theories regarding the relationship between firm performance and risks; behavioural risk theory predicts that low-performing firms will take greater risks, but threat-rigidity theory predicts that low-performing firms will be risk-averse (Audia & Greve, 2002). Audia and Greve (2002) also speculated that large firms would follow behavioural risk theory and that small firms would follow threat-rigidity theory because small firms are more focused on the threats of failure. In their study, the authors found that decreased performance induced risk aversion in small firms but not in large firms. Similarly, Staw *et al*. (1981), Lopes (1987) and Sitkin and Pablo (1992) suggested that performance below the aspiration level heightened awareness of danger and led to risk aversion.

Adoption of advanced manufacturing technology involves greater financial investment and high uncertainty in many aspects. The present study follows the argument made by Audia and Greve (2002) that small firms tend to use threat-rigidity theory in making decisions. Threat-rigidity theory argues that decision makers interpret performance below the aspiration level as a threat to their vital interests (Milliken & Lant, 1991; Mone *et al*., 1998; Ocasio, 1995; Sitkin & Pablo, 1992). As a result of the different levels of stress and anxiety experienced by performing and less-performing firms, their ability to identify benefits differs. Thus, it could also be argued that performing and less-performing firms might possess different perceptions of the benefits of and obstacles to technology implementation, since not all firms adopting the technology are able to reap all of its potential benefits. This study also investigated the relationship between organizational performance and the perceived benefits of and obstacles to technology adoption. This reasoning leads to the following hypotheses:

Hypothesis 2a:

There is significant mean difference in the perception of the benefits of technology adoption between low and high performing firms.

Hypothesis 2b:

There is significant mean difference in the perception of obstacles to technology adoption between low and high performing firms.

RESEARCH METHODOLOGY

Sample and Sampling Procedure

The mail survey was sent to a total of 328 food-processing SMEs listed in the Federation of Malaysian Manufacturer (FMM) and SMIDEC directories. We defined SMEs as companies with 150 or fewer employees, similar to the definition used by SMECorp Malaysia. A judgmental sampling procedure was used, and the respondents whose firms had the intention to adopt new technology. Respondents who held managerial positions were chosen, and as such, they were expected to possess relevant knowledge pertaining to both strategic and managerial issues at the institutional level. At the end of the data collection period, a total of 85 usable responses were collected for further analysis.

Measurement

This study used a list of advanced technologies derived and modified from the surveys conducted by Statistics Canada (Sabourin & Beckstead, 1999), Swamidass and Kotha (1998), and Abd Rahman *et al*. (2009). The list includes a variety of functional technology groups used in processing, assembly, packaging, automated material handling, inspection, integration and control. The respondents were asked to indicate the technologies their firms used and planned to use.

Scales for the perceived benefits of advanced technology were developed based on the study by McDermott and Stock (1999), who categorized the benefits of technology adoption into operational, organizational, and competitive benefits. Items were scored on a 5-point Likert scale ranging from “not at all” to “to a very great extent”. Meanwhile, perceived obstacles were developed based on various studies documenting stumbling blocks to successful technology implementation such as the lack of financial support, lack of knowledge, lack of support from employees and management, and lack of facilities and support from suppliers (Sabourin & Beckstead, 1999; Sambasivarao & Deshmukh, 1995; Sohal, 1997; Udo & Ehie, 1996; Walters *et al*., 2006). The respondents were asked to indicate their responses using the same 5-point scale described above.

The measure of organizational culture

was based on Quinn and Rohrbaugh's (1981, 1983) Competing Value Model (CVM) described earlier (Zammuto & O'Connor, 1992). The items were scored on a 5-point scale ranging from strongly disagree to strongly agree. The measure of performance was based on the research by Agarwal (1997), Vickery *et al.* (1993) and Youssef (1991). The respondents were asked to indicate on a 5-point scale their business unit performance on several dimensions in relation to their major competitors. Details of the items in the reliability and validity tests are shown in Tables 1, 2, 3, and 4.

Scale Purification

An initial reliability test was carried out on all the variables. Results indicated that the values are all above the recommended minimum threshold of 0.7. Next, a validity analysis was carried out using factor analysis. Table 1 indicates the value of the reliability test on the final items retained for further analysis.

The validity test was carried out using exploratory factor analysis (EFA) on the perceived benefits and perceived obstacles. During this stage, several items were deleted because they merged into the unintended factors. Also, dimensions of perceived obstacle variables were relabelled according to the pattern suggested by the factor analysis. For the perceived benefits scale, two items ('enabled the firm to meet organizational goal' and 'increase in the ability to compete') merged into the unintended factors. These items were deleted to increase content validity and internal reliability, leaving us with 15 items for further analysis. Table 2 shows the factor analysis after deleting the two items.

Table 3 indicates the results of EFA for the perceived obstacles construct. The analysis revealed that instead of loading into the five intended dimensions of obstacles (financial, skill, knowledge, people, and support), the components show strong loadings into only four different factors. The skill and knowledge scales appeared to merge together as one scale (under component 1); therefore, this scale was relabelled as perceived knowledge obstacles.

Table 4 indicates the results of the EFA for the performance construct. The analysis revealed that the components showed strong loadings into two intended factors, namely, non-cost performance and cost performance.

TABLE 1
Reliability test of all variables

Variables	**Cronbach's Alpha (α)**
Perceived Benefits	.829
Operational benefits	.818
Managerial benefits	.783
Competitive benefits	.799
Perceived Obstacles	.902
Financial obstacles	.906
Knowledge obstacles	.908
People obstacles	.922
Support obstacles	.901
Organizational Culture	.882
Group culture	.784
Developmental culture	.775
Rationale culture	.743
Hierarchy culture	.754
Organizational Performance	.822

Discriminant validity was further tested

TABLE 2
Exploratory factor analysis for perceived benefits construct

	Components		
	1	2	3
Increase in efficiency	.843		
Increase in productivity	.801		
Increase in reliability	.742		
Increase in quality	.622		
Increase in flexibility	.534		
Cost reduction	.437		
Increase in market share		.784	
Increase in profitability		.773	
Increase in return on investment		.759	
Increase in sales growth		.679	
Improvement in communication			.798
Improvement in work flow			.775
Integration of business activity			.723
Improvement in lead time			.719
Improvement in management control			.624

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

TABLE 3
Exploratory factor analysis for perceived obstacles construct

	Components			
	1	2	3	4
Inexperience in new/ advance technology implementation	.868			
Management Lacking of knowledge in new/ advanced technology	.852			
Our staff are lacking of skill for new/advanced technology	.830			
Our management is lacking of skill for new/ advanced technology	.794			
Lacking of knowledge in new/advanced technology by staff	.755			
Inability to evaluate financial return of new adopted technology	.613			
Inadequate understanding of new/advanced technology	.556			
Resistance by management		.854		
Lack of support from the management		.856		
Lack of support from staff		.850		
Resistance by staff		.810		
High cost equipment			.849	
Lack of funding			.824	
High integration cost of new technology			.621	
High training cost			.710	
Small market share			.633	
Lack of support by government				.834
Lack of technical support/ service by vendor/ consultant				.801
Lack of effective support system (infrastructure) in the firm				.668

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

TABLE 4
Exploratory factor analysis for the performance construct

	Components	
	1	2
product performance and reliability	.771	
production lead time	.756	
product features	.738	
delivery reliability	.734	
conformance to specifications	.728	
customers' perception of quality	.725	
lead time of order	.653	
design and engineering quality	.653	
response to customer requirement	.636	
speed in changing product volume	.632	
research and development effort	.586	
new product introduction	.531	
speed in making product changeover	.527	
volume flexibility	.479	
unit labour cost		.901
unit overhead cost		.881
unit material cost		.871
unit production cost		.753

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

using CFA. CFA for the perceived benefits resulted in an adequate fitting model of χ^2 (54) = 1763.3, p = 0.00; GFI = 0.90; CFI = 0.91, TLI = 0.90 and RMSEA = 0.08. Even though the chi-square statistic is significant, other fit indices indicate a recommended level of indices. Meanwhile, CFA for the perceived obstacles resulted in an adequate fitting model of χ^2 (113) = 240.1, p = 0.00; GFI = 0.90; CFI = 0.92, TLI = 0.91 and RMSEA = 0.09. The chi-square statistics were significant but other fit indices indicated a recommended level of indices, suggesting that the hypothesized model of perceived obstacles is admissible.

RESULTS AND DISCUSSION

Respondents' Profiles and Preliminary Analysis

Frequency and percentage distributions for corresponding demographic profiles are displayed in Table 5. The highest percentage of firms (36.5%) had 10 to 49 employees, while a similar percentage (34.1%) had 9 or fewer employees, and only 10.6% of the firms had been established for fewer than three years. Finally, the majority of the companies (68.2%) were locally owned.

Table 6 indicates the means, standard deviations and coefficient alphas for perceived benefits, perceived obstacles, organizational culture, and performance.

TABLE 5
Frequency and percentage distribution of respondents by demographic profile

Profile	Frequency	Percentage
Company size		
9 or less	29	34.1
10 to 49	31	36.5
50 to 100	12	14.1
101 to 150	13	15.3
Company establishment		
Less than 3 years	9	10.6
3 to 5 years	17	20.0
5 to 10 years	22	25.9
10 to 15 years	23	27.1
More than 15 years	14	16.5
Company status		
Local owned	58	68.2
> 50% foreign majority	12	14.1
< 50% foreign majority	13	15.3
Others	2	2.4

The mean score for each variable revealed that competitive and operational benefits were the two top perceived benefits from advanced technology adoption, with tej mean scores of 4.39 and 4.32, respectively. Meanwhile, financial impediments and lack of knowledge and skills were revealed as the top two obstacles perceived by the responding firms in adopting advanced technologies, with the mean scores of 3.68 and 3.25, respectively.

Testing of Hypotheses

Hypothesis 1 postulates that different organizational cultural values will lead to different level of organizational performance. Multiple regression analysis was used to test this relationship. All four organizational cultures were tested simultaneously in this multiple regression model to identify the predictive organizational culture and to explain the variance in organizational performance. Results of the analysis are depicted in Tables 7 and Table 8.

Table 7 shows that the value of R^2 is 0.18, suggesting that the model explains 18% of the variance in organizational performance. The model is significant with a statistical significance value of 0.00 ($p<0.05$). Table 8 shows that only two cultures, namely, group culture and rationale culture, make a significant unique contribution to the prediction of organizational performance. The group culture beta coefficient is 0.33, and the rationale culture beta coefficient is .44 (significant at $p<0.05$). The positive symbol indicates a positive relationship between organizational culture and performance, with high group and rationale culture associated with a high level of organizational performance.

TABLE 6
Means, Standard Deviations and Coefficient Alphas for Perceived Benefits, Perceived Obstacles, Organizational Culture and Performance

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Benefits																		
1. Operational Benefits	4.32	.62	NA															
2. Managerial Benefits	3.96	.73	.44**	NA														
3. Competitive Benefits	4.39	.59	.58**	.28**	NA													
4. Overall Benefits	4.22	.53	.85**	.79**	.71**	NA												
Obstacles																		
5. Financial Obstacles	3.68	.78	.21**	-.03	.17*	.14*	NA											
6. Knowledge Obstacles	3.25	.91	-.10	-.14	-.08	-.14	.48**	NA										
7. Staff Obstacles	2.25	1.00	-.16	-.21	-.19	-.24	.17*	.44**	NA									
8. Support Obstacles	2.88	1.05	-.10	-.10	-.12	-.13	.26**	.31**	.49**	NA								
9. Overall Obstacles	3.09	.67	-.05	-.17	-.07	-.13	.68**	.89**	.70**	.63**	NA							
Organizational Culture																		
10. Group Culture	4.07	.53	.32	.12	-.33	.30**	.05	-.01	-.20**	-.07	-.03	NA						
11. Develop. Culture	3.91	.50	.19	.15	.12	.20*	-.12	.01	-.04	-.03	-.06	.68**	NA					
12. Rationale Culture	3.76	.57	.32*	.34	.26	.40**	-.14	-.29	-.16*	-.06	-.25**	.37**	.56**	NA				
13. Hierarchy Culture	3.73	.57	.30	.35	.14	.35**	-.10	-.20	-.04	-.02	-.15	.32**	.62**	.77**	NA			
Performance																		
14. Non-Cost Performance	3.52	.69	.22*	.13	.20	.23*	.03	-.17	-.42**	-.10	-.23*	.29**	.15	.34**	.21	NA		
15. Cost Performance	3.40	.58	.01	.05	.15	.08	-.12	-.13	-.19	-.23*	-.22*	.18	.17	.21	.08	.56**	NA	
16. Overall Performance	3.49	.55	.18	.12	.21	.21	-.01	-.18	-.39**	-.15	-.25*	.29**	.17	.34**	.12	.93**	.73**	NA

**p<0.01 (2-tailed)
*p<0.05 (2 tailed)

TABLE 7
Model summary and ANOVA

Dependent variable	Model summary		ANOVA	
	R	R Square	F	Sig.
Overall Performance	.42	.18	4.37	.00

Predictors: (Constant), hierarchy culture, group culture, rationale culture, developmental culture

TABLE 8
Regression results on the relationship between organizational culture and organizational performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.89	.53		3.58	.00
	Group culture	.33	.15	.32	2.24	**.03**
	Developmental culture	-.27	.20	-.23	-1.33	.19
	Rationale culture	.44	.17	.42	2.60	**.01**
	Hierarchy culture	-.10	.18	-.10	-0.55	.58

a Dependent Variable: organizational performance

The finding showed that group and rationale cultures have a significant positive relationship with organizational performance. This suggests that organizations with stronger elements of group culture and rationale culture are likely to experience higher performance. This supports the arguments made by other researchers (e.g., Boon & Arumugam, 2006; Deshpande & Farley, 1999; Kotter & Heskett, 1992; Rashid *et al*., 2003; Van der Post *et al*., 1998). For example, Kotter and Heskett (1992) found that firms with a culture that emphasizes on all the key managerial constituencies (customers, stockholders and employees), as well as leadership from managers at all levels, outperformed by a huge margin other firms that do not have those cultural traits. Group culture emphasizes human resources (employees and stockholders), while rationale culture emphasizes external focus (customers); therefore, both these cultures present the values of those described by Kotter and Heskett (1992) as high performers.

Meanwhile, firms with a predominantly group culture emphasize commitment, participation and openness of their human resources as a means to achieve performance, while firms with a predominantly rationale culture emphasize goal clarification, direction and accomplishment of their human resources in achieving performance. Although these approaches differ, both seem to be effective means by which to achieve organizational performance.

Developmental culture is more common in newly established firms, while hierarchical culture is more common in government agencies. Firms owned by government agencies normally possess a hierarchical culture, with the characteristics of stability, control and continuality (Twati & Gammack, 2006). Since the adoption of technology tends to change work processes and methods in organizations, firms with a hierarchical culture are less likely to change. Therefore, private firms that fit strongly into a hierarchical culture are less likely to perform well than firms with a strong group culture or rationale culture (Obenchen *et al*., 2004).

Hypotheses 2a and 2b postulate that there is a significant relationship between organizational performance and the perceived benefits of and obstacles to technology adoption. An independent sample *t* test was conducted to identify any significant difference in the perceived benefits and obstacles between performing and less- performing firms. A mean score of 3.5 was used as a cut-off point; firms with a mean score above 3.5 were considered performing firms, while those with a mean score of 3.5 or below were considered as less performing firms. Tables 9 and 10 summarize the results of the independent *t* test between performance as a dependent

TABLE 9
Independent *T* Test Results for Differences in Perceived Benefits of Advanced Technology Adoption by Performance Level

Perceived Benefits	Performance	Mean	Levene's test (sig. value)	Sig. value
Operational	High	4.42	.322	.031
	Low	4.25		
Managerial	High	4.16	.345	.025
	Low	3.80		
Competitive	High	4.57	.620	.014
	Low	4.26		
Overall	High	4.42	.429	.002
	Low	4.12		

TABLE 10
Independent *T* Test Results for Differences in Perceived Obstacles to Advanced Technology Adoption by Performance Level

Perceived Obstacles	Performance	Mean	Levene's test (sig. value)	Sig. value
Financial	High	3.60	.427	.481
	Low	3.74		
Knowledge	High	3.00	.866	.008
	Low	3.48		
People	High	1.76	.077	.000
	Low	2.64		
Support	High	2.71	.569	.202
	Low	3.01		

variable and both perceived benefits and obstacles as independent variables. The results indicate that the mean score of perceived operational benefits, perceived managerial benefits, perceived competitive benefits, and perceived overall benefits are significantly different between the performing and less-performing firms. For all the dimensions of perceived benefits, the mean scores of performing firms are higher than those of the less-performing firms.

Meanwhile, the mean scores of people resistance as an obstacle and perceived overall obstacles are significantly different between the performing and less-performing firms. The mean score of people as an obstacle towards technology adoption is lower (1.76) in the performing firms than in the less-performing firms (2.64). A similar pattern is observed for the knowledge obstacles towards technology adoption, where firms with higher performance perceive lower knowledge obstacles (mean score of 3.0) than firms with lower performance (mean score of 3.48) in terms of their technological adoption behaviour.

The analysis between organizational performance and perceived benefits of and obstacles to technology adoption showed that performance level impacts the way firms perceive the benefits of technology adoption. The perception of threat leads to psychological stress and anxiety, which restricts information processing and reduces behavioural flexibility (Audia & Greve, 2002). The inability to generate and consider risky alternatives makes decision makers rigid and risk averse (Audia & Greve, 2002). Furthermore, based on threat-rigidity theory, performing and non-performing firms experience different levels of stress and anxiety, resulting in differing abilities to identify benefits. According to the authors, low-performing firms were risk averse, which meant that high-performing firms perceived higher benefits of technology adoption.

The perceptions of perceived benefits of and obstacles to technology adoption differ according to the firm's performance level. High-performing firms perceive more benefits from advanced manufacturing technology adoption than do less-performing firms. Rapid changes in the market demand can affect the product of a manufacturing firm and force it to redesign the product. In such cases, the existing equipment may be inadequate to incorporate the required changes to a product. Performing firms are quicker to recognize what the technology could bring to their organization in order to remain competitive.

Regardless of their performance level, firms perceive financial issues as the main obstacles to technology adoption. Less-performing firms see more obstacles in terms of knowledge and people's support than do high performing firms. In terms of overall obstacles, performing firms perceive fewer obstacles to technology adoption than do less-performing firms. The importance of knowledge and support from staff are enormous for successful implementation of advanced technologies into firms. Many firms that have already invested in technology are unable to progress to higher levels of technology. The investment may end up as the 'white elephant' and thus, firms fail to benefit from the technology.

Adopting new and advanced technology is a risky decision since it involves substantial financial investment and there is a possibility of adoption failure due to various factors such as lack of employee and vendor support, and lack of knowledge or failure of the technology to work as expected. The results of this study support the argument made by the threat-rigidity theory that low-performing firms will be risk-averse (Audia & Greve, 2002; Lopes, 1987; Sitkin & Pablo, 1992; Staw *et al*., 1981).

CONCLUSION

The results of the study contribute to the body of knowledge in organizational culture and technology adoption. These results aid in understanding the role of organizational culture in the propensity of food-processing SMEs to adopt new and advanced technologies in the immediate future. The findings highlight some important implications for practicing managers. First, managers of food processing SMEs may take steps to inculcate types of organizational culture with specific values that will enhance organizational performance. These values help to determine what members within the organization see as important and whether or not employees will be supportive of organizational goals to adopt technology. This is indirectly linked to the perceived obstacles to and benefits of technology implementation, particularly in the agriculture sector.

As the findings reveal that food processing SMEs' performance affects technological adoption behaviour, management should be aware that a firm's performance influences how it perceives the benefits of technology adoption, which could affect attitudes towards technology adoption. Managers of less-performing food-processing SMEs having low tendency to adopt technology should be encouraged to adopt technology into their manufacturing facility. These managers also need to be aware that resistance from people within the organization and the lack of knowledge and skills are impediments not only to successful technology implementation, but also to the initial intention to adopt the technology. As this study focuses on the future adopter, it can serve as a guideline for other players in the industry in order to increase the success rate of technology adoption and implementation in the Malaysian food-based manufacturing industry.

This study is limited to the demographic scope within Peninsular Malaysia, mainly due to financial and time constraints. Thus, it may limit the generalizability of the findings. In addition, the data for this study were obtained through questionnaires. Hence, this study has the inherent methodological limitations of any questionnaire investigation. Future research should use different methods or models to measure culture, performance and technological adoption behaviour, as these methods may result in different findings.

REFERENCES

Abd Rahman, A., Bennett, D., & Sohal, A. (2009). Transaction attributes and buyer-supplier relationships in AMT acquisition and implementation: the case of Malaysia. *International Journal of Production Research, 47*(9)*,* 2257-2278S.

Agarwal, D. (1997). An empirical investigation of the impact of advanced manufacturing technology on business performance. New York: The City University. Doctoral Dissertation.

Ahmed, P. K. (1998). Culture and climate for innovation. *European Journal of Innovation Management, 1*(1)*,* 30-43.

Ariss, S. S., Raghunathan, T. S., & Kunnathar, A. (2000). Factors affecting the adoption of advanced manufacturing technology in small firms. *SAM Advanced Management Journal*, 14-29.

Audia, P. G., & Greve, H. R. (2002). *Performance, firm size and factory expansion in the shipbuilding industry*. Michigan: University of Michigan. Automationmag. (2009). "advanved manufacturing."

Beatty, C. A., & Gordon, J. R. M. (1988). barriers to the implementation of CAD/CAM system. *Sloan Management Review,* Summer, 25-33.

Boon, O. K., & Arumugam, V. (2006). The influence of corporate culture on organozational commitment: case study of semiconductor organizations in Malaysia. *Sunway Academic Journal, 3*, 99-115.

Cameron, K., & Quinn, R. E. (1999). *Diagnosing and changing organizational culture*. New York: Addison-Wesley.

Cameron, K. S., Kim, M. U., & Whette, D. A. (1987). Organizational effects of decline and turbulence. *Administrative Science Quarterly, 32*, 222-240.

Chee, P. L. (1986). *Small Industry in Malaysia*. Kuala Lumpur: Berita Publishing Sdn. Bhd.

Chen, I. J., & Small, M. H. (1996). Planning for advanced manufacturing technology: A research framework. *International Journal of Operation & Production Management, 16*(5), 4-24.

Chow, C. W., Harrison, G. L., McKinnon, J. L., & Wu, A. (2001). Organizational culture: association with affective commitment, job satisfaction, propensity to remain and information sharing in a chinese cultural context. *Center for Interational Business Education and Research (CIBER),* 111.

Christensen, E. W., & Gordon, G. G. (1999). An exploration of industry, culture and revenue growth. *Organization Studies, 20*(3), 397-422.

Croissant J. L. (2008). *Technology adoption of. International Encyclopedia of the Social Sciences*. Encyclopedia.com. Retrived May 23, 2011 from encyclopedia.com:http//www.encylopedia.com/doc/1G2-3045302716.html.

Cyert, R. M., & March, J. G. (1963). *A Behavioral theory of the firm*. Eaglewood Cliffs, NJ: Prentice-Hall.

Dawson, P. (1994). *Organizational change: a process approach.* London, Paul Chatman.

deLisi, P. S. (1990). Lessons from the steel axe: culture, technology and organizational change. *Sloan Management Review 32(*1), 83-93.

Deshpande, R., & Farley, J. (1999). Executive insights: corporate culture and market orientation: comparing Indian and Japanese firms. *Journal of International Marketing, 7*(4), 111-127.

Deshpande, R., Farley, J., & Webster, F. E. (1993). corporate culture, customer orientation, and innovativeness in Japanese firms: a quadrant analysis. *Journal of Marketing, 57*, 23-37.

Deshpande, R., & Webster, F. E. Jr. (1989). Organizational culture and marketing: defining the research agenda. *Journal of Marketing 53*(1), 3-15.

Dhar, U. R. (1989). FMS: major breakthrough in manufacturing management *Engineering Management International, 5*(4), 271-277.

Dwyer, S., Richard, O. C., & Chadwick, K. (2003). Gender diversity in management and firm performance: the infuence of growth orientation and organizational culture *Journal of Business Research, 56*, 1009-1019.

Efstathiades, A., Tassou, S. A., Antoniou, A., & Oxinos, G. (1999). Strategic consideration in the introduction of advanced manufacturing technologies in the Cypriot industry. *Technovation, 15*, 105-115.

Ferraro, R. A., Hunley, T. E., & Shackney, O. Y. (1988). Banishing management barriers to automation. *Manufacturing engineering,* January, 44-48.

Fillis, I., Johannson, U., & Wagner, B. (2004). Factors impacting on e-business adoption and development in the smaller firm. *International Journal of Entrepreneurial Behaviour & Research*, *10*(3), 178 - 191.

Goffee, R., & Jones, G. (1998). The character of a corporation: How your company's culture can make or break your business. *Harper Business, London*.

Greenhalgh, L. (1983). Organizational decline. *Res. Social Organ., 2,* 231-276.

Gupta, A. (1996). Advanced manufacturing strategy: a managerial perspective. *International Journal of Vehicle Design, 17*(2)*,* 139-146.

Gupta, A., Chen, I., & Chiang, D. (1997). Determining organizational structure choices in Advanced Manufacturing Technology Management. *International Journal of Management Science, 25*(5), 511-521.

Henri, J.-F. (2006). organizational culture and performance measurement systems. *Accounting, Organization and Society, 31,* 77-103.

Hilal, A. V. G. d., Wetzel, U., & Ferreira, V. (2009). Organizational culture and Performance: a Brazilian case. *Management Research News, 32*(2)*,* 99-119.

Hofstede, G. (1998). Attitudes, values and organizational culture: disentangling the concepts. *Organization Studies, 19*(3)*,* 477-492.

Hofstede, G., Neuijen, B., Ohayv, D. D., & Sanders, G. (1990). Measuring organizational cultures: a qualitative and quantitative study across twenty cases. *Administrative Science Quarterly, 35*(2), 48-75.

Hottenstein, M. P., & Casey, M. S. (1997). Facilitation of advanced manufacturing technology: Implementation and transfer. *Industrial Management, 39* (5)*,* 8-15.

Jantan, M., Nasurdin, A. M., & Fadzil, N. F. A. (2003). Designing innovative organizations in Malaysia: do structure and culture matter. *Global Business Review, 4*(2)*,* 213-226.

Jabar, J., & Soosai, C. (2011). Organisational Learning as an antecedent of technology transfer and new product development: A study of Manufacturing firm in Malaysia. *Journal of Manufacturing Technology Management, 22*(1), 25-45.

Kahneman, D., & Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica, 25*, 683-706.

Kanter, R. S., Stein, B., & Jick, T. D. (1992). *The challenge of organizational change*. New York: The Free Press.

Kotter, J. P., & Heskett, J. L. (1992). *Corporate culture and performance*. New York: The Free Press.

Kumar, V., Murphy, S. A., & Loo, S. C. K. (1996). An investment decision process: the case of advanced technologies in Canadian manufacturing firm. *International journal of Production Research, 34*(4)*,* 947-958.

Lee, S. K. J., & Yu, K. (2004). Corporate culture and organizational performance. *Journal of Managerial Psychology, 19*(4), 340-359.

Leonard-Barton, D. (1988). Synergistic design for case studies: longitudinal single-site and replicated multiple-site. Longitudinal Research Methods in Organizations. Austin, TX, National Science Foundation.

Liu, H., & Barar, P. (2009). Performance implications of strategy-technology connections: an empirical examination. *Journal of Manufacturing Technology Management*, *20*, 52-73.

Lopes, L. L. (1987). Between hope and fear: the psychology of risk. *Adv. Experiment. Social Psych, 20*, 255-295.

Machuca, J. A. D., Diaz, M. S., & M. Gil, J. A. (2004). Adopting and implementing advanced manufacturing technology: new data on key factors from the aeronautical industry. *International Journal of Production Research, 42*(16), 3183-3202.

March, J. G., & Shapira, Z. (1987). Managerial perspectives on risk and risk taking *Management Science, 33*, 1404-1418.

McDermott, C. M., & Stock, G. N. (1999). Organizational culture and advanced manufacturing implementation. *Journal of Operations Management, 17*, 521-533.

Malaysian Investment Development Authority (MIDA) (2010). Retrieved April 25, 2012 from http://www.mida.gov.my/env3/index.php?page=food-industries.

Milliken, F. J., & Lant, T. K. (1991). The effect of an organization's recent performance history on strategic persistence and change. *Adv. Strategic Management, 7*, 129-156.

Mohd Aris, N. (2007). *SMEs: Building Blocks for Economic Growth*. Retrieved June 8, 2012 from www.smecorp.gov.my/v4/node/7.

Mone, M. A., McKinley, W., & Barker, V. L. (1998). Organizational decline and innovation: a contingency framework. *Academy Management Review, 23*, 115-132.

Moore, G.A., (1991). *Crossing the Chasm*. New York: HarperCollins

Noordahaven, G., Koen, I., & Beugelsdijk, S. (2002). Organizational culture and network embeddedness. *Tibung University Centre Discussion paper*, 2002-2091.

O'Reilly, C. A. I., Chatman, J. A., & Caldwell, D. (1991). People and organizational culture: a profile comparison approachto assessing person-organization fit. *Academy of Management Journal, 34*(3), 487-516.

Obenchen, A. M., Johnson, W. C., & Dion, P. A. (2004). Institutional types, organizational culture and innovation in Christian colleges and universities. *Christian Higher Education, 3*, 15-39.

Ocasio, W. C. (1995). *The enactment of academic adversity: a reconciliation of theories of failure-induced change and treat-rigidity*. Greenwich, CT: JAI Press.

Ott, J. S. (1989). *The organizational culture perspective*. Chicago: The Dorsey Press.

Pool, S. W. (2000). Organizational culture and its relationship between jobs tension in measuring outcomes among business executives *Journal of Management Development, 9*(1), 32-49.

Quinn, R. E. & Rohrbaugh, J. (1981). A competing value approach to organizational effectiveness. *Public Productivity Review, 5*, 122-140.

Quinn, R. E., & Rohrbaugh, J. (1983). A spatial model of effectiveness criteria: towards a competing values approach to organizational analysis. *Management Science, 29*, 363-377.

Ramamurthy, K. (1995a). The influence of planning on implementation success of advanced manufacturing technology. *IEEE Transaction on Engineering Management, 42*(1), 50-61.

Ramamurthy, K. (1995b). Influence of planning on implementation success of AMT. *IEEE Transitions on Engineering Management, 42*(1), 62-73.

Rashid, M. Z. A., Sambasivan, M., & Johari, J. (2003). The influence of corporate culture and organizational commitment on performance. *Journal of Management Development, 22*(8), 708-728.

Rashid, M. Z. A., Sambasivan, M., & Rahman, A. A. (2004). The influence of organizational culture on attitudes toward organizational change. *The Leadership and Organization Development Journal, 25*(2), 161-179.

Rose, R. C., Kumar, N., Abdullah, H., & G. Y. Ling (2008). Organizational culture as a root of performance improvement: research and recommendations. *Contemporary Management Research, 4*(1), 43-56.

Sabourin, D., & Beckstead, D. (1999). Technology adoption in Canadian manufacturing: Survey of advanced technology in Canadian manufacturing. *Science, Innovation and Electronic Information Division*.

Sambasivan, M., & Yen, C. Y (2010). Strategic alliances in a manufacturing supply chain: Influence of organizational culture from the manufacturer's perspective. *International Journal of Physical Distribution & Logistics Management*, *40*(6), 456-474.

Sambasivarao, K. V., & Deshmukh, S. G. (1995). Selection and implementation of advanced manufacturing technologies: classification and literature review of issues. *International Journal of Operations & Production Management, 15*(10), 43-62.

Schein, E. H. (1985). *Organizational culture and leadership: A dynamic view.* San Francisco, CA: Jossey Bass.

Schein, E. H. (1999). *The corporate culture survival guide*. San Francisco: Jossey-Bass.

Scheinder, B., & Brief, A. (1996). Creating a climate and culture for sustainable organizational change. *Organizational Dynamics, 24*(7), 7-19.

Schroeder, D. M., Gopinath, G., & Congden, S. W. (1989). New technology and the small manufacturer: Panacea and Plague. *Journal of Small Business Management, 27*, 1-10.

Silvester, J., & Anderson, N. R. (1999). organizational culture change *Journal of Occupational and Organizational Psychology, 72*(1), 1-24.

Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *Academy Management Review, 17*, 9-38.

SME. (2010/2011) *SME Annual Report 2010/2011: Leveraging Opportunities, Realising Growth*. Kuala Lumpur, Malaysia: Bank Negara Malaysia.

SMIDEC (2002). *SMI development plan (2001-2005)*. Kuala Lumpur: Percetakan Nasional Berhad.

SMIDEC (2006). *SME performance report*. Kuala Lumpur: Small and Medium Industries Development Corporation.

SMIDEC. (2008). *Financial assistant (grants and soft loans)*. Retrieved September 2, 2009 from www.smidec.gov.my.

Sohal, A. S. (1997). A longitudinal study of planning and implementation of advanced manufacturing technologies. *International Journal of Computer Integrated Manufacturing, 10*(1-4), 281-295.

Sohal A. S, Maguire, W. A., & Putterill, M. S. (1996). AMT investments in New Zealand: pattern purpose and outcomes. *Integrated Manufacturing Systems: An International Journal*, *7*(2), 27-36.

Staw, B. M., Sandelands, L. E., & Dutton, J. E. (1981). Threat-rigidity effects in organizational behavior: a multilevel analysis. *Administrative Science Quarterly, 26*, 501-524.

Swamidass, P. M., & Kotha, S. (1998). Explaining manufacturing technology use, firm size and performance using a multidimensional view of technology. *Journal of Operations Management, 17*(1), 23-37.

The-Star (2009, March 27). Technology is key for SMEs. *The Star.*

Twati, J. M., & Gammack, J. G. (2006). The impact of organisational culture innovation on the adoption of IS/IT: the case of Libya. *Journal of Enterprise Information System, 19*(2), 175-191.

Udo, G. J., & Ehie, I. C. (1996). Advanced manufacturing technologies determinants of implementation success. *International Journal of Operation & Production Management, 16*(12), 6-26.

Van der Post, W. Z., de Coning, T. J., & Smit, E. V. (1998). The relationship between organizational culture and financial performance: some South African evidence. *South African Journal of Business Management, 29*(1), 30-41.

Vickery, S. K., Droge, C., & Markland, R. E. (1993). Production competence and business strategy: do they affect business performance? *Decision Sciences, 24*, 435-455.

Wallach, E. J. (1983). Individuals and organizations: the cultural match. *Training and Development Journal, 37*, 247-252.

Walters, A. T., Millward, H., & Lewis, A. (2006). Case studies of advanced manufacturing technology implementation in small companies. *International Journal of Innovation and Technology Management, 3*(2), 149-169.

Yiing, L. H., & Ahmad, K. Z. B. (2009). The moderating effects of organizational culture on the relationship between leadership behaviour and organizational commitment and between organizational commitment and job satisfaction and performance. *Leadership & Organization Development Journal, 30*(1), 53-86.

Youssef, M. A. (1991). *Advanced manufacturing technologies, manufacturing strategy and economic performance: an empirical investigation*. New York: The City University. Doctoral Dissertation.

Yusuff, R. M., Chek, L. W., & Hashmi, M. S. J. (2005a). Advanced manufacturing in Malaysia. *CACCI Journal, 1,* 23-29.

Yusuff, R. M., Chek, L. W., & Hashmi, M. S. J. (2005b). Advanced Manufacturing Technologies in SMEs. *CACCI Journal, 1*, 23-29.

Zairi, M. (1992). Measuring success in AMT implementation using customer-supplier interaction criteria. *International Journal of Operations & Production Management, 12*(10), 34-55.

Zairi, M. (1998). Supplier partnerships for effective advanced manufacturing technology implementation: a proposed model. *Integrated Manufacturing System, 9*(2), 13.

Zammuto, R. F., & Krakower, J. Y. (1991). Quantitative and qualitative studies of organizational culture *Research in Organizational Change and Development, 5*, 83-114.

Zammuto, R. F., & O'Connor, E. J. (1992). Gaining advanced manufacturing technologies' benefits: the roles of organization design and culture. *Academy of Management Review, 17*(4), 701-728.

Zhao, H., & Co, H. C. (1997). Adoption and implementation of advanced manufacturing technology in Singapore. *International Journal of Production economics, 48*, 7-19.