
Supplier management: past, present and anticipated future perspectives

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Abstract: The study illustrates the historical development of the criteria used for supplier management, and suggests a possible future trend as a result of this development. This study stems from globalisation in the private sector, and many policy initiatives of Thai public agencies to assist specific industries, such as electronic and automotive sectors. The awareness of these past and current developments, coupled with anticipation of a possible future trend, should help large companies and Small and Medium Enterprises (SMEs) become better prepared. This study initially relies on literature reviews for identifying the criteria's historical development, and later confirms the result with separate surveys to companies belonging to the Federation of Thai Industries (FTI). A future trend on accreditation practices is suggested and discussed. This is potentially useful for value chain management, especially for SMEs when dealing with large companies. The follow-up discussion seems to agree with this suggestion.

Keywords: supplier management; accreditation; SME development.

Reference to this paper should be made as follows: Phusavat, K., Kanchana, R. and Helo, P. (2007) 'Supplier management: past, present and anticipated future perspectives', *Int. J. Management and Enterprise Development*, Vol. 4, No. 5, pp.502–519.

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1 Introduction

Given the pressure to balance cost competitiveness (to overcome competition), responsiveness (to serve customers) and flexibility (to ensure own competency), many companies, especially in Thailand, have begun to work more closely with their suppliers or contractors. The potential benefit from this cooperation is an opportunity to address these three concerns (Kumar and Liu, 2005). Suppliers have been increasingly perceived as important strategic partners because of their impact on a company's short- and long-term successes (Blanchard, 2004). If a supplier fails to provide incoming parts or delivery services on time, this will likely lead to poor customer services and will subsequently add to the cost in an entire value chain. At the same time, when developing new products, a great deal of consideration must be given to a supplier's ability to come up with a new part on time in the required volume. Simply put, supplier management or partnership represents a critical task that has to be well planned, and needs to be integrated with a company's strategic goals (Kahraman *et al.*, 2003).

In the past, supplier management tended to focus on contractual agreements with an emphasis on cost – typically referred to as cost-based contracts (Dickson, 1966). Since the early 1990s, the time component has been added (Takala, 2002). According to Beamon (1999) and Li (2000), the issues regarding flexibility have also emerged as some of the key factors during the 1990s. In fact, Garfamy (2003) suggests that the backbone of a generic supplier management needs to consist of at least five main categories:

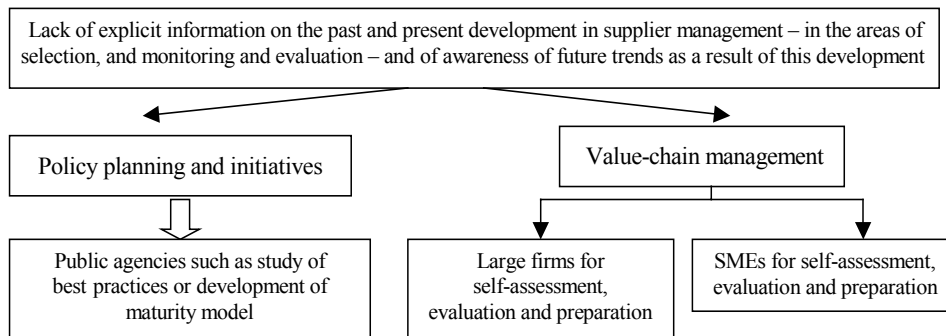
- 1 quality
- 2 service
- 3 organisation profile
- 4 relationship
- 5 cycle time for key work processes.

Chan (2003) further explains that apart from the common criteria, such as cost and quality, other aspects should not be overlooked, such as flexibility and innovation. Therefore, it is reasonable to conclude that the criteria for supplier management are dynamic but its key features have remained the same over the years (Monczka *et al.*, 2005).

2 Problem background

Owing to the dynamic nature of supplier management, especially in the areas of selection and of monitoring and evaluation, an awareness of its past and present development is necessary. First of all, the findings on this development can influence policy initiatives from relevant public agencies in Thailand, especially the Departments of Industrial Promotion (DIP) and of Industrial Work (DIW) under the Ministry of Industry. Several public agencies have expressed the need to have such information so that proper policies can be formulated to benefit both the large firms at the end of the value chain, and the SMEs that are part of this chain. In addition, the anticipation of possible future trends can add to time for promoting public awareness in order to accommodate upcoming changes. Large firms may evaluate their own supplier-management framework so that they can initiate the required changes. The SMEs can apply the study's findings to help their own development as deemed necessary by large firms. This can help SMEs overcome the competition in their respective businesses (Wickramasinghe and Sharma, 2005). In addition, public agencies can put together related research work, such as on the development of best practices or the maturity model to be used as a roadmap for self-assessment and planning, and as a guideline for improvement (see Figure 1).

Figure 1 Problem background



3 Objectives

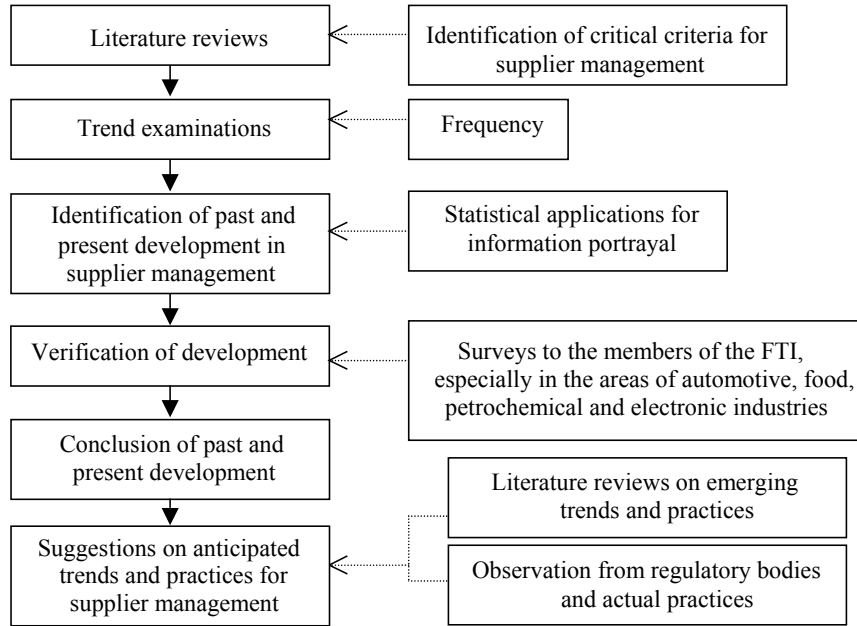
The overall objectives of this study are (1) to illustrate the past and present development in supplier management – in selection, monitoring and evaluation; and (2) to anticipate possible future trends and practices in supplier management.

4 Methodology

In order to achieve the above two objectives, there are many tasks that have to be undertaken. The first task involves looking at extensive literature reviews in the areas of supplier management. Key criteria for supplier management need to be identified. The next task is to examine the literature. For this study, the frequency of citations is applied

for this examination. When completed, the description of the historical development can be made. To substantiate this development, the separate surveys are to be distributed to manufacturing firms belonging to the Federation of Thai Industries (FTI). The last major task is to anticipate possible trends and practices in supplier management (see Figure 2).

Figure 2 Research methodology



5 Results

Given extensive reviews on supplier management, there are seven major criteria that are regularly mentioned: quality, cost, delivery, technical service, management, responsiveness and environment/safety.¹ Their details are as follows:

- *Quality*: product performance, product reliability and product conformance
- *Cost*: competitive prices, payment terms flexibility, cost-reduction efforts and price-adjustment provisions
- *Delivery*: delivery lead-time, flexibility in delivery schedule, delivery-staff performance and shipment condition
- *Responsiveness*: prompt response to requests, and labour and machine flexibility
- *Management*: quality management systems, production facility and capability, commitment to improvement, flexible contract terms and conditions, warranties and claims policies, and performance history

- *Technical service*: technical compliance, technical support availability, design capability and technical problem-solving ability
- *Environment and safety*: environmental management systems, accident preparation, regulation compliance, insurance provision and waste reduction.

The attempt in this paper to understand the development of supplier management covers the period from 1966 to 2006. In order to summarise this development, each study or literature is matched with these seven criteria (see Table 1). For this study, the timeline is divided into three intervals – 1966–1986, 1987–1996 and 1997–2006 (see Table 2). Thus, the citation frequency illustrates this historical development over the past 40 years. It should be noted that it is quite possible that not all related studies completed during this period are included. Based on the development, the aspects quality, cost, delivery and technical service have been consistently cited since the 1960s, with quality and cost mentioned the most frequently. This overall development is similar to many past references. According to Weber *et al.* (1991), Pearson and Ellram (1995), Verma and Pullman (1998) and Chan and Chan (2004), the quality aspect has always been listed as the most important criterion for supplier management. According to Humphreys *et al.* (2003), a successful partnership represents an ability to provide quality products and services to customers. Choi and Hartley (1996), Menon *et al.* (1998), Vonderembse and Tracey (1999), Muralidharan *et al.* (2002) and Barla (2003) support the notion that typical issues to be considered for supplier management should include zero defects (reliability), application of Statistical Process Control (SPC) and continuous improvement, such as KAIZEN – all representing quality consideration.

In reference to Simpson *et al.* (2002), over 50% of the cost of goods sold worldwide is derived from purchased materials and services – relating strongly to supplier management. Typically, the cost element consists of many features, such as competitive prices (see Menon *et al.*, 1998; Muralidharan *et al.*, 2002; Bertolini *et al.*, 2004; Wisner *et al.*, 2005) and flexibility in payment terms (see Lehmusvaara *et al.*, 1999). For the delivery criterion, there are many key highlights, such as delivery lead-time (see Verma and Pullman, 1998; Muralidharan *et al.*, 2002; Onesime *et al.*, 2004; Lau *et al.*, 2005; Wisner *et al.*, 2005; Traver and Wilcock, 2006) and shipment condition and delivery flexibility (see Kent and Parker, 1999; Choy and Lee, 2002; Aktas and Ulengin, 2005; Wisner *et al.*, 2005). According to this development, the technical service consideration has also been recognised as an important criterion for supplier management in the earlier periods. Kent and Parker (1999), Bertolini *et al.* (2004) and Onesime *et al.* (2004) have focused the technical-service term on capability for on-site services for manufacturers and on behalf of manufacturers for their customers.

It is interesting to note that the term ‘management’ has also been mentioned at a very early stage for supplier management. This is due to the perception that its integration into a traditional contract is probably difficult. A typical contract is based primarily on numerical figures such as purchasing prices, delivery time and acceptable defective levels. According to Lee *et al.* (2001), an ability to manage production and service facilities becomes an important consideration in ensuring supplier’s long-term capability with manufacturers’ plans and targets. Nowadays, the term ‘management’ tends to be associated with quality management systems such as ISO 9001:2000 (Barla, 2003; Wisner *et al.*, 2005; Traver and Wilcock, 2006).

Table 1 Literature reviews on supplier management's criteria

<i>References</i>	<i>Quality</i>	<i>Cost</i>	<i>Delivery</i>	<i>Technical service</i>	<i>Management</i>	<i>Responsiveness</i>	<i>Environment/Safety</i>
Dickson (1966)	●	●	●	●	●		
Lehmann and O'shaughnessy (1974)	●	●	●	●			
Perreault and Russ (1976)	●	●	●				
Abratt (1986)	●	●	●	●			
Weber <i>et al.</i> (1991)	●	●	●	●	●		
Pearson and Ellram (1995)	●	●	●	●	●		
Choi and Hartley (1996)	●	●	●	●	●		
Mummalaneni <i>et al.</i> (1996)	●		●			●	
Hirakubo and Kublin (1998)	●	●	●				
Menon <i>et al.</i> (1998)		●					
Razzaque and Sheng (1998)		●					
Verma and Pullman (1998)	●	●	●				
Kent and Parker (1999)	●	●	●				
Lehmusvaara <i>et al.</i> (1999)	●						
Vonderembse and Tracey (1999)	●	●					
Yahya and Kingsman (1999)	●		●	●	●	●	
Lee <i>et al.</i> (2001)	●	●	●	●			
Choy and Lee (2002)		●	●		●		
Handfield <i>et al.</i> (2002)							●
Kannan and Tan (2002)	●	●	●		●	●	
Muralidharan <i>et al.</i> (2002)	●	●	●	●	●		
Barla (2003)		●	●				
Humphreys <i>et al.</i> (2003)	●	●			●		●
Bertolini <i>et al.</i> (2004)	●	●					●
Chan <i>et al.</i> (2004)							●
Chan and Chan (2004)	●	●	●	●			
Katsikeas <i>et al.</i> (2004)	●	●		●			
Onesime <i>et al.</i> (2004)			●				
Aktas and Ulengin (2005)	●	●	●		●	●	
Lau <i>et al.</i> (2005)	●	●		●			
Liu and Hai (2005)	●		●	●	●	●	
Ndubishi <i>et al.</i> (2005)	●	●	●	●			
Wisner <i>et al.</i> (2005)	●	●	●	●	●	●	●
Traver and Wilcock (2006)	●	●					

Table 2 Ten-year intervals and the use of the main criteria

<i>Main criteria</i>	<i>1966–1986</i>	<i>1987–1996</i>	<i>1997–2006</i>
Quality (Q)	✓	✓	✓
Cost (C)	✓	✓	✓
Delivery (D)	✓	✓	✓
Technical Service (TS)	✓	✓	✓
Management (M)	✓	✓	✓
Responsiveness (R)	–	✓	✓
Environment and Safety (ES)	–	–	✓

The historical development indicates that responsiveness has been cited since the 1990s. A quick response to customers in regard to product availability and customer demands (*e.g.*, suggestions and complaints) has become a widespread strategic paradigm of manufacturing industries since the 1990s (Perry and Sohal, 2000). As the competition increases, so do the demands from customers, given the greater role of information technology. In other words, the competition has allowed customers to express greater demands in contradictory manners; *e.g.*, lower cost, higher quality or reliability, and with faster market delivery. For example, according to Mummalaneni *et al.* (1996), Chinese purchasing managers have considered responsiveness one of their top priorities. Similarly, an ability to respond to urgent customer requests from third-party logistics providers has been considered of high value for operational managers when developing partnerships with their service suppliers (Menon *et al.*, 1998).

Recently, the issues of social responsibility and public accountability have been mentioned more frequently. It appears that environmental consideration is no longer an option. Many countries have already introduced legislations that emphasise traceability of products (Humphreys *et al.*, 2003). Moreover, the protection is not limited to consumers. Many regulations also place a great deal of attention on workers and have allowed the general public better access to worker-related issues such as accidental records and working conditions. The use of underaged labour or lack of provision of good working conditions for workers by suppliers often creates embarrassments, public-relations nightmares and reputation risks for manufacturers (see Handfield *et al.*, 2002; Humphreys *et al.*, 2003; Chan *et al.*, 2004; Wisner *et al.*, 2005). Finally, although cost, quality and delivery have been cited many years ago, even with new criteria their overall importance has not changed (see Figure 3).

To further understand this development, a separate survey on supplier management is conducted on two key activities: production supply and transportation (see Appendix). The FTI has provided assistance for this survey. The survey form is pre-tested for its content validity by two experts prior to distribution. Only minor revisions are required. Then, the survey is sent to 100 randomly selected firms belonging to the FTI. These 100 firms operate in four industries that have been relying in the past on suppliers for their operational performance. These industries are (1) automotive and auto parts, (2) electrical and electronic, (3) food and (4) petrochemical. Thirty-five surveys are returned. The overall results appear to be consistent with the criteria's historical development (see Table 3). It should be noted that none of the executives who participated in this survey expressed the need to add more criteria for supplier partnership. It is also important to note that, according to their comments on data collection, when considering

quality, cost and delivery, the emphasis is on the use of quantitative data. For example, the specifications on defective rates, purchasing prices, and delivery schedules and locations can be determined quantitatively. However, when dealing with management, responsiveness, technical services and environment/safety, the required data represent both quantitative and descriptive aspects so that manufacturers or large firms can have more confidence in their suppliers' performance.

Figure 3 Citation of criteria for supplier management

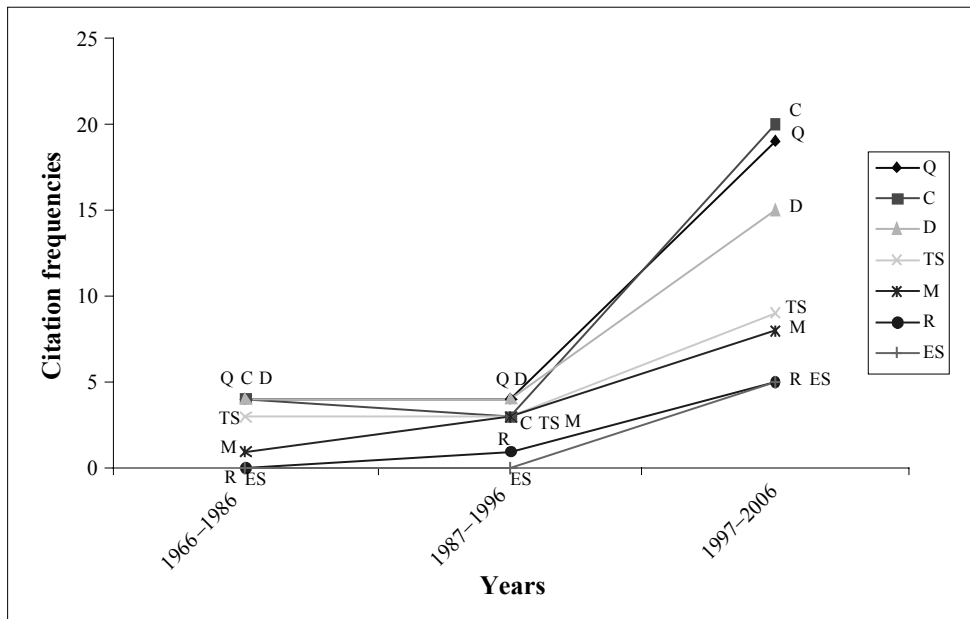


Table 3 Criteria cited for each outsourced work by Thai manufacturers

Criteria	Production supply		Transportation	
	Rank #	p-value	Rank #	p-value
Quality	1	0.47	1	0.76
Cost	2	0.11	2	0.13
Delivery	3	0.03*	3	0.20
Responsiveness	4	0.58	4	0.66
Management	5	0.05	5	0.07
Technical service	6	0.12	6	0.29
Environment/Safety	7	0.05	7	0.31

Note *Significant at the 0.05 level. (Additional tests were performed on the delivery criterion for the production-supply activity. The latter test results were acceptable. In addition, there was no significant difference in the overall results from the four industries.)

6 Analyses and possible future trends

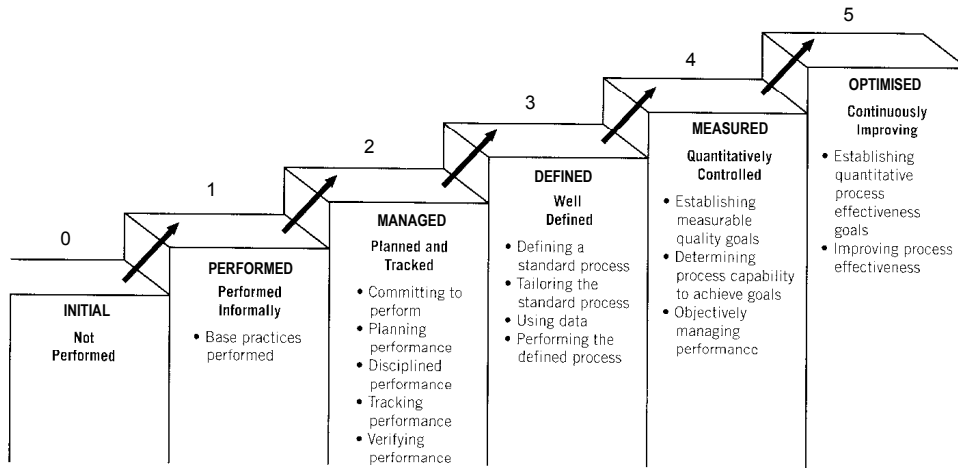
The overall development of supplier management's criteria can be described as follows: During 1966–1986, the supplier management's criteria (*i.e.*, cost, quality and delivery) appeared to be almost constant, including technical service and management. However, during 1987–1996, the term 'responsiveness' emerged. In the last period (1997–2006), the issues relating to environment and safety became more apparent. Although there are new criteria cited, the old ones have maintained their importance (in reference to Figure 3 and Table 3). Given the additional criteria, data collection and information analysis for supplier management have had to be modified. The use of numerical values can be inspected in order to assure suppliers' compliance on the first three criteria (*i.e.*, cost, quality and delivery). On the other hand, the remaining four criteria (*i.e.*, responsiveness, management, technical service, and environment/safety) need to be clearly defined, agreed on and audited.

When dealing with inspection, manufacturers can rely on statistical tools, such as sample size, for data collection and analysis. However, if depending too heavily on inspection, the manufacturers may face some consequences. According to Sink and Tuttle (1989), these include higher operation cost (inspection not considered as a value-added activity), and only short-term reflection – results of today's inspection not being able to predict characteristics of tomorrow's goods. Simply put, the focus of inspection is mainly on the results, based on a contractual agreement. To complement inspection, large manufacturers have also applied the term 'verification' (Blanchard, 2004). Verification represents an effort to move beyond the manufacturers' premises and to visit suppliers' locations and/or their operational sites. Simply put, the term 'verification' represents a combination of inspection (emphasis on results) and observation (primarily on work or operational processes). The two activities are similar in their extensive use of quantitative data – representing the means to gain confidence in the cost, quality and delivery criteria.

Based on Blanchard (2004), the term 'certification' is broader than verification and has been practised somewhat in the past. It represents a combination of verification (*i.e.*, results and work or operational processes) and examination of a supplier's management process. According to Kurstedt (1992), a management process consists of performance measurement, analysis and improvement. Certification represents a means to gain insight into a supplier's capability on the responsiveness, management, technical service and environment/safety criteria.

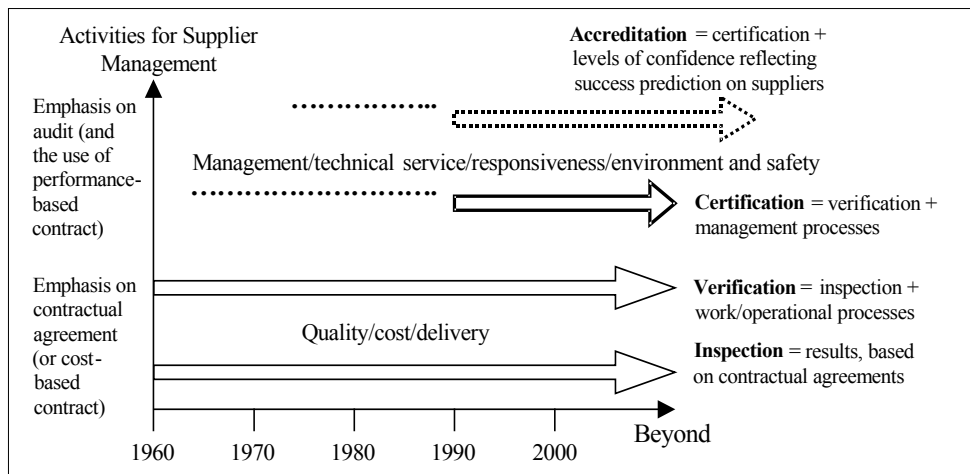
Finally, given the progress from inspection and verification to certification – with emerging criteria that require descriptive data – it appears that the term 'accreditation' will likely play a more prominent role in future supplier management. In this study, accreditation focuses on a supplier's behaviour, which reflects capability, maturity and consistency. According to Blanchard (2004), it is possible that this behaviour may be categorised into different levels, similar to the Capability and Maturity Model (CMM) (see Figure 4). The levels indicate a roadmap or a direction to achieve excellent operation and high performance. Certification and accreditation are similar in their use of descriptive data (although still requiring some quantitative data). The audit is a key activity to gather data for accreditation when managing suppliers (see Figure 5).

Figure 4 System engineering’s capability and maturity level



Source: Blanchard (2004)

Figure 5 Trends in activities for supplier management



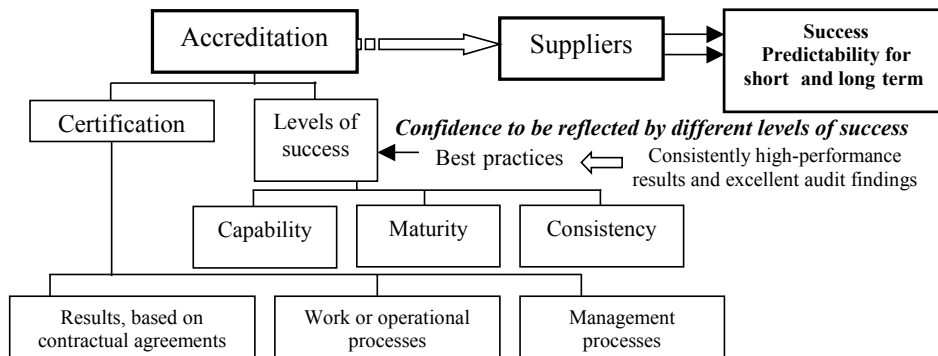
7 Accreditation movement

Accreditation requires comprehensive audits for identifying whether a supplier’s behaviour is consistent with the level that matches with a manufacturer’s requirement. It has become more widespread in supplier management and can be applied to both manufacturing and service industries (such as hospitals, hotels and universities). For example, the National Aerospace and Defense Contractors Accreditation Program or NADCAP is the leading cooperative programme of major companies, designed to

provide continuous improvement within the aerospace industry. There is also the Joint Commission International Accreditation or JCIA. According to the Thai Hospital Accreditation (THA), the accreditation’s purposes are to ensure that there exists high-standard practices and mechanisms in place for continuous performance improvement. Simply put, accreditation helps ensure manufacturers’ confidence in their supplier’s ability from both short and long term points of view.

There are many ways to integrate accreditation into supplier management. A trade association within a specific industry can help initiate an accreditation effort. A company with extensive use of suppliers may develop its own internal accreditation system. A public agency can initiate this effort as well. It is possible that, in Thailand, either DIW or DIP, in cooperation with FTI, can group manufacturers into different value chains, such as electronic, foods, automobile and computer-related. After that, the common set of key performance indicators or parameters can be arranged to ensure that suppliers (*i.e.*, SMEs) in a value chain collect the same data (see Ho and Kim, 2004). Afterward, their performance results and audit findings can be compared over a specific duration so that only consistently excellent companies are selected for further study. Their key processes, such as operation, maintenance, distribution and transportation, and human resource development, can be studied in terms of success factors, outstanding behaviour, unique characteristics, *etc.* Then different levels of success can be formulated, described and proposed (see Figure 6).

Figure 6 Roles of accreditation

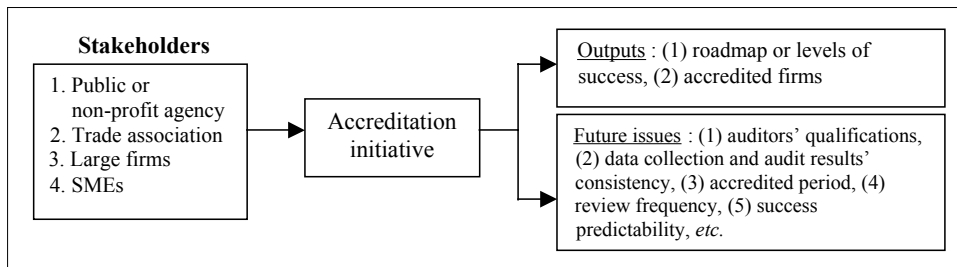


8 Benefits of accreditation and issues for future consideration

There are many potential benefits of accreditation. First of all, it represents an opportunity for different stakeholders within a value chain to cooperate. From the manufacturers’ point of view, it helps to establish long-term partnerships with accredited suppliers. A public agency (or even a non-profit agency), as a neutral entity, can develop and promote public awareness and acceptance of accreditation (especially for the model reflecting different levels of success). A trade association such as the FTI can share some of these roles. SMEs can use accreditation for their strategic and operational planning (see Gullidge *et al.*, 2006 for the need to improve SMEs’ planning process). Subsequently, these SMEs can be more prepared for globalisation since the levels of success should represent common practices that an individual SME should aspire to

(Kumar and Liu, 2005). Although accreditation appears to represent a future trend, there are a few issues to be concerned with. For example, what are the qualifications for auditors? How does one ensure consistency in data collection and audit findings? What is the review frequency for accredited SMEs in a value chain? How long is an accreditation period? How does one ensure the success predictability, given different proposed levels (see Yu and Stough, 2006)? These are typical issues that have to be examined some more in the future (see Figure 7).

Figure 7 More details on accreditation



9 Additional demonstrations

To support growing numbers of related studies on developing the levels of success (*i.e.*, capability, maturity and consistency, which reflect excellent or best practices), this paper illustrates two additional examples. The first example is from the American Productivity and Quality Center² or APQC. The APQC has conducted an examination on identifying different levels of success for a company adapting a performance measurement, the Balanced Scorecard (BSC), to improve its management process. It has conducted many best-practice cases in parallel with this identification process (see Figure 8 for best-practice descriptions and Figure 9 for the proposed levels of success).

Figure 8 Integrating the BSC into a management process

1. Scorecard link to strategy
 - Linking the scorecard to goals
 - Creating a process to identify and define key scorecard measures
2. Technology enablers
 - Identifying the role of technology in implementing a balanced scorecard
 - Creating criteria to enable the decision to build or buy
 - Selecting and evaluating software systems
3. Change management
 - Determining how scorecard implementation affects all employees
 - Restructuring compensation to motivate employees
4. Monitor and assess the scorecard
 - Communicating the results of the scorecard
 - Reviewing measures and seeking solutions to potential problems
 - Revising the scorecard to reflect emerging strategic changes

Source: APQC²

Figure 9 Levels of success for BSC implementation

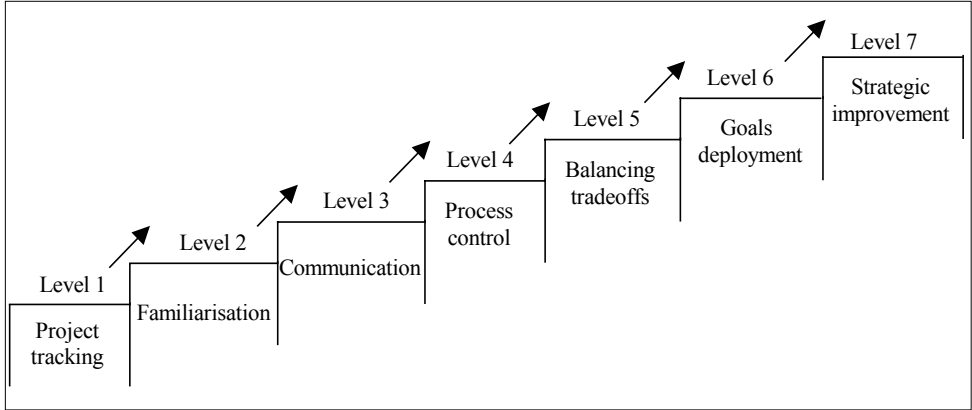


Figure 10 Levels of success for e-business development framework

Maturity stage Business application areas	Maturity stage			
	Level I / II	Level III	Level IV	Level V
Information technology	Point solutions	Linked intranets	Intranet-based extranet	Full network communication system
Design development product/service introduction	Internal only	Selected external assistance	Collaborative design – enterprise integration and PIM	Business functional view – joint design and development
Purchase, procurement, sourcing	Leverage business unit volume	Leverage full network through aggregation	Key supplier assistance, web-based sourcing	Network sourcing through best constituent
Marketing, sales, customer service	Internally developed programmes, promotions	Customer-focused, data-based initiatives	Collaborative development for focused consumer base	Consumer response system across the value chain
Engineering, planning, scheduling, manufacturing	MRP MRPII DRP	ERP-internal connectivity	Collaborative network planning – best asset utilisation	Full network business system optimisation
Logistics and inventory management	Manufacturing push – inventory intensive	Pull system through internal/external providers	Best constituent provider – dual channel	Total network, dual-channel optimisation
Customer care and order management	Customer service reaction	Focused service – call centres	Segmented response system, customer relationship management	Matched care – customer care automation
Human resources	Internal sc training	Provide network resources, training	Interenterprise resource utilisation	Full network alignment and capability provision

Source: Poirier and Bauer (2001)

The second example focuses on the use of e-commerce within an enterprise. According to Poirier and Bauer (2001), the levels of success consist of:

- Level 1 Enterprise integration with emphasis on functional processes
- Level 2 Corporate excellence at the intra-enterprise level
- Level 3 Partner collaboration by vigorously working with selected suppliers and customers
- Level 4 Value chain collaboration, using cyber technologies
- Level 5 Full network connectivity through integrating systems to the benefit of all partners.

Based on this supply-chain maturity model, companies move through two internal levels of progress (levels 1 and 2), and as many as three levels of advanced activity (for levels 3 through 5), with the ultimate goal of realising a full network connectivity with suppliers and customers (see Poirier and Bauer, 2001 and Figure 10).

10 Follow-up discussion

The follow-up discussion sessions are arranged with top managers from two large firms in the food industry in regard to the study's suggestion on accreditation. They have expressed their general agreement on this suggested trend and the potential benefits from accreditation. In fact, given their export status, these two managers are familiar with certification. Their operational and management processes have been routinely audited. On the other hand, these top managers express some concern over the development of the levels reflecting desirable behaviour. From their point of view, it is important that a public agency conducts research on developing best-practice cases and categorising their success results into different levels. The key considerations are reliability and success predictability. Otherwise, SMEs in the value chains may not accept the proposed levels of success (if developed solely by large manufacturers). Simply put, the process that helps supplier development should be clearly specified and demonstrated (Sandhu and Helo, 2006). The promotion of public awareness and recognition is also important for the integration of accreditation into supplier management.

11 Conclusion

The historical development of supplier management has been demonstrated. The relevant stakeholders, such as large firms, SMEs and public agencies, can benefit from an awareness of this development and the anticipated future roles of accreditation. It appears that the applications of accreditation coincide with the need to comprehensively and concurrently manage seven criteria relating to suppliers; *i.e.*, cost, quality, delivery, management, technical service, responsiveness and environment/safety. In addition, the activities of inspection, verification and even certification cannot guarantee that only excellent SMEs are selected and maintained as large firms' partners in their value chains. More investigations need to be made on how accreditation should be adopted and practised in order to ensure its acceptance and recognition.

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Notes

- 1 Their corresponding references will be provided later during detailed discussion of each criterion.
- 2 American Productivity and Quality Center, www.apqc.org.

Appendix Information on the surveyed companies

The survey instrument is designed to help confirm the historical development of the criteria used for supplier management. Based on the returned surveys, 45.7% of responses are from the electronic/electrical industry, while 25.7%, 20% and 8.6% come from food, automotive/auto parts and petrochemical industries, respectively. Of the respondent firms, 31.4% have more than 500 full-time employees. Foreign investors own 42.9% of the firms that returned the survey. For 35 respondents, their outsourced work includes production supply (85.7%) and transportation (57.1%). At least one firm that participated in the survey has one outsourced work. It should be noted that one firm could have more than one outsourced work. The titles of the respondents are Factory Manager (28.6%), General Manager (25.7%), Purchasing Manager (14.3%), Production Manager (14.3%), Engineering Manager (8.6%) and President (8.6%). With regard to age, 57.1% of respondents are 31–40 years old. More than half of the respondents have non-engineering backgrounds. Almost half of the respondents have between 11 and 20 years of working experience. Based on this background, the participating companies should provide useful and accurate data on their supplier management. See Tables A.1 and A.2 for the background on participating companies.

Table A.1 Number of respondents classified by industry type

<i>Industry type</i>	<i>Number</i>	<i>Percent (%)</i>
Automotive and auto parts	7	20.0
Electronic and electrical	16	45.7
Food	9	25.7
Petrochemical	3	8.6
<i>Total</i>	35	100

Table A.2 Proportion of outsourced work categories

<i>Category</i>	<i>Number of companies</i>				<i>Total</i>
	<i>Outsourced</i>	<i>Percent (%)</i>	<i>Not outsourced</i>	<i>Percent (%)</i>	
Production supply	30	85.7	5	14.3	35
Transportation	20	57.1	15	42.9	35