Performance Measurements Related to Lean Manufacturing that Affect Net Profit of SMEs in the Manufacturing Sector of Thailand

Panutporn Ruangchoengchum

Abstract This chapter aimed to assess performance measurement related to lean manufacturing and net profit of small and medium enterprises (SMEs) in Thailand, by interviewing 100 SME entrepreneurs, particularly in the manufacturing sector, and analyzing data by applying factor analysis and multinomial logistic regression. The results found that performance measurement for SMEs in the manufacturing sector in Thailand agreed with most variables at a high level, except for product usage and service at a medium level. When considering each entrepreneur individually, they had medium net profit at 11–15 %. When comparing performance measurements related to lean manufacturing, it was found that factors affected a high net profit of 15 % and they should continually work on it in order to ensure product quality, process quality, waste, defects, suppliers, work-in-process, output, lead time, delivery lead time, and inventory.

Keywords SMEs in the manufacturing sector · Net profit · Performance measurement · Lean manufacturing

1 Introduction

In Thailand at present, it is accepted that small and medium enterprises (SMEs) have a role important in the country's economic expansion. It can be seen from the expansion rate of the SME gross domestic product (GDP) is a key economic indicator for a macroeconomic overview. It is likely to be higher than the expansion rate of the country (2.9 %) in 2014 [The Office of Small and Medium Enterprise Promotion (OSMEP) 2014]. Meanwhile, the percentage of GDP of SMEs increased from 37.0 % of GDP of SMEs in 2013 to 37.4 % of GDP of SMEs in 2014

P. Ruangchoengchum (✉)
College of Graduate Study in Management, Khon Kaen University,
Khon Kaen 40002, Thailand
e-mail: rpanut@kku.ac.th

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(OSMEP 2014). Indeed, SMEs, particularly those in the manufacturing sector, are the engine of growth in the economic system of Thailand and directly benefit the economic growth of the country. It can be seen when comparing the GDP's ratio of SMEs in the manufacturing sector against the service sector and the retail sector in 2014 that SMEs in the manufacturing sector had the significantly highest growth rates in GDP at 32.9 % of GDP compared with the service sector and the retail sector at 32.5 and 13.0 %, respectively (OSMEP 2014).

Despite these successes and the status of major SMEs in the manufacturing sector, they have failed to achieve the SME entrepreneurship confidence index. The Office of SMEs Promotion (2014) reports that the SME entrepreneurship has low confidence index in terms of the costs such as production cost, labor cost, and logistics and transportation cost, and the competitive marketplace is also related to the low confidence index. Low confidence index results in this sense affect business profits and the survival of business operations.

Government sectors are trying to promote and support SME operations, particularly in the manufacturing sector, in order to find a strategy on how to reduce costs and how to gain the highest profit margins, and also to create the potential for competitive advantage. For example, the Bank of Small- and Medium-sized Enterprises development of Thailand (SME Bank) organizes activities to strengthen SMEs by allowing easier access to capital. In addition, the Office of SMEs Promotion (2013) has conducted training programs to develop the potential of SMEs, and the federation of Thai Industries has provided a framework for cooperation between the public and private sectors for the development of SMEs in Thailand and to develop competitiveness capacity in both domestic and international markets (International Institute for Trade and Development 2013). But SME entrepreneurship might still have weak points in getting accurate data for analysis and business development planning for the right decision in operations. Performance measurement is then a management tool that is a vital part of helping entrepreneurs know the results of business operations in the past and predict business, as well as to know the impact on the profitability of the business and in which way SME entrepreneurs should improve or enhance performance to be suitable for increasing net profits and reducing costs, particularly unnecessary production costs or waste solutions, which can possibly be eliminated and lead to business profits. If there is no potential for SME business improvement, it would not be able to compete. Therefore, SMEs should have proper performance measurement to find weaknesses and to improve and strengthen their businesses.

For this reason, the researcher was interested in performance measurements related to lean manufacturing that affect net profit of SMEs in the manufacturing sector. Thus, it is the intention of this research project to find out to what extent this occurs. The following are significant research objectives: (1) to measure SMEs' performance in the manufacturing sector in Thailand; (2) to study SMEs' net profit in the manufacturing sector in Thailand, and (3) to study performance measurements related to lean manufacturing that affect net profit of SMEs in the manufacturing sector in Thailand. This would appear to be a promising method to alleviate industrial problems. The results of this research would be useful for SME

entrepreneurs, particularly in the manufacturing sector, and other Thai government agencies, to be used as guidelines to reduce costs, to develop competitiveness in world markets, and to enhance the competitive advantage as preparation for continued economic expansion. To achieve research outcomes, we provide an in-depth review of the literature underpinning the research objectives toward the development of an evaluative framework with which to undertake the research project.

2 Reviewed Literature

This section reviews the literature concerning the parameters of research under four main headings: SMEs, Net Profit of SMEs, Performance Measurement, and Lean Manufacturing. These attributes build upon the literature of the research project's posited objectives and elucidate the key issues underpinning the research methodology.

2.1 Beyond the Established Theoretical Perspectives: SMEs

The coordination and project management of the Office of SMEs Promotion (2014) gave the definition of SMEs that cover business in the manufacturing sector, the wholesale sector, the retail sector, and the service sector, with the following meanings.

- The manufacturing sector is characterized by production industrial enterprises of all types. By definition, the internationalization of production is to transform the object into a new type of mechanical or chemical product, regardless of whether the work is done by machine or by hand. The manufacturing operations include the simple processing of agricultural products with industrial processes, and community enterprises, as well as household manufacturing.
- The wholesale sector means services for trading, and selling new and used goods to retailers, industrial, commercial, institutional, and professional users, and includes sales to the wholesalers themselves.
- The retail sector means the sale without transformation of both new and used goods to the general public for personal consumption or use by a particular household. This trade also includes being a broker or dealer, gas stations, and consumer cooperatives.
- The service sector means education, health, entertainment, transportation, construction and real estate, hotels and hostels, restaurants, selling food and beverage sales of restaurants, rental, entertainment and recreation, personal service, household services, services for business, all kinds of repair, and travel- and tourism-related businesses.

In sum, this research studied SMEs in the manufacturing sector. The sample groups were covered by the definitions above. The issue researched and analyzed is the net profit of SMEs.

2.2 Beyond the Established Theoretical Perspectives: Net Profit of SMEs

Net profit of SMEs will be measured by the survival level of companies with net profits from net income of approximately from less than 5 to 15 % and above as the researcher has defined, as the OSMEP (2013) set equations to predict the survival of SMEs in Thailand into 5 levels as follows:

- Level 5 strongly survives (net gain of more than 15 %);
- Level 4 survives as normal or firm (net gain of about 11–15 %);
- Level 3 not good enough, there are certain profits, but no loss (net profit of around 8–10 %);
- Level 2 quite poor, barely surviving, but circulation of funds is possible (net gain of around 5–7 %); and
- Level 1 awful, cannot survive, loss and no circulation of funds (net gain of less than 5 %).

Collectively, these attributes of the survival of SMEs suggest an approach to research, which is an issue that will be analyzed further in performance measurement.

2.3 Beyond the Established Theoretical Perspectives: Performance Measurement

Performance measurement is an indicator of results, in which the researcher studied documents and related research on performance measurements that affected net profit on various variables as follows.

Fred (2011) has classified performance measurement quantitatively using financial ratios as a basis for assessing corporate strategies, including return on investment (ROI), return on equity (ROE), profit margin, market share, debt to equity, earnings per share (EPS), sales growth, asset growth, and qualitative performance measurements such as in human resources, marketing, finance/accounting, accounting research and development (R&D) or management information systems.

Hudson et al. (2001) divided performance measurement into 6 areas: quality: reliability of products delivered or waste from the production service; time: the reduction in waiting time and resource utilization; flexibility: productivity and introduction of new products; finance: sales, cash flow, and inventory; customer

satisfaction: delivery reliability, service, and market share; and human resources: quality of work, labor efficiency, and staff learning.

Inman (2014) mentioned that the performance measurement can be divided into two types: performance on achievement and productivity on output or outcomes, such as competitiveness and financial performance, and measurement operations to focus on the factors of achievement including quality and flexibility, resource utilization, and innovation. The basic performance measurements of the business process consist of currency (from profits), productive relationships: output/input or productivity to cater to the customer, innovation and adaptation to change, and human resources, with standard indicators in performance measurement which were productivity measures, quality measures, inventory measures, and lead time measures.

Training Resources and Data Exchange (TRADE), US Department of Energy (2005) noted that the performance measurement is generally divided into six categories; however, some organizations may develop metrics appropriate for type of business, depending on the organization's mission and including effectiveness of the product, efficiency of the production process, quality of product or service, timeliness, productivity, and safety at work of employees.

However, the issue will be researched and analyzed further in performance measurement related to lean manufacturing.

2.4 Beyond the Established Theoretical Perspectives: Lean Manufacturing of SMEs

The ways of performance measurement related to lean manufacturing will be significant by being without waste in the process of production. Ohno (1998) studied waste elimination such as overproduction, time delay or failing to meet the delivery lead time by suppliers or transporting, inappropriate processing, unnecessary inventory, excess motion and defects or return of the product, which can help companies significantly cut costs, particularly waste reduction. There are unnecessary production costs, which can be possibly eliminated, known as seven wastes. There are overproduction, time delay, transporting, inappropriate processing, unnecessary inventory, excess motion, and defects (Ohno 1998).

Lean manufacturing of SMEs will be defined by reducing costs and wasteful practices, and increasing quality (Ohno 1998; Melton 2005). These may help to increase net profit of SMEs. Likewise, Wilson et al. (2008) studied lean manufacturing or lean production of SMEs in New Zealand, which refers to processing and production management among various resources in order to decrease waste, inefficient activities and work-in-process while offering quality products on time and at least cost. In addition, Nasser Mohd et al. (2009) studied a review on lean manufacturing practices in SMEs, Malaysia. Those viewed as being more important are to be resources such as finance, manpower, and machines of SMEs. The benefits

of SMEs to apply lean manufacturing will be the net profit of SMEs, which is the major significant measure of a company's profitability (OSMEP 2013).

In summary, the researchers have applied the concepts above, by focusing on the concepts of Ohno (1998), Hudson et al. (2001), Wilson et al. (2008), and Nasser Mohd et al. (2009) to specify the criteria for performance measurement related to lean manufacturing, and in all twenty-four variables under all the five performance measurement perspectives (quality, time, finance, customer satisfaction, and human resources) as follows:

- **Quality**: 5 variables include product quality, process quality, waste, defects, and suppliers;
- **Time**: 4 variables include work-in-process, output, lead time, and delivery lead time;
- **Finance**: 7 variables include inventory, orders/receipts, profit, turnover, costs and expenditure, cash flow, and sales/value added;
- **Customer Satisfaction**: 5 variables include user problems, product usage, customer service, returns, and complaints; and
- **Human Resources**: 3 variables include safety, staff turnover, and personnel development.

3 Conceptual Framework and Proposed Research

Based on the proposed theoretical background and the literature studied, we derive the conceptual framework as in Fig. 1, in which the prime variable of study is the performance measurement related to lean manufacturing. We studied twenty-four variables (as mentioned above) under all the five performance measurement perspectives (quality, time, finance, and customer satisfaction), and the fixed variable was SMEs' net profit in the manufacturing sector, Thailand.

These variables have been further explained in the framed hypotheses. Hence, we posit the following:

- **Hypothesis 1**: SMEs in the manufacturing sectors have different net profit, and
- **Hypothesis 2**: SMEs in the manufacturing sector's profit depend on performance measurements related to lean manufacturing.

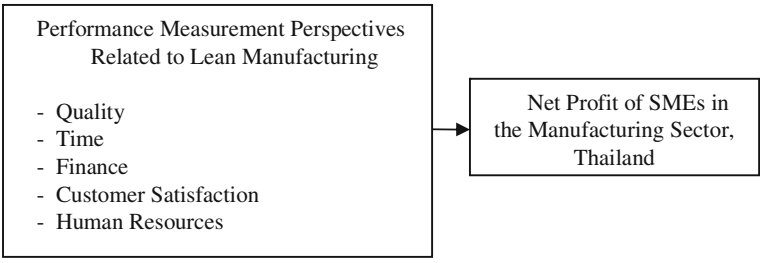

Fig. 1 Research conceptual framework

4 Research Methodology

This section provides an overview of the research methodology employed to resolve the research objectives concerning the framed hypotheses as mentioned above.

4.1 To Measure SMEs' Performance in the Manufacturing Sector in Thailand

4.1.1 Sampling and Data Collection

The samples used in this study were SMEs in the manufacturing sector, which are located in the northeastern region of Thailand, which is a major hub for rural industries such as the agricultural processing in the northeast region (Glassman and Sneddon 2003). Thus, the majority of entrepreneurs in the northeastern region are engaged in agriculture. It can be seen from more than 80 % of industrial firms in the northeast of Thailand being focused on rice milling and the remainder relying on the processing of agricultural produce and other primary manufacturing industries (Parnwell and Khamanarong 1996). We selected the area of Khon Kaen Province, which is the center of the northeastern region and has the densest SMEs, contributing 7.56 % to the total number of SMEs of Thailand (OSMEP 2014). Khon Kaen Province is then attractive to investors; both domestic and foreign investors are pouring in (Suwannaporn 2013).

In this study, the researchers focus on SMEs in the manufacturing sector, the sampled group size was 100 SMEs, and data were collected by quota sampling. With the above sampling groups, a questionnaire was used as a tool for data collection to create a questionnaire checklist by studying twenty-four variables under all the five performance measurement perspectives (quality, time, finance, and customer satisfaction) for performance measurement of SMEs in the manufacturing sector in the province.

4.1.2 Data Analysis and Statistics Used in the Research

The research data were analyzed using SPSS for Windows Version 17.0. Descriptive statistics used were arithmetic mean (AM) and standard deviation (SD) to interpret the comment level by applying an average score in each level on a statistical basis which is to find the range, and to use a formula for calculating the width of the interval to determine the average level of opinion as follows:

- Average of 4.21–5.00 is the highest opinion level;
- Average of 3.41–4.20 means there are a lot of comments;

- Average of 2.61–3.40 means there is moderate comment;
- Average of 1.81–2.60 means there is less comment; and
- Average of 1.00–1.80 means the least number of opinions.

4.2 To Study SMEs' Net Profit in the Manufacturing Sector in Thailand

4.2.1 Sampling and Data Collection

The samples were selected according to 4.1.1. A questionnaire was used as a tool for data collection and for studying net profits, which were divided into 5 levels: Level 5 strongly survives with a net gain of more than 15 %, Level 4 survives as normal or firm with a net gain of about 11–15 %, Level 3 not good enough as there are certain profits but no loss (net profit of around 8–10 %), Level 2 is quite poor, barely surviving, but circulation of funds is possible, with a net gain of around 5–7 %, and Level 1 awful, cannot survive, makes a loss and has no circulation of funds with a net gain of approximately less than 5 %.

4.2.2 Data Analysis and Statistical Methods Used in the Research

The research measured the level of survival of the SMEs from the net profit that was less than 5 % to over 15 % net profit by using descriptive statistics for percentage of acquisition characteristics and tested hypotheses of different SMEs with net profit different or not different with statistical significance.

4.3 To Study Performance Measurement Related to Lean Manufacturing that Affects Net Profit of SMEs in the Manufacturing Sector in Thailand

4.3.1 Statistic and Data Analysis

In a study of performance measurement related to lean manufacturing that affects net profit of SMEs in the manufacturing sector in Thailand, the researchers used factor analysis to find the factors. The study extracted factors using the principle component method and forecasted identify factors that affect net profit by using multinomial logistic regression analysis and grouping patterns of business operations of SMEs with statistical analysis.

4.3.2 Assessment of Research Tools

The researchers assessed the accuracy and reliability of the questionnaire by examining the content reliability from experts with updates and corrections and the test reliability by finding the discrimination power by using item-total correlation, which measures the performance of SMEs in the discrimination (r) range from 0.329 to 0.731. To test the tools' reliability, Cronbach's alpha coefficient was used, and the performance measures of SMEs had alpha coefficients ranging from 0.738 to 0.850.

5 Results

This section analyzes the outcomes of the research project with reference to the framed hypotheses, which guide the research methodology and structure the analysis of the research outcomes.

Three significant features of performance measurement emerge as relevant issues in an analysis of the participants' responses. These are the performance measurements of SMEs, net profit of SMEs, and performance measurements related to lean manufacturing that affect net profit of SMEs in the manufacturing sector in Thailand.

5.1 Performance Measurement of SMEs in the Manufacturing Sector in Thailand

Overall, it was found that the majority of SMEs in the manufacturing sector in Thailand had operated for a period of 5 years and 6–10 years in similar proportions of 30 % and 30.75 %, respectively, mainly employing only 25 staff or less (91.75 %) and having fixed assets of no more than 30 million baht (80.75 %), while most, 69.25 %, had registered commercially and had individual proprietorship.

All SMEs have been classified into manufacturing sector. We found that SME entrepreneurs overall had performance measurement at a high level in all variables, except for the product usage and service which was at the medium level as shown in Table 1.

5.2 SMEs' Net Profit in Manufacturing Sector in Thailand

From Table 2, SMEs in the manufacturing sectors had different net profits, which were statistically significant at the 0.05 level, and profitability as normally survive (net profit is about 11–15 %) was mainly in the manufacturing sector (37.24 %).

Table 1 Performance measurements for SMEs in manufacturing sector

Performance measurement	Manufacturing sector		
	$\overline{X}$	S.D.	Opinion level
Product quality	4.40	0.60	High
Process quality	4.30	0.70	High
Waste	4.30	0.60	High
Defects	4.30	0.60	High
Suppliers	4.40	0.60	High
Work-in-process	4.20	0.60	High
Output	4.20	0.60	High
Lead time	4.20	0.50	High
Delivery lead time	4.20	0.60	High
Inventory	3.90	0.50	High
Orders/Receipts	3.80	0.60	High
Turnover	3.80	0.50	High
Costs and expenditure	3.80	0.60	High
Cash flow	3.80	0.60	High
Profit	4.00	0.50	High
Sales/Value added	4.10	0.50	High
User problems	3.80	0.50	High
Product usage	3.20	0.70	Medium
Customer service	3.30	0.70	Medium
Returns	4.20	0.60	High
Complaints	3.80	0.50	High
Safety	3.80	0.60	High
Staff turnover	3.80	0.60	High
Personnel development	3.90	0.60	High

Table 2 SMEs' net profit in the manufacturing sector

Net profit	Manufacturing sector *n* (%)
Strongly survive (net gain of more than 15%)	16
Survive as normal or firm (net gain of about 11–15 %)	54
Not good enough, there is uncertain profit or loss (net profit of around 8–10 %)	27
Barely survive, but circulation of funds is possible (net gain of around 5–7 %)	2
Cannot survive (net gain of approximately less than 5 %)	1(100.00)

The entrepreneurs with a profit at a terrible loss, with no circulation of funds (net profit of less than 5 %), had only one entrepreneur in the manufacturing sector. These results support Hypothesis 1.

5.3 Performance Measurements Related to Lean Manufacturing that Affect Net Profit of SMEs in the Manufacturing Sector in Thailand

5.3.1 Factor Analysis

From SMEs performance measurement related to lean manufacturing in the province, it was found that there were several independent variables. The researchers wanted to know whether any independent variables affected the net profit of these SMEs. The analysis showed some independent variables were multicollinear; therefore, a statistical technique called factor analysis was used to group the independent variables together, which then led to the creation of new variables' equation in the following order.

When factor analysis has been done to determine the factors that affect the survival of SMEs in the province, the factors were extracted using principle component to see how many of the 23 variables could be factors. It was considered by eigenvalue that exceeds 1.0; the eigenvalue is indicative of the ability of the emerging factors to explain the variability of the original variables. Besides, in this research, we also applied the Varimax rotation method and the KMO statistics, which are used to measure the suitability of the information available, and KMO > 0.6 would be considered suitable data to use for factor analysis techniques. The results showed that the KMO = 0.8123, which was over 0.6, so the information was appropriate to use technical analysis. The results showed there were five factors that had eigenvalue over 1.0, so the analysis grouped the factors into five factors as in Table 3.

5.3.2 Multinomial Logistic Regression Analysis

The dependent variables were divided into 4 groups; the group with net profit less than 5 % was added to the 5–7 % group because there was just one case. Multinomial logistic regression analysis techniques were applied with the added group, earning less than 5 % to the 5–7 %, as a baseline category as in Table 4.

The probability that the entrepreneur would have the opportunity to gain a level3 as it is not good enough but has no loss (net profits of around 8–10 %) was considered. When compared to the opportunity profitable level 2 or level 1, the results showed that there were no factors affecting the net profit of the SMEs in the province as in Table 4.

From Table 5, the results of the entrepreneurs grouping showed the following. Group 1: Most entrepreneurs had normal net profit level which was sufficient or a net gain of about 7.5 %, and this group had very different comment level from medium to high level. Group 2: Entrepreneurs with enough net profit, had a net gain of about 8–15 %, and had high-level comments. Group 3: Entrepreneurs with stable profit level, had a net profit of over 15 %, and had high to highest level opinion.

Table 3 Factor analysis of five factors

Order and factors of variance performance measurement	% of variance	Performance measurement
F1. lean manufacturing	23.73 %	–Product quality
		–Process quality
		–Waste
		–Defects
		–Suppliers
		–Work-in-process
		–Output
		–Lead time
		–Delivery lead time
		–Inventory
F2. cash performance	12.99 %	–Orders/Receipts
		–Turnover
		–Cash flow
F3. customer service and human resource management	11.93 %	–Returns
		–Complaints
		–Safety
		–Staff turnover
		–Personnel development
F4. value-added resources	11.80 %	–Costs and expenditure
		–Profit
		–User problems
		–Sales/Value added
F5. product information service/consulting services	10.39 %	–Product usage
		–Service
Total	70.84 %	Total of 70.84 % that the 5 factors could explain variability of the original 23 variables

Likewise, with a significantly high net profit (over 15 %), entrepreneurs should have the highest opinion concerning lean manufacturing. These results support Hypothesis 2.

6 Discussion and Conclusion

The outcomes of this research project contribute significantly to the knowledge base of the discussion, and it can be concluded as follows.

Most SME entrepreneurs in the manufacturing sector had high level of opinion on performance measurement in product quality, process quality, waste, defects, suppliers, work-in-process, output, lead time, delivery lead time, inventory, orders/receipts, turnover, costs and expenditure, cash flow, profit, sales/value

Table 4 Factors affecting SMEs' net profit

Factors affecting SMEs' net profit	Coefficient	*P*-value	Marginal effect
Net profit level 3			
Constant	7.083	0.356	–
Factor 1	2.860	0.377	0.124
Factor 2	−4.753	0.117	0.001
Factor 3	7.521	0.349	−0.088
Factor 4	0.158	0.964	−0.367
Factor 5	−1.222	0.406	0.042
Net profit level 4			
Constant	2.615	0.726	–
Factor 1	2.052	0.521	−0.190
Factor 2	−4.795	0.110	−0.023
Factor 3	1.803	0.245	−0.031
Factor 4	2.274	0.507	0.409
Factor 5	−1.401	0.333	−0.010
Net profit level 5			
Constant	−1.179	0.883	–
Factor 1	2.885	0.379	0.080
Factor 2	−4.787	0.117	−0.025
Factor 3	2.665	0.134	0.129
Factor 4	1.353	0.700	−0.033
Factor 5	−1.635	0.277	−0.040
Pseudo R^2 = 0.0892			

added, user problems, returns, complaints, safety, staff turnover, and personnel development as business operation was an essential process in which business must be able to manage an organization operation system, personnel, and teamwork in order to drive the business process to reach the goal. This is relevant to the work of Hudson et al. (2001), which was about SME performance measurement systems. To be in line with the business strategy, this research studied the performance measures in five perspectives, which cover all aspects of the organization's operations including the results of operations (dimensions of quality, dimension of time and flexibility, financial results, how to make the company recognized externally (customer dimension), and work environment (human resources dimension) which was consistent with the concepts of Parmenter (2007) who noted that from assessment of the performance of SMEs, most of them used KPI measures and focused on the operational aspects of the organization. The things most important to the success and impact of the organization now and in the future were consistent with the concepts of Wiwakanond et al. (2004) who mentioned that there is a critical need to manage the organization's processes such as competitively low cost, quality or customer satisfaction, capacity or service of process, and fast and

Table 5 Performance measurement in each factor classified by group of entrepreneurs in the manufacturing sector

Performance measurement for each factor	$\overline{X}$	S. D.	Level opinion
Group 1			
Factor 1 lean manufacturing	3.81	0.45	High
Factor 2 cash performance	3.29	0.48	Medium
Factor 3 customer service and human resource management	3.30	0.43	Medium
Factor 4 value-added resources	3.61	0.43	High
Factor 5 product information service	3.13	0.62	Medium
Group 2			
Factor 1 lean manufacturing	4.19	0.31	High
Factor 2 cash performance	3.81	0.35	High
Factor 3 customer service and human resource management	3.97	0.28	High
Factor 4 value-added resources	4.09	0.29	High
Factor 5 product information service	3.83	0.44	High
Group 3			
Factor 1 lean manufacturing	4.56	0.33	Highest
Factor 2 cash performance	4.19	0.41	High
Factor 3 customer service and human resource management	4.26	0.38	High
Factor 4 value-added resources	4.50	0.35	High
Factor 5 product information service	4.34	0.41	High

accurate delivery. These are consistent with the company's operating philosophy, UM limited by Thailand Productivity Institute (2004) which noted that a company's operating philosophy should be "To maintain integrity, quality, punctuality," which focused on producing quality products according to customer requirements and being on time with delivery.

In order to accomplish the work with this philosophy, the business is committed to the development of production processes and product quality to meet customer requirements. These were applied in operation planning and production design, including a focus on suppliers, with having meetings and planning together all the time in order to work effectively. In addition to satisfying the customer, catering to the delivery, and processing, the company also focused on employees in the organization as it considered them as the most precious resource in the operation. The executives had to create a good atmosphere in the workplace, encourage learning and collaboration, create employee satisfaction, emphasize teamwork, and collect data to measure and analyze the performance as well.

Although entrepreneurs in the manufacturing sector had opinions on performance measurement on each variable at a high level, they had medium-level opinions in product usage and service such as providing free workshops on product use, and how to impress customers in order to retain customers in the manufacturing sector. This shows that most of entrepreneurs in the manufacturing sector may lack skills of product information service.

6.1 Performance Measurement Affected SMEs' Net Profits as Follows

Most of SMEs in the manufacturing sector had net profit: level 4 as normal survival or net profit of approximately 11–15 %. Factors that affected net profits to survive in level 4 included the following:

- Customer service and personnel development factors consisted of product usage including providing products introduction services, such as training in how to use the product for free, service to impress and retain customer, taking complaints or satisfaction from customers to make a better organization performance, promoting safety and staff welfare apart from that required by the law such as health insurance, creating good atmosphere with clean and safe workplace, staff turnover having efficient recruitment process to recruit good people who work hard and stay for a long time, and having low or no staff turnover each year. And for personnel development, factors were to encourage staff to develop their knowledge and skills by allowing staff to study further or providing staff training to enhance skills and knowledge, both in and out of the workplace, and having performance assessment of the parties involved;
- Value-added resource factors were costs and expenditure, cost reduction of production of goods/services such as raw materials purchased for production, production costs, overhead supplies in the production process, labor cost in services, cost of service goods, sales and administrative expenses, ability to increase profits as per goals, sales/value-added ability to increase sales volume and having service center to provide counseling whether clients have problem with the product/service; and
- Cash Performance factors were order/receipts, facilitating orders/services such as customers can order products/services by telephone or Internet, also for facilitating the payment for goods/services to the customers via the internet, ATM or credit card, turnover ability to manage inventory more effectively, such as the ability to remove products inactive for more than six months or to manage product storage or to reduce the inventory need and cash flow, to use resources cost effectively and to reduce costs and expenses of the company.

Factors that affected net profits at a strong survival level 5 (high net profit of 15 % or more) included lean manufacturing factors, which were product quality, quality test of raw materials used in process prior to the production of goods, and raw materials used in accordance with the standard set. Process quality is the quality check at every step, which leads to high-quality production of goods/services. Waste, minimal or no waste focuses on the use of resources for maximum benefit. Defects focus on delivering quality products and product insurance if it is damaged as a result of the delivery process. Suppliers with vendor selection and quality production factor and Work-in-process with a focus on reducing the amount of time (lead time) used in manufacturing with warranty products/services (outputs). If the customer is not satisfied with the product/customer service, the customer can

choose to return the product or get new products to replace it or a refund within the prescribed period. In addition, human resource management factor focuses on personnel development and involves developing staffs' knowledge and customer service skills. Moreover, if human resource management, from the recruitment process, had an effective selection, and evaluation process, personnel welfare and safety apart from the law, service quality guarantee, as well as protect to return of goods, and facilitation for ordering service, then these factors would lead to business success. The entrepreneur should focus on performance measurement in customer satisfaction as it is the basic retention strategy to keep repeat and return customers (loyalty customers) with the organization as long as possible and to attract new customers to the business.

6.2 Factors of Lean Manufacturing

The entrepreneurs focused on the factors of lean manufacturing (product quality, process quality, waste, defects, suppliers, work-in-process, output, lead time, delivery lead time that should be near the operation plant to save transportation costs and have feedstock at the plant throughout the year and inventory management) as the greater the focus on performance measurement, the higher possibility of net profit. The entrepreneurs realized the importance from the selection of raw materials, production quality, and quality control process at every step to shorten the process time, minimize or remove waste, and have a damage warranty. These factors were particularly important, resulting in customers being highly satisfied with the products and services, leading to an increasing sales volume and net profits for the business. These were consistent with the concepts of Inman (2014), who mentioned business performance measurement focusing on the determinants of the results such as quality, which is basic for customers to focus on and links to financial results, in accordance with the concept of Olsen (2007) who stated that lean operations and waste were important factors to develop competitive pricing positions and net profit.

In addition, if the SMEs entrepreneurs in manufacturing focused on these factors it would result in a work process that moved the business forward such as the entrepreneur that provided consulting services involving product information service to clients when a problem with the product occurred, having information on service support for product guarantee with unsatisfactory services, or even taking complaints or assessing customer satisfaction to improve organization efficiency.

In conclusion, the analyses and discussions refer to the conceptual framework, hypothesis, and concepts derived from the literature review to elucidate the significance of entrepreneurs' responses and their relationship to the research outcomes. It is concluded emphatically that the SMEs' entrepreneurs in manufacturing should focus on performance measurement related to lean manufacturing factors (product quality, process quality, waste, defects, suppliers, work-in-process, output,

lead time, delivery lead time, and inventory). These factors affected a high net profit of 15 % or more.

However, other possible directions for future research that might build on this research project include the following:

- The impact or the other factors affecting SMEs' net profit should be investigated, and the data from this study can be applied for operations management to create effective performance.
- Problems and obstacles that affect performance measurement of SMEs' business should be studied to find guidelines for business development, as there are changes of environment both inside and outside the company all the time.

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