EVALUATING THE IMPLEMENTATION SUPPLY CHAIN QUALITY ANAGEMENT OF MANUFACTURING COMPANIES IN HO CHI MINH CITY

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Abstract - The purpose of the research is to assess the quality of the supply chain of manufacturing companies in Ho Chi Minh City. The paper highlights the current situation in manufacturing industries with more focus on internal quality management op- erations than on upstream and downstream quality management practices. This study also confirms correlations and regression analyzes that show a significant link between quality control practices in the supply chains and operational performance. Quality management upstream and downstream is a big indicator of high quality, cost and distribution performance. Provide empir- ical evidence to practitioners, especially emerging economies, to improve their specific performance. It is emphasized that quality management at the level of the supply chain should be improved in order to exploit the potential of external stakeholders in a competitive and uncertain market environment. Implementation of practices such as linkages to information technology (IT), knowledge sharing, participation of suppliers and the involve- ment of customers would lead to a high level of operational efficiency in manufacturing companies.

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I. INTRODUCTION

Via access to numerous content and labor sources, access to consumer news and information and technologies, political and macroeconomic stimulus, and macroeconomic incentives, with their quick growth in the economy and industrialization, give great opportunities for the global supply chain. Scholars have established a variety of factors for shifting manufacturing and service operations from developed countries to emerging economies, such as rising demand-approximation in produc- tion and/or service, improving quality and intellectual property control, overcoming the lack of expertise or technology con- straints at existing sites as well as lowering labor and material costs. As multinationals becoming more and more providers in emerging markets, the task of establishing and maintaining their supply chain is to decrease product returns, reduce recalls and maximize profit in institutionally and culturally diversified environments.

In order to achieve a high performance supply chain, partner organizations must concentrate on supply chain quality control involving all the parties in the supply chain network to enhance goods, services and processes aimed at

competitively distinguishing and at delivering customer value beyond the limits of individual companies [1]. Since the 2000s, scientists have increased their attention to managing the supply chain efficiency. More studies have shown empirical evidence of a substantial effect on various aspects of production companies' organizational efficiency of supply chain management activ- ities. They suggested that convergence in the supply chain, consumer orientation and quality control supply have major organizational impacts [2, 3]. Implementation of a range of practices including participation of suppliers in product design and enhancement of quality, improved contact with suppliers and clients. Manufacturing business prices, distribution, versa- tility [4–7]. Although quality management in the supply chain is widely studied in highly developed countries, there are still few studies on the quality management of the supply chain in emerging and developing economies.

Vietnam is also considered to be a developing country with relatively fast growth (an average of 7.1% in 2000-2019), ranked by the International Monetary Foundation as the 36th largest in the world to achieve nominal domestic gross product (GDP). Top manufacturing industries in Vietnam include food, textile, chemicals and electrical goods. Vietnam is becoming a new factory hub in Asia with considerable natural resources and large numbers of workforce, especially for Japanese and Korean firms. Vietnam is continually attracting foreign direct investment (FDI). Vietnam has drawn US$ 129.5 billion from foreign investors in 1990-2019, primarily in manufacturing, processing, mine and immobilizing enterprises. Samsung Vietnam, with US$ 20 million investments in R&D and manufacturing, is known as the largest FDI company in Vietnam. Samsung's Vietnam sales of US $65.8 billion and export turnover of US $60 billion in 2019 accounted for over 25% of Vietnam's export value. In the 2000-2010 period, many US, European, Japanese, and Korean manufacturers have turned towards South East Asian countries for factory locations in emerging market situations under pressure to reduce production costs. The rapid entrance of many multinationals into Vietnam significantly leads to an increase in the support industry and the incorporation of domestic and foreign producers into the global supply chains. In the 1990-2000s, a significant number of local manufacturers began building their QM systems with the focus on internal issues such as process monitoring, selection of the suppliers and materials, and inspections of their final product. As the starting point, several organizations have chosen the ISO 9001standard. After 2010, many Vietnamese manufacturers focused more on SCM practices to quickly, efficiently, and profitably respond to market demands. The SCM practices are a major focus. Managers are paying greater attention to developing long-term supplier relationships, choosing suppliers based on quality rather than cost concerns, exchanging knowledge with suppliers and consumers, consumer and supplier engagement in troubleshooting and enhancing quality activities [8]. In such an emerging market as Vietnam, however, an efficient QM supply chain would cost off. The quality leadership and long-term involvement of top managers is required in businesses, the barriers that depend on the conventional corporate culture of short-term business relationship and the choice of cost suppliers due to the political uncertainties of the macroeconomics.

In both developed and developing countries, the influence of the QM supply chain has been further explored in business results. Does QM supply chain practice affect all aspects of

manufacturing companies' success in developing countries? Answering the questions above will allow us to understand the importance of the supply chain QM deeper. There are various similarities and differences in market conditions and man- agement between the transitional Vietnamese economy and the developed economies, which may have different research consequences for Vietnamese companies and other emerging economies that are more instructive.

This study aims to fill the gap in supply chain QM literature by looking at existing QM supply chain activities and their ef- fect on Vietnam's operational efficiency. The analyzes of data collected from the survey on 100 manufacturing companies in Ho Chi Minh City, which are based upon statistical techniques such as ANOVA and regression.

II. LITERATURE REVIEW

A. Quality control of the supply chain

The supply chain QM is a new idea that originated in the late 1980ies that can be regarded as the latest stage in total QM (TQM) process concerns the achievement of high quality between separate parties rather than corporate [8]. Therefore, supply chain QM was early described as involving all parties in a network of supply chains, beyond each company's limits, for product, service and process improvement and then competitive differentiation and consumer values [1]. In recent years, the supply chain QM is a synergy between SCM and QM where QM is the key to enhancing efficiency across the entire chain. It therefore extends the QM and SCM perspective to cooperation between all participants and shows a near correlation between QM and SCM that improves supply chain efficiency [9]. [10] considers the QM supply chain to be an integrated approach to higher supply chain performance that involves dynamics among internal, forward and downstream processes.

Recently, the supply chain QM was seen as a multidi- mensional term involving internal QM (process management, process design, quality training and so on) and supply chain activities (customer and supplier collaboration, supply chain quality training, the engagement of different participants in product design, etc.) [7].

B. Management of the supply chain quality

To investigate the efficiency of the QM supply chain, scholars also focused on QM practices, described as everyday practices taken by organizations to meet QM supply chain goals [11]. Many researchers are researching the activities of the QM supply chain for the production of QM supply chain structures and examining the impact of individual practices on performance [3] [12] suggested 11 QM supply chain measurement models based on internal QM processes as well as company customer and vendor interactions. In the meant eight activities have been built for the QM supply chain by Kaynak and Hartley in 2008, concentrating on internal and supplier QM. [8] subsequently suggested to research the effect on national performance of QM Supply Chain Activities in three classes, namely internal, upstream, and downstream. More recently, QM supply chain activities are linked to information sharing and knowledge management between businesses, manufacturers and consumers, including the use of IT and modern Internet technologies [11] [7] to improve quality efficiency across the entire supply chain [13]. Researchers are investigating the impacts of QM Supply Chain practice on performance in an enhanced understanding of how the supply chain influences QM performance [3, 14], consumer satisfaction [8]. Due to different contexts, samples and a clear and completed measurement of supplier chain

QM practices there were diversification of the results among researchers. [8] showed no major effect on the consistency of conformity of upstream QM, for instance, while Soares, for example the emphasis of providers and the integration of suppliers can dramatically improve performance. Research in QM and SCM after the 2000s has been earned in Vietnam. Researchers found there is still a shortage of money, professional work and expertise to concentrate constant improvement practices on Vietnamese businesses [15]. [16] found that ISO 9000 implementation helps change QM activities to improve customer loyalty and efficiency. More recently, [17] have pointed out that TQM activities are largely sponsored by an internal focus culture in Vietnamese companies and TQM implementation has been found to be positively connected with the success of organizations. [18] proposed that Vietnamese small and medium-sized companies concentrate on improving their employees' continuous improvement attitude to increase efficiency and product quality. The [11] study highlights the value of SCM activities, such as top managerial support, emphasis on consumers, process control and development, supplier management. Studies in the Vietnamese context view SCM and QM generally as two separate terms instead of being placed in an integrated context.

A systematic literature review allows for the supply chains QM studies to be grouped into three main guidelines: clas- sifying and analyzing the QM supply chain characteristics; studying and developing scales for measuring QM operations in the supply chain; and measuring the empirical impact of QM supply chain action on corporate performance. Although many studies describe internal and external operations in the QM supply chain, few studies usually have an effect on internal, upstream and downstream QM. Moreover, research on the QM supply chain is scarce in emerging economies like Vietnam. Therefore, this research will provide more empirical proof of QM practices in the supply chain in Vietnam and supplement the model relationship between QM practice and supply chain operational efficiency.

III. RESEARCH FRAMEWORK

Based on [10], [8] an empirical QM supply chain structure with three dimensions is proposed: internal, upstream and downstream QM. From a high-performance manufacturing perspective [19], this study explores QM supply chain prac- tices by concentrating on a range of everyday practices, including internal, upstream and downstream QM:

Internal QM covers activities to ensure superior product/ service quality as well as process quality within an enterprise that can be described as top quality management, structured strategic planning, process monitoring, quality data reporting, quality knowledge use, quality design, small-group problem- solving, continuous improvement and learning, quality training and rewards.

The QM upstream consists of activities that include providers in QM for companies: quality of providers, informa- tion technology connections to providers, information sharing by suppliers, participation of suppliers in design, involvement of suppliers in quality, and collaboration of suppliers.

Downstream QM covers activities related to the manage- ment of customer relationships as well as the role of customers in quality management: customer relationships, information technology ties with customers, information sharing with customers, customer participation in design and customer engagement in quality. Both QM supply chain

activities and references from previous studies are summarized.

The main factor evaluating the competitive advantages of the business or the supply chain over a particular time [20] is operational efficiency. This analysis focuses on three aspects: efficiency, cost and supply. The findings are the most impor- tant. These elements have been commonly used in QM and SCM methodological studies.

A. Hypotheses

1) Relation between internal and organizational quality control: With internal quality control eliminates barriers be- tween functional divisions, exchanges are encouraged and common tasks are organized. In addition, internal QM helps overcome disputes and problems that occur as businesses attempt to improve efficiency, quality and consumer require- ments [8]. Earlier research has shown that the organization can increase its customers' product delivery speed through collaboration between commercialization, planning, develop- ment, inventory management and logistics functions [21]. Many works have also reported that various QM activities enhance quality efficiency in a number of ways, for example, improving quality of product / service, minimizing waste and reprocessing costs as a percentage of sales, quality costs, less time-to-service delivery of finished goods/ services [22, 23]. On the basis of the above argument, the following are three hypotheses:

H1. Internal QM affects consistency positively Vietnamese production companies results.

H2. Internal QM has a positive effect in Vietnamese manu- facturing companies on cost efficiency.

H3. Internal QM has a positive effect in Vietnamese manu- facturing companies' delivery efficiency.

2) Relation between the management of quality and opera- tional efficiency upstream: Previous studies in the field of QM and SCM have suggested that the assessment of suppliers, establishing long-term ties with suppliers, participation of supplier in product growth, selection of supplier quality and higher productivity lead to improved product quality [5, 24]. If these results were applied to the QM supply chain, the incor- poration of QM suppliers could minimize supply chain risks and expand awareness of supply chain members about quality requirements for the supply chain. In addition, the integration of suppliers helps create loyalty and confidence between companies and suppliers. Near partnerships with vendors make distribution and design processes simpler. Therefore, product quality / service is improved and manufacturing costs are lower [5]. In addition, the introduction of information sharing would raise inventory prices, achieve high quality materials leading to a better quality of the finished goods and lower the transport time [25]. Moreover, information sharing would help to improve technical ties with providers. [26] found that the participation of suppliers in design would improve their business efficiency. The below are the following hypotheses:

H4. In Vietnamese manufacturing companies, upstream QM positively affects quality output.

H5. In Vietnamese manufacturing companies, the upstream QM positively affects cost efficiency.

H6. In Vietnamese manufacturing companies, Upstream QM positive impacts delivery efficiency.

3) Relationship between quality and

operating efficiency downstream : The emphasis of customers is also seen as the first concept for an efficient QM system. Customer com- munication is an integral aspect of QM and should therefore listen to the voice of customers and create long-term customer relationships [22, 27]. Since consumers are end-users (for B2C companies) and product suppliers (for B2B companies), high consumer awareness is a vital prerequisite for high-quality and efficient delivery of goods in a cost-effective manner [5]. Feedback on the design and enhancement of product quality will avoid quality problems and postponement of delivery. Companies will minimize errors and rework and waste by knowing the customer requirements since the design process. Therefore, the following are three hypotheses:

H7. In Vietnamese producers, Downstream QM has a pos- itive influence on quality results.

H8. Downstream QM has a favorable cost impact Viet- namese production companies results.

H9. Downstream QM has a positive impact Vietnamese production companies results.

The authors use statistical methods, including the correlation and regression, to analyze data obtained by means of a cross- sectional survey mentioned in the following section to test the hypothesis.

IV. RESULTS AND ANALYSIS

This survey adopts supply chain quality metrics from the ongoing High Performance Manufacturing (HPM) [19] inter- national research project. [4], [23] and [8] have been widely used for these scales. A 2019 survey of questionnaires was carried out in Vietnam. Included in this survey were the manufacturers invited to be selected from the Vietnam General Statistics Office industrial list. An e-mail was sent to 1,000 manufacturing firms, as well as 104 responses, which gained a reply rate of 10,4% (including Vietnamese). Four findings were omitted by preliminary inspection because of insufficient details.

Quality managers, customer relations managers, departmen- tal buying managers in every organization are the respondents for supply chain QM practice. Plant managers have determined the success metrics. The survey items have been assessed with a Likert scale of five points (1 = somewhat different from each other, 3 = either unanimous, or unfair, 5 = strongly unanimous).

The first step in the process of data analysis is the verifica- tion of the reliability of the test instrument and its validation. Reliability test: a level agreed of 0.6 was determined by Cronbach, suggesting continuity in the building between the products as indicated in the literature. Content validity: Valid- ity of contents is assured by comprehensive QM supply chain literature review. Validity of construction: Factor analysis shall be used to determine the calculation of objects of the same multivariate form on a scale. Factor loadings for each measuring scale exceeds 0.4 and the value of all buildings exceeds 1.

The measurement test results indicate that the data obtained are accurate, true and useful for testing hypotheses. With re- gard to the average ratings, intern QM activities are reasonably high. Obviously, activities involving and sharing with vendors or consumers are typically less relevant than other activities. For example, the supplier engagement in quality and customer involvement are of the lowest average value that implies lower contact and a coordination of quality improvements in Vietnam's manufacturing companies with external partners.

Regression analysis is conducted after ensuring the normal distribution of reported data and no autocorrelation, cross- linearity and phenomenon of error variance is observed. As dependent variables in the regression model, quality, cost and delivery efficiency are used. Three independent variable (internal, upstream and downstream QM) are the three super scales that are determined based on an average of activities.

Testing the influence of the supply chain QM practice on operational efficiency in two models takes place through hierarchical regression analyses:

Model 1 only includes internal QM as an autonomous variable; and Model 2 involves QM activities as independent variables, internally, upstream and downstream. Check the values of R^2 and F-statistics for major changes in Figure 2 relative to Figure 1. When QM supply chain is expanded to include internal QM practices only external practices, we expect major changes in dependent variables (quality, expense, delivery): upstream and downstream QM practices.

The power of explanation for model 2 is greater since it has a higher R^2 (5%, 12% and 7% higher) than model 1 *(appendix)*. Only downstream QM has a major influence in the regression of quality and delivery results. Regressions of cost efficiency have beneficial and important effects on upstream and downstream QM. Interestingly, internal MQ has a negative effect on cost efficiency, which contributes to higher internal QM implementation. It indicates that the test results are H5, H7, H8 and H9, while the test results are H1, H2, H3, H4 and H6.

V. DISCUSSION

This study proposes and measures for the Supply Chain Quality Management Practices a range of measurement scales. These scales are accurate and true for data collected from 100 Vietnamese manufacturing firms, according to statistical results. Second, this study illustrates the current situation in Vietnamese manufacturing companies in adopting QM supply chain practices. The descriptive study reveals that Vietnamese production companies are more concerned with internal QM activities than with upstream and downstream QM. Moreover, the results show the low linkage in Vietnamese manufacturing enterprises between internal and external QM practices. The third analysis is verified in this report, correlation and regres- sion analysis, which demonstrates the important connection between QM supply chain practices and operating results. Analytical findings indicate a strong link between quality and distribution efficiency of supply chain QM activities. Hierarchical regression analysis reveals, when upstream and downstream QM practices are applied to the models, that regression model is more relevant.

The current situation of QM supply chain activities in Vietnamese manufacturers is suggested by correlation and regression analysis, which can be further debated as: Internal QM activities tend to be higher than others, but they affect organizational efficiency less dramatically. During the 1990s and 2000s, many Vietnamese manufacturing companies tried to follow international standards, tools and techniques for controlling and performing production.

Due to lack of funding, however, internal QM procedures, such as inventory inspections, process inspections, final in- spections, instead of external practices relating to suppliers and consumers, are usually given first priority. In recent times, some manufacturing companies in Vietnam have concentrated more closely on the growth of their production networks to compete in domestic and global markets. Thus the

company pays more attention to external problems surrounding vendors and consumer quality. This may clarify our finding that in this analysis, internal QM practices have higher values than external QM practices. This finding is similar to Rashid and Aslam's work (2012), demonstrating that QM remains at the start of the supply chain in Pakistan as a Developed Country and that substantial supply chain integration in QM takes a long time. More specifically, top quality management leader- ship has been shown to align strongly with other activities and three dimensions of efficiency. Similar to many past research, leadership plays a primary part in QM [28]. There is no impor- tant or negative association between few internal QM activities and cost output of interesting findings. We found that high cost performance is not linked to formal strategic planning, process control, quality design, incentives and ongoing learning and improvement. Moreover, the problem solving of small groups is negatively linked to prices. It can be clarified that low-cost firms deliberately implement problem solving for small groups.

Master implementation of up-stream QM activities and a partial impact on operational efficiency. The quality, cost and efficiency of these activities were strongly linked, for example, to the information technology relations with suppliers, infor- mation sharing by supplier and supplier participation in the design. This finding is consistent with previous studies which confirmed the importance of the performance improvement activities of the upstream QM [3, 7, 14, 29]. In developing countries, technology in the exchange of knowledge and the use of supplier skills in new product development are not strong compared with other prosperous nations and, thus, IT development simplifies the production process and eliminates waste and defects and contributes to lower costs.

Downstream QM activities tend to be comparatively lower than some, but have a substantial effect on operations. The findings of correlation analysis indicate that the quality and delivery efficiency of all QM practice is positively inter- connected. The regression results show further that further downstream QM practice implementation will achieve a higher level of success than internal QM practices. The role played by customer attention and customer relations in increasing effi- ciency is comparable to previous studies [20, 22]. The adverse association between clients 'engagement in quality and cost efficiency may be clarified by customers' active involvement in QM activities by low-cost performance companies.

Earlier studies have shown that the TQM practice and the company results in Vietnam are significantly positive [17]. In addition, emphasis has also been placed on the role of SCM activities such as customer attention and supplier management [11]. This study helps to improve Vietnam 's understanding of QM supply chains by highlighting the role of downstream QM practice in success. This research also tests operating performance using three different dimensions: efficiency, cost and delivery performance rather than taking operating performance as a single structure in past studi- eschical regression analysis has shown that, compared with the model with only internal QM, the model including the internal, upstream and downstream QM will explain more of the variations of each organizational output dimension. This result confirms research from [14], which indicates that, in order to gain support from other members of the supply chain, the high level of QM distribution within individual companies should be first high.

									Statistic variation		
Model	Variable	R^2	Adjusted R^2	F-statistic	Significance	Standardized β	t-value	p-value	ΔR^2	ΔF	Sig. ΔF
1	Internal QM	0.04	0.03	3.9	0.05	0.2	1.97	0.05	0.04	3.9	0.05
2	Internal QM	0.18	0.16	7.11	0	-0.56	-2.55	0.01	0.14	8.42	0
	Upstream QM					0.46	2.43	0.02			
	Downstream QM					0.48	3.47	0			

Note: Dependent variable: cost performance

Fig. 1. Hierarchical regression on cost performance

									Statistic variation		
Model	Variable	R^2	Adjusted R^2	F-statistic	Significance	Standardized β	t-value	p-value	ΔR^2	ΔF	Sig. ΔF
1	Internal QM	0.42	0.41	69.46	0	0.64	8.33	0	0.42	69.46	0
2	Internal QM	0.51	0.49	32.66	0	0.25	1.47	0.14	0.09	8.76	0
	Upstream QM					0.07	0.46	0.65			
	Downstream QM					0.45	4.18	0			

Note: Dependent variable: delivery performance

Fig. 2. Hierarchical regression on delivery performance

II. CONCLUSION

SCM and QM are two areas in which researchers have earned a great deal of focus. The definition of QM supply chain and its effect on business efficiency, especially in developed countries, have not been thoroughly investigated in established literature. This research provides and evaluates

a framework for evaluating the supply chain QM in three elements through a systematic literature review: internal, up- stream, and downstream QM. In order to better understand the QM supply chains in the Vietnamese context, their effect on quality, cost and distribution are further analyzed. This paper helps to better understand QM supplies in developing countries in the present literature and recommends that managers not only rely on internal QMs but expand QMs to external supply chain partners to enhance operating efficiency, including high quality, low cost and timed delivery.

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ĐÁNH GIÁ VIỆC THỰC HIỆN QUẢN LÝ CHẤT LƯỢNG CHUỖI CUNG ỨNG CỦA CÁC CÔNG TY SẢN XUẤT TRÊN ĐỊA BÀN THÀNH PHỐ HỒ CHÍ MINH

Tóm tắt: Mục đích của đề tài là đánh giá chất lượng chuỗi cung ứng của các công ty sản xuất trên địa bàn thành phố Hồ Chí Minh. Bài báo tập trung vào các hoạt động quản lý chất lượng trong nội bộ tại các công ty trong ngành sản xuất và khái quát hóa thực trạng quản lý chất lượng trong chuỗi cung ứng xuôi và ngược. Nghiên cứu này cũng xác nhận mối tương quan và phân tích hồi quy giữa công tác kiểm soát chất lượng trong chuỗi cung ứng và hiệu quả hoạt động vận hành trong chuỗi cung ứng. Quản lý chất lượng ở chiều xuôi và ngược mang lại mức độ hiệu quả về chất lượng, chi phí và hiệu suất đáp ứng. Nghiên cứu còn đóng góp cho các nhà quản lý liên quan đến chất lượng chuỗi cung ứng nên tập trung và chỉ ra quản lý chất lượng ở các cấp độ trong chuỗi cung ứng cần được chú trọng và cải thiện để khai thác tiềm năng của các bên liên quan từ môi trường bên ngoài và lẫn bên trong với nhiều cạnh tranh và không chắc chắn về nhu cầu. Qua đó cho thấy tầm quan trọng của chuỗi các giá trị mang lại dựa vào mối liên kết và ứng dụng công nghệ thông tin, chia sẻ thông tin, kiến thức và kinh nghiệm, sự tham gia giữa các nhà cung ứng và sự tham gia của khách hàng sẽ dẫn đến mức hiệu quả cao trong hoạt động quản lý trong công ty sản xuất tại Tp. Hồ Chí Minh.

Từ khóa: Sản xuất tại Việt Nam, Chất lượng chuỗi cung ứng, Hiệu quả hoạt động

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