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Development of Questionnaire on Supplier Selection Criteria for Textile and Apparel Industry – A Case Study in Vietnam

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Abstract— **Supplier selection criteria are of importance in supplier selection because of their impact on the input materials and production progress of purchasers. However, there is a dearth of researches on a well-designed and validated questionnaire, from which practitioners or researchers are able to execute an official survey in large scope to assess supplier selection criteria for textile and apparel sector in general and for Vietnamese textile and apparel industry in particular. Therefore, the purpose of this study was to develop a questionnaire to explore those criteria with their level of importance. An integrated approach of qualitative and quantitative was employed in the study. First, the qualitative approach involving purposeful sampling and theoretical sampling was used to explore what supplier selection criteria Vietnamese textile and apparel companies were utilizing after the literature on supplier selection criteria had been reviewed. Next, a prequestionnaire was built and sent to some practitioners and experts for their revision. Then, a pilot survey of 31 companies was conducted in Vietnamese textile and apparel companies to determine the supplier selection criteria that are best suited for Vietnamese textile and apparel companies. Numerous statistical tests were conducted to validate the results. Exploring the extant supplier selection criteria of T&A companies will contribute to the literature about the sourcing in particular and the supply chain management in general.**

Keywords— *Sourcing activities, supplier selection criteria, supply chain management, textile and apparel.*

1. Introduction

The textile and apparel (T&A) industry is a major driver of economic growth in Vietnam. Its export volume accounts for 15% of Vietnam's GDP and employs more than 2.5 million labourers [1]. In addition, Vietnam also acts as the tenth largest T&A exporter in the world [2]. It is proven that the Vietnamese T&A industry plays an outstanding role not only in Vietnam's economy but also in the world. However, the added value received by Vietnam and T&A companies remains quite low because 65% of Vietnamese T&A companies undertake the basic form of garment manufacturing, which is cut-make-trim [3]. Therefore, the Vietnam Textile and Apparel Association has introduced a variety of programmes in order to encourage Vietnamese T&A companies to upgrade their production into higher value-added processes such as fabric sourcing, designing, marketing, or branding [4]. For those reasons, Vietnamese T&A companies are also upgrading to the higher form of manufacturing [5] [6]. Nonetheless, the upgrade builds on the sourcing of materials [7]. Effective sourcing is the key indicator of the competitive advantage of an organization [8] [9]; however, a continuing challenge of sourcing is to select from a great number of suppliers those that are capable of supplying the buyer with the right quality products and/or services at the right price in the right quantity and at the right time [10]. This confirms the necessity of a set of supplier selection criteria for Vietnamese T&A industry.

The determination of criteria for the selection of suppliers has been the major concern of many practitioners [11]; however, Vietnamese T&A companies merely rely on some simple criteria or their managers' opinions to make decision. Although a plenty of literature is available on supplier selection criteria, these studies were only conducted for the top four largest T&A export countries (China, EU, India, and America), accounting for more than 70% of the global market share [2]. Few studies have been published regarding the Vietnamese T&A industry. It is inappropriate for Vietnamese T&A companies to make use of the above large countries' selection criteria because the selection of suppliers needs to be built on a specific purchasing context [11]. Also, a well-designed and validated questionnaire to assess supplier selection criteria for T&A sector in general and for Vietnamese T&A industry in particular is seldom available. Thus, an attempt to develop a reliable questionnaire has been made for Vietnamese T&A industry to choose the best supplier selection criteria.

The research is developed into 6 sections. Section 1 presents the general introduction to supplier selection in Vietnamese T&A companies. Section 2 & 3 highlights the Vietnamese T&A industry characteristics and literature review. The methods applied in the research has been

introduced in Section 4 followed by analysis and discussion in Section 5. The paper concludes with the findings and its contribution to industrial practices and highlights paths for future research.

2. Vietnamese Textile and Apparel Industry Characteristics

There are four production methods in Vietnamese T&A industry. The lowest value-added method is cut-make-trim (CMT), under which the client companies will provide all input materials and Vietnamese T&A companies receive processing fee at the most [1]. The higher production mode is free on board (FOB)/original equipment manufacturing (OEM). Under this mode, T&A companies may make finished products in accordance with the clients' requirements as well as would be responsible for input materials. However, in Vietnam, this mode has a little bit difference. It is divided into two types: FOB1 and FOB2. Under FOB1, T&A companies purchase input materials from suppliers designated by their clients whilst they are responsible for materials in case of FOB2 [1]. FOB2 obviously brings more benefits for T&A companies than FOB1 does. Another higher value-added mode is original design manufacturing (ODM) in which T&A companies not only manage materials but also the product design process. The highest level of production is OBM (original brand manufacturing), under which T&A companies work on their own brands designing and making new products, conducting research and development on their products and production, and organizing sales and distribution [12]. At present, 65% of Vietnamese T&A companies undertake CMT, 20% in FOB1, 10% in FOB2, and only 5% in ODM and OBM [3]. Therefore, to enjoy higher added value and profits, Vietnamese T&A companies are gradually moving their production from CMT and FOB1 to FOB2, ODM and OBM [6]. Nonetheless, the ability to do so is conditioned by the sourcing of materials [7].

Recently, Vietnamese T&A has received many positive news. As an illustration, Vietnam concluded negotiations on multilateral and bilateral free trade agreements such as the Free Trade Agreement between Vietnam and Korea (VKFTA), EU-Vietnam Free Trade Agreement (EVFTA), and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), and so forth [13]. As a member of these agreements, Vietnam will benefit greatly, particularly in its T&A sector. For instance, the signing of EU-Vietnam Free Trade Agreement is believed to provide numerours benefits to Vietnam, such as reducing 99% of its tariffs on Vietnam's exports to the EU to zero and helping Vietnamese businesses penetrate and earn profits from the other's market [14]. In fact, in the past 10 years, the T&A industry has achieved continuous export growth from FTAs, attaining an average of more than 10% per year [15]. However, it is not easy for domestic companies to

effectively utilize opportunities provided by the trade agreements. Vietnamese businesses need to meet many requirements on quality, technical requirements, or corporate social responsibilities (CSR)… to enjoy special preferences [16].

In the current scenario, to grasp all opportunities provided by the free trade agreements, to increase the competitive advantages of Vietnamese T&A in the world and to change the production mode from CMT and FOB1 to FOB2, ODM, and OBM, one of the requirements is that Vietnamese companies need to take the initiative in input materials by selecting qualified suppliers that can meet conditions in price, quality, CSR ... However, the current supplier selection criteria used by Vietnamese T&A companies are ambiguous.

3. Literature Review

In the T&A industry, sourcing relies on the performance capabilities of the supply base. In most cases, there are a wide range of potential vendors that differ in quality, cost, delivery time, and production flexibility. Based on a survey of industries, Dickson G. W. (1966) proposed 23 criteria to be used for choosing suppliers [17]. These are terrific criteria for companies to select their suppliers and valuable literature for researchers. However, the selection of supplier criteria depends on the purchasing circumstances [11]. Thus, this review confirms the necessity of studying a set of supplier selection criteria.

According to Lee [18], fashion apparel has a short life cycle and their demand is highly unpredictable; however, the supply is stable, with a reliable supply base and a mature manufacturing process technology. Therefore, for basic apparel, efficient process is best suited. The focus of efficient process is creating the highest levels of cost efficiency. For fashion apparel, responsive and flexible supply to the moving and varied needs of the customers is best appropriate. In the same line of thought, in 2005, Gary Teng and Jaramillo proposed 5 criteria (delivery, flexibility, price, quality, and trust) and 19 sub-criteria to evaluate and select suppliers in global textile and apparel supply chains [19]. In 2007, Koprulu et al. also proposed a supplier selection model with the same criteria as those of Gary Teng and Jaramillo and one new criterion emerged which is innovation [20]. Based on many previous studies, in 2012, Vijayvagy suggested a detailed supplier selection set including 18 criteria divided into 7 groups: quality, cost, delivery, flexibility, reputation, reliability, and post-sales services [21]. Mokhtari et al. in 2013 based on 17 papers to find a set of supplier selection including 19 criteria and then used group discussion technique to extract the significant supplier selection criteria encompassing quality, cost, location, delivery, and trust [22]. In their study in 2014, Mızrak Özfirat et al. proposed four criteria including

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quality, delivery, lead time, and production capacity to choose suppliers in the sports outerwear sector [23]. In 2017, Fallahpour et al. proposed a set of criteria based on the three aspects: economic, environmental and social. The economic aspect comprises cost, quality, delivery and service, and flexibility. The environmental aspect consists of an environmental management system, green products, green warehousing, eco-design, green technology, and green transportation. The social aspect comprises workers' rights, health and safety at work, and supportive activities for workers [24]. This list of refined main criteria and sub-criteria for each aspect was developed based on the literature and opinions of the panel used in the study. Also, in 2017 Ha-Brookshire stated that there were macro and micro levels for supplier selection [25]. Therefore, the selection of suppliers does involve not only the suppliers' performance and/ or organizational characteristics and capabilities but also macro factors such as political and economic stability of sourcing countries, cultural differences, etc.

However, according to a study of Yildil &Yayla, only 2 per cent of the supplier selection studies were from the textile industry, the remaining 98% were from electrical-electronics sector, automotive sector, manufacturing sector … [26] This means that there has not been much attention paid to the determination of supplier selection criteria in T&A industry. To have a comprehensive set of criteria, further studies on other industries need to be conducted. Based on literature review, 27 criteria and 178 sub-criteria were identified. Therefore, it is critical to determine the most significant criteria and sub-criteria through a well-designed questionnaire.

4.   Research Methodology

In order to construct an instrument to assess supplier selection criteria for Vietnamese T&A companies, the authors employed an integrated approach of qualitative and quantitative illustrated in Figure 1.

◆ Step 1: A review of literature with high impact journal articles was conducted to build up a set of supplier selection criteria.

◆ Step 2: The qualitative approach involving in-depth interview with 20 sourcing managers was conducted to explore what supplier selection criteria Vietnamese T&A companies were utilizing and which criteria in the occurrence listing of the literature were necessary for T&A industry. The authors applied an exploratory, qualitative approach, as this approach is best suited for "the collection and analysis of qualitative data for the purpose of generating explanatory theory that furthers the understanding of social and psychological phenomena" [27, p. 3]. The QSR NVIVO 10.0 software program was then used for the theme generation and data transcription.

◆ Step 3: A prequestionnaire sheet was set up and sent to practitioners and experts in the industry for their reviews and comments, from which the prequestionnaire was revised one more time. The objective of this pretest was to gain feedback from practitioners and experts on whether any more questions should be added into the questionnaire, any unsuitable questions should be deleted, or any sentences should be rephrased to make them clearer and simpler or not. In case no changes to the prequestionnaire were made, step 4 would be conducted. Or else, literature would be reviewed basing on the expert and practitioners' feedback.

◆ Step 4: Pilot study was executed to determine the supplier selection criteria that were best suited for Vietnamese T&A companies. Numerous tests were conducted to ensure the reliability, the validity, and sensitivity of the measures. These three criteria were utilized for evaluating good measurements. [28, p. 305].

Reliability is an indicator of a measure's internal consistency. This can be measured by the Cronbach's alpha which is the most common estimate of the instrument's reliability. The Cronbach's alpha normally lies between 0 and 1. However, the recommended value suggested by Hair et al. is 0.60 [29].

The four basic approaches to testing validity are face validity, content validity, criterion validity, and construct validity. Face validity refers to the agreement of professionals that a measurement scale reflects the concept being measured. Content validity refers to the extent to which a measure covers all aspects of a given construct. Criterion validity is of importance in describing how well one measure estimates the value of another measure. To test the criterion validity, multiple correlation coefficient is utilized. For Construct validity, it refers to how well an item measures the construct that it was designed to measure, and it is factor loading to be employed to measure the construct validity. [28, p. 305].

The sensitivity of a measurement refers to changes in attitudes being under investigation. The sensitivity is often increased by adding more response points or scale items such as strongly agree, mildly agree, neither agree or disagree, mildly disagree, and strongly disagree.

The data were analyzed using SPSS20 software. All of respondents are mainly responsible for sourcing activities in their companies.
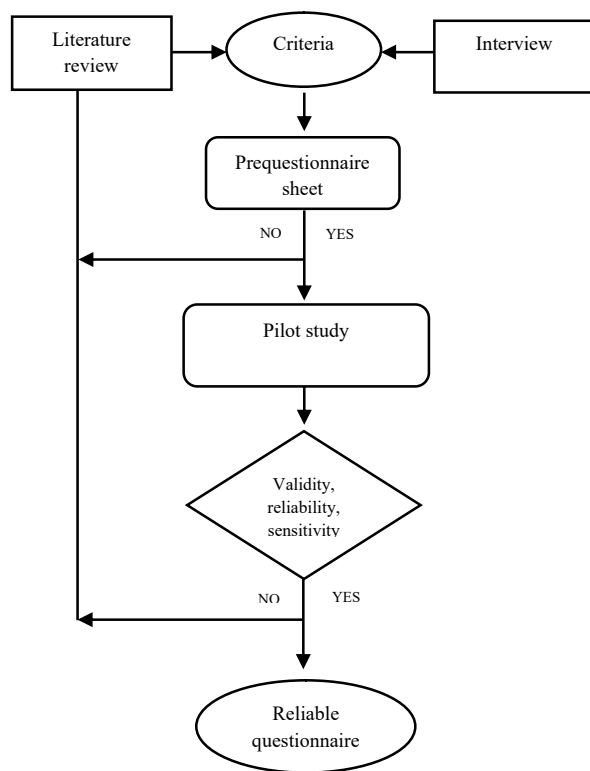
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Figure 1. Flow chart for questionnaire development

5.   Analysis and Discussions

This section presents the results of the above four steps in striving to propose a measurement scale for determining supplier selection criteria.

  ⬥ **Step 1: Literature review**

Based on the result of literature review, a list of 27 criteria and 178 sub-criteria with their occurrence was made, in which cost, quality and delivery are clearly the three most important criteria. These criteria were valued as being of considerable significance and extreme significance by Dickson. These three key criteria are identified as performance metrics [30] which indicate the ability of a supplier to meet short-term requirements of a purchaser [11]. Further, those criteria which focus less on operational measures, but more on the characteristics and capabilities of the suppliers such as financial, relationship, and technology issues can be grouped as organizational factors [30].

  ⬥ **Step 2: In-depth interview**

From the interviews, we found that most Vietnamese T&A companies based their selection of suppliers on three groups of criteria: organizational factors, performance metrics, and sourcing country. The organizational factors primarily focus on the suppliers' capabilities, social responsibilities, and characteristics. This group consists of supplier's capabilities, relationships with purchasers, and corporate social responsibilities. The performance metrics group includes quality, cost, delivery and service. The

criteria in this group are operational measures that Vietnamese T&A companies used to evaluate the supply performance of their suppliers. These selection criteria can be evaluated through their sub-criteria.

One of the findings of the interview is the emergence of certain new criteria compared to those criteria in the literature, including CSR, and certain sub-criteria, such as the payment method in the cost cluster, the sample development capacity in the capability cluster, the carrier in the delivery cluster, and the offering service in the service cluster. Additionally, the set of criteria includes not only internal criteria (quality, cost, delivery, service, capability, and relationship) but also external ones – CSR and sourcing country.

Taken together, 8 criteria and 38 sub-criteria were identified to include in the questionnaire (see Table 2)

  ⬥ **Step 3: Prequestionnaire**

In total 20 industry practitioners in Vietnam in the industry were contacted to check the prequestionnaire sheet. As a result, some questions related to background of respondents were added. In addition, the language of questions was also refined to bring simplicity for the questionnaire.

  ⬥ **Step 4: Pilot study**

The prequestionnaire was sent to 39 companies, in which 08 companies did not belong to the research object. The final number of effective responses was 31. All of respondents are mainly responsible for sourcing activities in their companies. In addition, 25 out of 31 respondents have more than five-year experience, which indicates the reliability of their responses.

Out of 31 companies, 24 are from garment, 02 from textile, and the other 05 are from textile and garment. It is known from the above numbers that textile companies also involve in garment. In terms of human and capital scope, 58% companies are small ones. In regard to types of enterprises, respondents are from joint stock (48.4%), limited liability (41.9%), and private companies (9.7 %). These limited liability and private companies are all small-size ones.

Joint stock companies are mostly medium and big size ones, which involve not only in CMT but also in FOB1, FOB2, ODM, and OBM. Meanwhile, private and limited liability companies are small and medium enterprises. They almost undertake CMT, and some in FOB.

After the data were collected, the authors conducted Reliability test (Cronbach's alpha) to measure the correlation between measures of the same concept [31] and to make sure the collected data were reliable for further analysis. The results revealed that all seven criteria had the Cronbach's alpha values higher than the recommended value (0.60). As shown in the Table 1, the Cronbach's alpha values ranged from 0.672 to 0.859, which means the research survey is highly reliable.

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Table 1. Reliability test

Factor	No. of items	Cronbach's alpha
Quality (QA)	5	0.672
Costs (CO)	5	0.771
Delivery (DE)	5	0.817
Service (SE)	5	0.780
Capability (CA)	6	0.767
Relationship (PR)	4	0.718
CSR (CS)	4	0.853
Sourcing country (SC)	4	0.859

In addition to reliability test, face validity, content validity, criterion validity, and construct validity were conducted. In terms of face validity, as the research was about supplier selection criteria, all questions involved "supplier selection" or "select suppliers". For example, "We select suppliers who got quality certificates" or "Lead-time affects our supplier selection decision". Therefore, the face validity found good for all selection criteria for Vietnamese T&A industry. For content validity, the criteria and sub-criteria were defined by reviewing the literature [31] on T&A industry and in-depth interviews with 20 experts who are currently sourcing managers of different T&A companies in Vietnam. Then, the measurement items in the questionnaire survey were reviewed by 20 industry practitioners in the industry. Therefore, the content validity of the study is supported. In regard to criterion validity, the multiple correlation coefficient got 0.866, which indicates a high degree of criterion-related validity [32]. The next test that should be employed is construct validity [31]. According to Tabachnick and Fidell (2001), at least 300 cases were best for factor analysis [33]. However, the number of respondents in this paper only reached 31, so it was impossible to run factor analysis.

For the sensitivity, the respondents were required to rate the level of agreement on each supplier selection criterion based on a five-point Likert scale with 5 as "strongly agree", 4 as "agree", 3 as "neither agree nor disagree", 2 as "disagree", and 1 as "strongly disagree". This measurement instrument is able to accurately measure variability in responses [28, p. 305].

The importance of each criterion is presented in Table 2. The mean values of criteria ranged from 3.661 to 4.315, which indicate the significance of these criteria. In addition, the mean values of all sub-criteria also get high

results, ranging from 3.16 to 4.71, which indicates they are well recognized by Vietnamese T&A companies. From the survey results, relationship is the most important supplier selection criterion, followed by service, quality, delivery, capability, CSR, costs and sourcing country. Among the criteria under the relationship category, honesty and trust act as the two most important ones, and then long-term partnership and information sharing. High level of honesty and trust are significant in fiercely competitive supply environment. Service appears to be the second most significant category, in which responsiveness is ranked as the most important criterion with its mean of 4.42, then ease of communication, after-sales service, flexibility to changes and offering service. The criterion followed by service is quality. Under this group, conformance to requirements acts as the highest mean compared to other sub-criteria (4.71). Although quality is ranked as the third important cluster, its component criterion – conformance to requirements - has still been the most sub-criterion. Under the delivery category, on-time delivery is the main concern of Vietnamese T&A companies in selecting suppliers with the second highest mean compared to other sub-criteria (4.68). In addition to on-time delivery, delivery quality and lead-time are also of the main requirements of Vietnamese T&A companies with their high mean. The cost and sourcing category have the lowest mean, preceded by capability and CSR. It is shown from the results that relationship, service and quality are of the three-great significance, which means Vietnamese T&A companies focus much on those make the product's quality better including good and long-term relationship; just-in-time service whilst financial matters play secondary roles. This outcome seems to conflict with the findings in the literature where quality, cost, and delivery are the three most important criteria.

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Table 2. Questionnaire survey results

Criteria	Mean	Mode	Criteria	Mean	Mode
Quality (QA)	**4.077**		**Capability (CA)**	**3.962**	
Conformance to requirements	4.71	5	Financial capacity	3.90	4
Country of origin	3.94	4	Production capacity	4.32	5
Certificate of quality	3.84	4	Human resources	3.90	4
Defect & scrap ratio	4.00	5	Reputation	3.58	3
Continuous quality improvement program	3.90	5	Sample development capacity	4.03	4
Costs (CO)	**3.677**		Factories	4.03	5
Price of material	4.23	4	**Relationship (PR)**	**4.315**	
Minimum order quantity	3.74	4	Long-term partnership	4.13	4
Freight cost	3.45	4	Trust	4.52	5
Discount	3.16	4	Honesty	4.61	5
Payment method	3.81	4	Information sharing	4.00	4
Delivery (DE)	**4.019**		**CSR (CS)**	**3.815**	
On-time delivery	4.68	5	Labor practices	3.84	4
Lead-time	4.10	4	Consumer protection	4.03	4
Delivery quality	4.48	5	Environmental protection	3.97	4
Geographic distance	3.48	3	Contributions to communities	3.42	3
Appropriate carriers	3.35	3	**Sourcing country (SC)**	**3.661**	
Service (SE)	**4.206**		Political stability	4.00	4
Flexibility to changes	4.19	4	Economic stability	3.71	4
Responsiveness	4.42	5	Cultural affinity	3.29	3
Ease of communication	4.32	4	Labor disputes	3.65	3
After-sales service	4.26	4			
Offering service	3.84	4			

6. Conclusion

The outcome of this study is the reliable and tested questionnaire for practitioners or researchers to execute an official survey in large scope to assess supplier selection criteria for T&A sector in general and for Vietnamese T&A industry in particular. The results also provide some beneficial results for T&A companies since they can utilize the finding as a tool to set their supplier selection criteria based on the importance of each criterion. Among criteria found, relationship in which honesty, trust, long-term partnership, and information sharing between suppliers and buyers is of the most significance. Service and delivery are the next important criteria, then followed by quality, capabilities, CSR, cost, and sourcing country. Cost is no longer considered as an important criterion, but rather honesty and mutual trust in the business relationship. Basing on the above result, T&A companies may select capable suppliers as their partners in the supply chain so as to minimize their risks and costs and advance their current production method to higher levels. Additionally, the finding provides insight into a comprehensive set of supplier selection criteria for T&A companies as well as contributes to the literature about the sourcing in particular and the supply chain management in general. For suppliers from Vietnam and foreign countries, they can take advantage of this finding to increase their competitiveness in order to become material or auxiliary suppliers. Apart from the theoretical and managerial implications, this study also has some limitations which need to be solved in future researches such as increasing the sample size to run factor loading or practicing these criteria in the selection of suppliers for T&A companies.

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