Harmony Supply Chain: A New Construct towards Company Resilience

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***Abstract*— in the global business environment, the focus of business competition shifts from companies against companies to supply chains against supply chains. A superior company must have an orientation to improve the company's resilience. Based on the literature review, noevidence that supply chain affects the company's resilience. Therefore, supply chain reconstruction is needed that can develop the company's resilience. The harmony supply chain, which is the result of hybridization between lean supply chains and responsive supply chains, is expected to be a valid and reliable measurement tool in developing company resilience. A series of studies consisting of harmony supply chain testing as a valid and reliable measurement tool. The software used for testing is SPSS version 20 and AMOS version 18. The test results show that the harmony supply chain is a new construct as a valid and reliable measurement tool. The main contribution of these scientific research paper is proposing a novel construct of Harmony Supply Chain which can be useful for developing supply chain strategies especially at SMEs**

***Keywords*—** *supply chain, supply chain harmony, firm resilience, measurement*

1. Introduction

The complexity of a supply chain demands the existence of several organizational theories that underlie the development of corporate resilience. The theoretical foundation for supply chain management is broad enough to cover the theory of competitive advantage [1], resource-based view, RBV, network theory and the theory of winner orders and order qualifiers [2]. These theories are not explicitly related to the responsive and lean strategy of a supply chain, but they are closely related to the resilience of a supply chain.

A lean supply chain is a supply chain concept that uses economic considerations as the main basis [3]. Lean supply chains are able to maximize profits through cost reduction, but are less agile in the supply that customers need [4]. There are four dimensions related to the measurement of lean supply chains, namely: cost, time, quality and flexibility [5]. Slim chain practices are becoming challenging to implement as supply chains as complexity increases [6].

Further development of a lean supply chain is an efficiency-based supply chain that assumes that customer demand is predictable and stable. However, this assumption often does not apply to concise life cycle products that tend to be erratic [7], for example in the toy industry [8] and the clothing industry for fashion [9]. Supply chains based on cost-saving efficiency tend to be more vulnerable to unexpected changes in customer demand than responsive supply chains [10].

In addition to efficient supply chains that are derived from lean supply chains, responsive supply chains are also developing. Responsive supply chains are derived from the agile supply chain. The agile supply chain has a primary focus on the ability to respond quickly to market changes and maintain the ability to survive [11]. Agility has been identified as one of the most prominent issues of contemporary supply chain management [12].

The agile supply chain is expected to be able to respond quickly according to random variations in the market [4, 13]. An agile supply chain that develops into a responsive supply chain as an interaction of collaborative networks of partners, systems and information technology and management knowledge [14]. According to Tiwari, Mahanty, Sarmah, & Jenaman [14], some of the research needed to help develop responsive supply chains is speed and flexibility. The responsive supply chain takes full account of availability but does not take into account the level of costs incurred by inventory arrangements [15]. Tiwari, Mahanty, Sarmah, & Jenaman [14] found that responsive supply chains were able to overcome demand oscillations; however, the influence of responsive supply chains on corporate performance has not been empirically tested [7].

Naim & Gosling [16] has discussed the difference between leanness and agility in the context of the supply chain. The concept of a lean supply chain focuses on eliminating activities that do not provide added value but are different from agility that is ready when facing market changes [17]. Hybridization leanness and agility in the supply chain become a concept of leagile supply chain, but it is only a concept that has never been proven through empirical research [18].

The literature review in the supply chain shows the existence of minimal scientific work on firm toughness practices in SMEs [19]. SMEs is a company that has a workforce of between 150 and 200 people [20]. SMEs have played a role in producing more than 70% of world goods [21]. On the other hand, SMEs play a critical role in the national economy of the country. Research on corporate resilience practices in SMEs is still limited and has not received much attention [19]. At present, there is a lack of effectiveness of SMEs in adapting to changing traditional relations into a more modern and resilient collaborative supply chain [22]. Although further, some other researchers have combined lean and agile supply chains through decoupling points into leagile (lean - agile) concepts, the concept has not contributed to the success of the firm's resilience facing the threat of uncertainty that may be faced [17]. Therefore we need a construct that can develop the resilience of companies in developing countries, especially for small and medium scale companies (SMEs).

This research paper proposes a new construct called the "harmony supply chain". The supply chain harmony is the result of hybridization or decoupling from the lean supply chain and responsive supply chain. With these two concepts combined, a chain of Small and Medium Enterprises (SMEs) will be formed that is both efficient and responsive (supply chain responsiveness). Through this supply chain, harmony is expected to be able to increase the resilience or resilience of SMEs that have experienced many weaknesses and vulnerabilities. Furthermore, it needs to be tested whether the development of harmony supply chain constructs can produce a valid and reliable measurement scale.

2. Literature Review

2.1 Supply Chain Management

A supply chain is all stages involved in meeting consumer demand consisting of producers, suppliers, retailers and customers [23]. Supply chain management serves as a manager in a dynamic supply chain network [24]. According to [25], supply chain management is a total system approach to delivering products to end customers by using information technology to coordinate all supplier-to-retail supply chain elements. Whereas [27] define SCM as a system for implementing an inclusive approach in managing the entire flow of information, materials, and services from raw materials through factories and warehouses to end consumers. The main objectives of the Supply Chain Management (SCM) strategy are to shorten the supply chain cycle, develop or build services, reduce costs and prices [28]. The SCM's short-term strategic objective is to minimize cycle time and inventory, thus increasing productivity, while the long-term objective is to increase profits through market share and customer satisfaction. Understanding SCM for the company's operational interests means that it must understand the operations strategy which includes making to stock strategy, configure to order (sold first then made), and engineer to order (complex and unique products for specific consumer needs). The main goal of building a supply chain (Supply Chain Management) is to minimize the flow of raw materials and finished products in each line to increase productivity and cost savings.

The success of a supply chain business is managing several essential elements for parts such as individual business units in the entire supply chain. Strategies are covered in different aspects to contribute to the overall results [29]. Supply Chain Management has three components consisting of Upstream Supply Chain Management, a process in which the company gets suppliers from outside parties to obtain raw materials. Then the second component is Internal Supply Chain Management, a process where a change from raw material to finished product is taking place. SCM's last element is Downstream Supply Chain Management, a system in which an independent supplier usually carries out the company's distribution of goods to consumers [30].

2.2 SCM's significance for SMEs

The typical problem in Indonesia's Small and Medium Enterprises (SMEs) business is a matter of managerial ability that has not been optimal [31]. The managerial problem includes managing availability and continuity of material, product quality management, product compatibility and products availability that meet consumer needs [32]. Problems also occur in terms of product distribution to target consumers. Whereas the ASEAN Economic act as a driving force for Indonesian SMEs to be able to apply business practices that demand a high level of effectiveness and efficiency. A management tool that is seen able to increase the level of effectiveness and efficiency is Management Supply Chain. Research conducted by [33] in Malaysia revealed the benefits received from implementing SCM for SMEs. The benefits include improved customer service and business communication between SMEs, reduced business risk, and an increasingly shorter product development time [34]. In another study involving small and medium-sized manufacturing companies for Turkey, it was found that SCM implementation would support SMEs by reducing inventory levels, minimizing production times, scheduling

appropriate assets, saving costs and rising acquisition costs [35].

2.3 Supply Chain Strategies

Two supply chain strategies are lean supply chain (efficient supply chain) and agile supply chain (responsive supply chain) [36]. The lean supply chain is a process that prioritizes efforts to respond to demand consumers quickly and precisely so that it supports the existence of inventory in anticipation of demand [37]. Lean supply chain management is not just correcting what is wrong that has been done incorrectly so far. However, it is related to the design and implementation of lean principles in the entire supply chain process, with the primary objective being to eliminate waste and non-value added activities [38]. Improved performance of lean supply chain management must refer to a reduction in the total time cycle, inventory, and costs throughout the whole supply chain process. This process requires continuous improvement efforts that are supported by management and employees through the creation of learning organizations and cultural changes that support the achievement of the lean supply chain. Additionally, according to [39], lean supply chain management involves removing excess or unwanted elements from a system. This system is most often applied in manufacturing, where products can be ordered as required rather than storing up a lot of inventory.

Through a lean management tactic, identifying the value and non-value parts of the supply chain is vital to organizational leadership. By identifying what is of value in the supply chain, it is possible to determine how business can be focused on those valued parts. Meanwhile, an agile supply chain is a distribution system that aims to do things quickly, sustain flexibility and maintain high productivity, save production cost and a high response to market demands. According to [13, 40], agility is a form of responsive strategy in a volatile market, where demand drives this strategy entirely. The main objectives of the agile supply chain are value creation and customer satisfaction, achieving mass customization at mass production costs, and increasing the role and involvement of human resources in the use of information technology [41].

3. Methodology

This study took the subject of an owner or manager of Small and Medium Enterprises (SMEs) of essential oils processing industry in Indonesia, which is responsible for managing the SMEs. The owner or manager of the SMEs which is the subject of research is based on the consideration that the owner or manager is considered to have sufficient skills and has the highest understanding of the management of his Small and Medium Enterprises (SMEs). This understanding covers all aspects of capital issues, production processes, distribution/marketing and human resource management.

In this study, the data measurement tool used was the interval scale. Interval scale is chosen because this data measurement tool has a meaningful range of values, even though the absolute value is less meaningful. In this interval, the scale will produce measurement data that allows calculating the average value, parameter statistics, standard deviation, correlation, regression and the like. The interval scale used in this study is the agree - disagree scale (agree-disagree scale). According to Ferdinand [42], the agree-disagree scale is in the form of an interval that can be generated through the bipolar adjective data collection technique [43]. The scale that uses bipolar adjective data is the scale of the results of the development of the semantic scaled data technique, namely through the addition of two extreme categories [43].

The questionnaire method is a method of collecting data by giving a list of questions filled out by respondents. Data obtained through questionnaires are data about respondents' responses related to the variables studied. The questionnaire consisted of closed questionnaires and open questionnaires. The closed questionnaire aims to obtain interval data with the bipolar adjective method, while the questionnaire is open in general to explore and find out the reasons why respondents give answers to the numbers on the adjective bipolar scale.

In this study, the validity of the measurement instrument is examined by statistical tools, and internal testing validity was used, namely by using item analysts. The item analysis is done by correlating the question items with the total number of question items. Testing the instrument validity is done on the questionnaire instrument that will be used to retrieve data in the field. The validity test of this instrument was carried out using a sample of 168 respondents.

According to Santoso [44], the results of measurement classified as valid if the item correlation coefficient for total> r table with df (0.05, n-2) or the value of Sig. Item correlation to the total.

In this study, the instrument reliability test was conducted using the Cronbach Alpha internal reliability test with the help of SPSS version 20. According to Santoso [44], Cronbach Alpha acceptance criteria are as follows:

- The <0.200 interval is very low
- Intervals of 0.200 - 0.399 Low
- Intervals of 0.400 - 0.599 Enough
- Intervals of 0.600 - 0.799 Height
- 0.800 - 1.00 interval is very high

Current research aims to develop the resilience of companies in further empirical studies. Researchers developed surveys using a multi-item scale, both new and existing [45]. A new scale was developed for constructing harmony supply chains. To develop a harmony supply chain scale, researchers followed Churchill's method to construct and test new constructs [26-28]. This method consists of four main steps: (1) developing a construct and examining content and validity; (2) test dimensions; (3) checking internal consistency and (4) ensuring convergent validity, discriminant, and nomological validity of measurements [46].

3. Results and Discussion

3.1 Conceptual Mapping

In this study, a new concept was developed called "harmony supply chain". The supply chain harmony is the result of hybridization or decoupling from the lean supply chain and responsive supply chain. It is hoped that this new concept will be able to bridge some of the previous concepts which are shown to improve organizational performance for large companies with a background in developed countries. Through this harmony supply chain, it is expected to increase the repertoire of the development of operational management science while at the same time being able to improve the resilience of the SMEs which has experienced many weaknesses and vulnerabilities. The conceptual mapping of the emergence of supply chain harmony is as Figure 1.

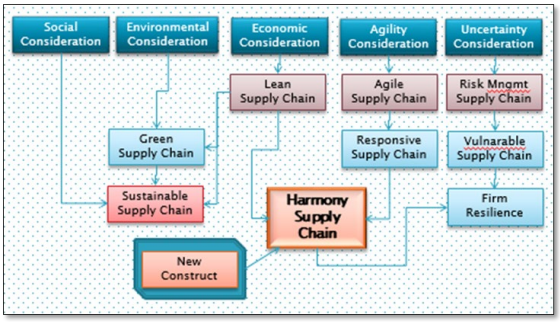

Figure 1. Conceptual Mapping of the New Concept of Harmony Supply Chain

The concept of supply chain harmony is different from the previous concepts summarized in Table 1.

Table 1. Differences in Harmony Supply Chains with Other Supply Chains

Lean Supply Chain	Responsive Supply Chain	Responsive Supply Chain	Rantai Pasokan Harmoni
Qrunfleh and Tarafdar [29]	Qrunfleh and Tarafdar [29]	Roh, Hong [7]	New Construct (2018)
• Manage inventory as needed • Manage inventory by sending when needed • Manage inventory according to where it is needed • Adopt quality practices according to requirements • Manage quality according to requirements • Check products frequently • Reducing all types of waste	• Able to handle difficult orders that are not standard • Able to meet specific customer specifications • Able to produce products that are characterized by a wide selection of features, sizes and colors • Can quickly adjust capacity so that it can speed up or slow down production in response to changes in customer demand • Can quickly introduce a large number of product improvements / variations	• Broader product coverage • Offer new products more often • Offering more innovative products	• Decrease various costs (raw material costs, fuel / energy, storage and transportation waste) • Offering products more often and more innovatively • Offering products with a wider range • Adjust request capacity • Respond faster to process, shipping and inventory • Continuous improvement • Handle special orders (nonstandard) • Improve customer quality and requirements • Minimizing various types of waste

In the first step, nine items were determined from the literature study. The items consist of efforts to reduce various costs, offer products more often and more innovatively, offer products with a broader range, ability to adjust demand capacity, have a faster response in the process, delivery and inventory, always make continuous improvements, the ability to handle orders specifically (nonstandard), always improving the quality and requirements of customers, and always minimizing various types of waste [7,48].

After the first collection of items, a test of substantive validity is used for scaling purification [27, 30]. Substantive validity is defined as how well a measurement item reflects or is theoretically related to a construct [46,48]. This procedure is recommended when constructs are still relatively new [45]. On the nine items, the questions then tested the face validity of the experts consisting of experts (supervisors, teaching staff, colleagues who were conducting similar studies) and practitioners. Experts and practitioners were asked to consider the relevance of each item to the concept of the harmony supply chain. Opinions of industry experts were asked to assess scale substantive validity. Besides, industry experts were also asked to consider the disruptions facing their company in previous years.

The next step in the scale development process is an analysis of validity. The process of developing harmony supply chain new constructs uses Exploratory Factor Analysis (EFA).

3.2 Exploratory Factor Analysis (EFA) Harmony Supply Chain

Testing the supply chain harmony validity of harmony in this study was carried out using the method of exploratory factor analysis (EFA). This analysis was carried out to test the assumption of

the unidimensionality of a measuring instrument. Two things need to be done so that factor analysis can be carried out, the first is the Measuring of Sampling Adequacy Keizer-Meyers-Oklin (KMO) to measure the adequacy of the sample by comparing the magnitude of the correlation coefficient observed with its coefficient correlation. Calculations using SPSS version 20 software for 42 preliminary samples obtained a value of 0.819. The KMO value of 0.819 shows that the adequacy of the sample is in the high category.

The second calculation is to determine the value of the Barlett Test of Sphericity to determine whether there is a significant correlation between variables. The test results of the value of the Barlett Test of Sphericity is 173,796 with a significance level of 0,000, which means that there is a significant correlation between the observed variables. The following is the anti-image correlation construct supply chain construct.

Table 2. Correlation of Anti-Image Contours of the Harmony Supply Chain

Item	*Anti Image correlation*
RPH1	0,841
RPH2	0,858
RPH3	0,858
RPH4	0,832
RPH5	0,843
RPH6	0,766
RPH7	0,834
RPH8	0,800
RPH9	0,608

Based on table 2 and the value of Keizer-Meyers-Oklin (KMO) 0.819 shows that all items are feasible to analyze factors because they have an anti-image correlation coefficient above 0.5. After the harmony supply chain construct is deemed feasible to be analyzed, then further factor extraction is carried out on the items of all variables. Figure 2 shows the scree plot of harmony supply chain variables.

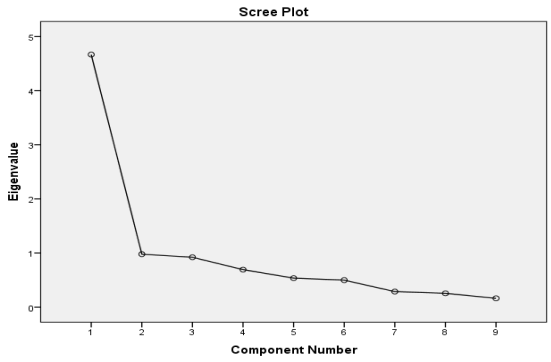

Figure 2. Scree-plot Harmony Supply ChainVariable

Based on Figure 2, it appears that there is only one component of the eigenvalues factor more significant than one with a cumulative variance value of 51.849%. Figure 2 explains the results of factor extraction, which produces 1 factor rotated using the Principal Component Analysis extraction method. The first factor explains the variance of 51.849% while the next factor only shows a variance smaller than 11%. The other component variants are shown in Table 3 as follows:

Table 3. Variance of Eigenvalue

Component	Initial Eigenvalue		
	Total	% of Variance	Cumulative %
1	4,666	51,849	51,849
2	0,979	10,873	62,722
3	0,922	10,240	72,962
4	0,693	7,702	80,664
5	0,563	5,951	86,615
6	0,499	5,545	92,160
7	0,288	3,196	95,356
8	0,255	2,835	98,192
9	0,163	1,808	100,000

Extraction Method: Principal Component Analysis

Because it only produces one factor, this shows that the supply chain harmony variable is unidimensionality. Thus, it can be concluded that the scale of supply chain harmony only stands as the first-order construct.

Table 4. Rotational Factors, Communities, and Harmony Supply Chain Scale Variances

Item	Factor_1	Communities	Factor Loading
RPH1	0,872	0,761	0.872
RPH2	0,813	0,662	0.813
RPH3	0,861	0,741	0.861
RPH4	0,814	0,662	0.814
RPH5	0,832	0,693	0.832
RPH6	0,824	0,678	0.824
RPH7	0,837	0,700	0.837
RPH8	0,831	0,690	0.831
RPH9	0,803	0,645	0.803

3.3 Test the Dimensionality of constructing the Harmony Supply Chain

Statement in the Harmonious Supply Chain variable of 9 items. Confirmatory factor analysis is carried out to test the dimensionality of the harmony supply chain variable and described in the following model.

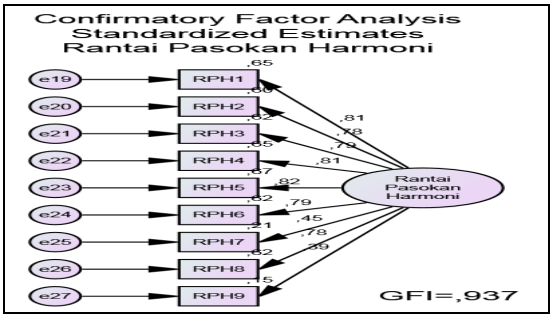

Figure 3. Confirmatory Factor Analysis construction of Harmony Supply Chain

The values of loading factors, factor score scales, construct reliability, alpha Cronbach and variance extract constructs of the Harmony Supply Chain are presented in Table 5 below:

Table 5. Loading Factor, Factor Score, Construct Reliability, Alpha Cronbach and Variance Extract Harmonious Supply Chain Variables

Item	Loading factor	Factor Score	CR/ α /VE
RPH1	0,809	0,075	
RPH2	0,776	0,060	
RPH3	0,786	0,065	
RPH4	0,807	0,074	CR=0,907
RPH5	0,817	0,083	α = 0,895
RPH6	0,787	0,076	VE=0,531
RPH7	0,454	0,015	
RPH8	0,785	0,069	
RPH9	0,385	0,013	

From table 5 above it is known that the seventh indicator (RPH7) and the ninth indicator (RPH9) have a loading factor value of 0.454 and 0.385 (<0.7), so the seventh and ninth indicators must be excluded from the model because they are considered unable to explain variables Harmony Supply Chain. The following are the results of confirmatory factor analysis after the seventh and ninth indicators of the Harmony Supply Chain variable are issued.

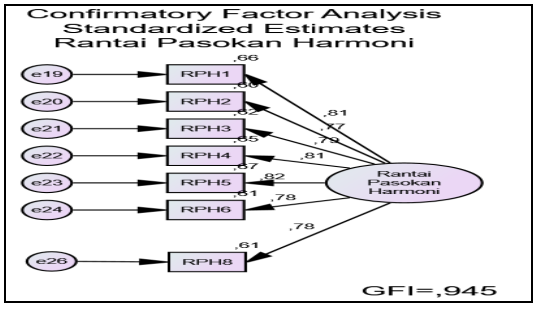

Figure 4. Confirmatory Factor Analysis Harmony Supply Chain Variables after Revised Indicators

The magnitude of loading factors, factor score scales, construct reliability, alpha Cronbach and variance extract of Harmonious Supply Chain variables are presented in Table 6 below

Table 6. Loading Factor Magnitude, Factor Score, Construct Reliability, Cronbach Alpha and Variance Extract Harmony Supply Chain Variables after Revised Indicator.

Item	Factor_1	Communities	Factor Loading
RPH1	0,814	0,137	
RPH2	0,773	0,103	
RPH3	0,789	0,116	
RPH4	0,806	0,129	CR=0,923
RPH5	0,819	0,148	α = 0,923
RPH6	0,781	0,131	VE=0,632
RPH7	0,781	0,120	
RPH8	0,814	0,137	
RPH9	0,773	0,103	

4. Conclusion

Based on the examination in this study after issuing the seven indicators (RPH7) and leisure (RPH9), all loading factor values from each indicator of the Harmony Supply Chain have a value above 0.7, meaning that all indicators meet the requirements so that there are no indicators must be removed from the model. The value of construct reliability is 0.923, Cronbach's alpha value is 0.923 and extracts variance value is 0.632. Based on the results of the loading factor value and the value construct of the five indicators in the harmony Supply Chain variable, it can be said that it has good validity and reliability for the Harmony Supply Chain construct [49]. This means the new construction of harmony supply chains is reasonably reliable and valid and can be used as a measurement tool. This research contribution is expected to provide a new perspective in managing supply chains in SME's.

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