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Evaluation Of Relationship Causes Of The Return Process In The Supply Chain Of The Textile Industry

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A B S T R A C T

This research focuses on the return process, the process where consumers decide to return the product after receiving an order or after making a purchase. This incident is not desired by the company, because it has the potential to reduce profits and consumer loyalty. However, the company is aware that the return process cannot be avoided. So this research aims to evaluate the factors that have the potential to cause the return process by using the Interpretive Structural Modeling (ISM) Methodology. This research case study was conducted on a textile company that serves orders for school uniforms, office uniforms, moslem clothes, etc. Nine factors were identified, that are: off-season, overstock, delivery error, incorrect size, incorrect color, quality issue, change mind, damaged item, and incorrect product, which are the reasons consumers carry out the return process. The results of the ISM-based model and MICMAC analysis mapping show that the quality issue factor is the key reason for consumers to make the return process. The strategy of handling presses return in connection with these factors is carried out by developing a system that supports customer support work to maintain consumer loyalty. Through the ISM methodology, companies can simplify complex problems, so they focus on the factors that are the root of the problem to be able to design strategies to deal with them.

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INTRODUCTION

Nowadays, sustainability has become a main focus in many organizations. It is due to the increasing of environmental concerns that have a negative impact on life quality of the community and the environment. The success of an organization ability to attract and retain customers is critical. Consumer loyalty requires a strong desire from consumers for a product. It is often formed by positive experiences of consumers of their purchases. A number of factors contribute to experience and convenience, product availability, shipping, return policies, etc. [1]. These factors are based on the company efficient performance in managing product returns.

Quality is closely related to the return process. Low quality products and services can reduce customer satisfaction and may cause frequent product returns, while high quality products and services can satisfy consumers and reduce returns. Research related to the product return process conducted by Foscht et al. [2] describes consumer return behavior on remote purchases. Here consumers are grouped into four categories based on the rate of return of the product made. According to him, there is still relatively little research that focuses on the process of return from consumers. Powers and Jack [3] beside that it explains that there are two main reasons consumers return products, namely the product fails to meet expectations and consumers find products with better prices elsewhere. Based on the explanation, it is important for companies to investigate the root causes of the main reasons consumers return products, so that companies can design strategies to improve their performance.

Warfield in 1974, proposed an effective way of developing relationships between factors in complex systems [4]. Furthermore, some researchers began to implement it to describe the various problems that arise. Mukherjee and Mondal [5] utilize the ISM methodology to analyze the main issues in the photocopier remanufacturing process. Yuliawati et al. [6] developed an ISM model to investigate the interrelationships between factors that motivate business success to obtain a return quantity/volume in order to ensure the availability of cores in construction machinery remanufacturing companies. Kumar and Dixit [7] proposed the ISM-DEMATEL approach to identify barriers to e-waste management, as well as provide direction for improving e-waste management performance in India. Vasanthakumar et al. [8] evaluated the factors influencing lean remanufacturing in the automotive industry.

The literature on the product return process is still limited, especially from the aspect of individual consumer behavior. Given that the product return process is unavoidable, however, this process is quite troublesome for the supply chain and drains overall profitability [9], it is in the interest of the company to investigate the return process that occurs. This study took a case study on a textile company in Lamongan city, Indonesia, which has been operating for almost ten years. In the last five quarters, the company often gets product claims from customers. This paper briefly discusses the evaluation of the interrelationship of factors why consumers make the return process in the textile industry. Not many published studies have tried to analyze the return process, including in the textile industry.

Based on this background, this study aimed to: (1) Identify the reasons why consumers carry out the return process in the textile industry using the ISM methodology, (2) Develop a model that reveals the relationship between these factors, and (3) Determine the driving power and the dependence power of the identified Factor.

The study is divided into four parts. The initial part is an introduction that has been described earlier, then continued with a research method that contains the steps of completing the research. Furthermore, the results and discussions that describe the results of research and discussion. The last part is the conclusion.

RESEARCH METHOD

This section contained a series of research completion steps to ensure the achievement of the research objectives, namely obtaining a model of the relationship between the factors that make consumers return to the textile industry. Figure 1 shows a sequence of steps for the ISM methodology developed by Kannan et al. [10].

The first step was data collection that consist of factors that caused consumers to return products. Information related to this factor was obtained through reputable international journals and direct observation of one of the textile companies. Information related to product returns is obtained through the results of interviews and interviews with owners, production departments and marketing departments. They were chosen because they understood this problem. Data retrieval in the field is carried out for almost a month.

After that, the validation process was carried out to ensure the identified factors were proven to be relevant to the problem. Experts involved a total of six people consisting of practitioners, consumers and academics. Furthermore, using an expert questionnaire, identify the relationship of contextual relationships in pairs among the factors under consideration in the system. The next step is processing the data using the ISM methodology in accordance with the order in Figure 1.

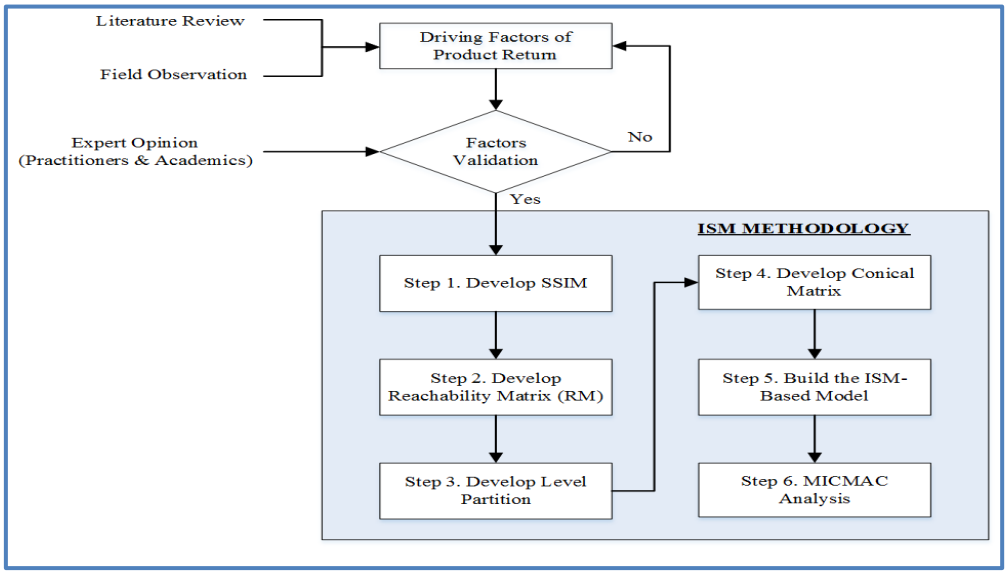

Figure 1. Research Stage

RESULTS AND DISCUSSION

Illustration of Closed-*Loop Supply Chain* (CLSC) of Textile Company

This research was conducted on a Closed-Loop Supply Chain textile company that focuses on producing school uniforms, office uniforms, Muslim clothes, etc. The company implements a make to stock (MTS) and make to order (MTO) production system. The MTS

system is applied to products that companies routinely distribute to partner stores, such as school uniforms, office uniforms and religious clothing. Nevertheless, the company also accepts orders with the MTS system. Usually the company receives orders from several offices that want to be made custom. In order to procure raw materials, the company cooperates with fabric supplier business partners who are not far from the company location. The majority of the company workforce is female. They are housewives who live around the company.

The flow of information and materials from upstream to downstream, as shown in Figure 2. The flow of information starts from a request from consumers received by the company through two mechanisms, namely direct and through retail/stores. Furthermore, the retail/store will continue the request to the company. The request is then recapitulated by the company and becomes an input for planning raw material requirements. The main raw materials for the textile company are cloth, yarn, buttons and zippers. The raw material requirement data is then sent to the suppliers of each raw material.

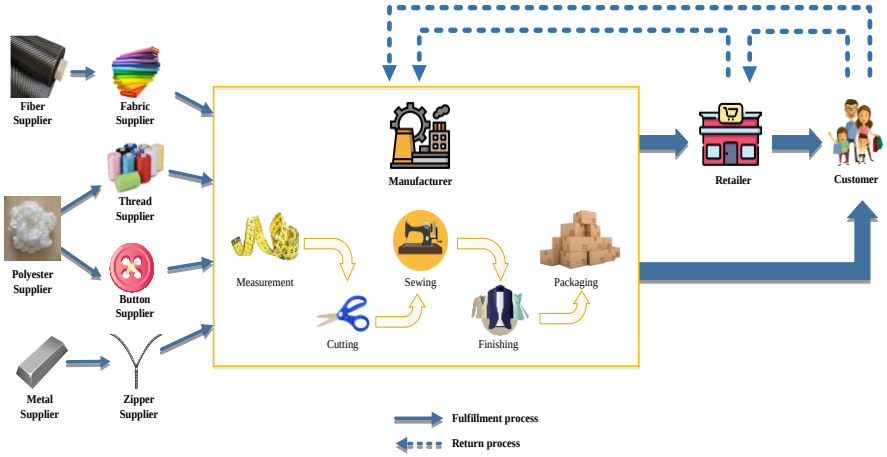

Figure 2. Structure of *Closed-Loop Supply Chain* of Textile Company

Furthermore, the material flow starts when the supplier sends raw materials to fulfill the company request. Then the raw materials are received by the company and then used to produce finished products. After the process is complete, some products are sent directly to consumers and some products are sent to retail/stores.

As the company operates, in the last six quarters of sales, the company has received several claims from consumers.. Consumers can make claims/returns through retail/stores, which will then be forwarded to the company, or made directly to the company. This combined forward and reverse supply chain mechanism that is known as Closed-Loop Supply Chain (CLSC).

Identification and Validation Factor

The problem of the return process is important because it can affect customer satisfaction and company performance. So it is necessary to identify the reason for consumers to return products. Factor identification is carried out by browsing several reputable international journal databases (Table 1) and direct observations in the field. Furthermore, these factors are

validated by experts who are directly related to the problem such as textile company practitioners, consumers and academics. There are nine factors that become the reasons for consumers to carry out the product return process, it can be seen in Table 1.

Table 1. Factor that Causes Customer Performs Return Product

Code	Factor	Reference
F1	*Off-season*	Observation
F2	*Overstock*	Observation
F3	*Delivery error*	[11]
F4	*Incorrect size*	[12]
F5	*Incorrect colour*	[12]
F6	*Quality issue*	[12] [13] [11]
F7	*Change mind*	Observation
F8	*Damaged item*	Observation
F9	*Incorrect product*	[12]

Implementation of *Interpretive Structural Modeling* (ISM) *Methodology*

Evaluation of factors that cause consumers to return products is carried out using the ISM methodology.

a. *Develop Structural Self-Interaction Matrix (SSIM)*

This step illustrates the pairwise contextual relationships among the factors in the system. The identification of the relationship was carried out by the expert through a questionnaire. Filling out the questionnaire used four symbols that indicate the direction of the relationship between two Factors i and j:

-V : if Factor i will affect Factor j
-A : if Factor j will affect Factor i
-X : if Factors i and j will influence each other
-O : If Factors i and j are not related.

The pairwise relationship between the factors is represented in the MIS matrix (Table 2) by considering the mode [14] of the expert judgment.

b. *Generate Reachability Matrix* (RM)

The next step is to transform the symbols in SSIM into a binary matrix, by substituting V, A, X, O with 1 and 0. The result of the transformation is called the initial reachability matrix as can be seen in Table 3. The rules for substitution of 1 and 0 are as follows:

-If the input (i, j) in SSIM is V, then the input (i, j) in the reachability matrix becomes 1 and the input (j, i) becomes 0.

-If the input (i, j) in SSIM is A, then the input (i, j) in the reachability matrix becomes 0 and the input (j, i) becomes 1.

-If the input (i, j) in SSIM is X, then the input (i, j) in the reachability matrix becomes 1 and the input (j, i) also becomes 1.

-If input (i, j) in SSIM is 0, then input (i, j) in reachability matrix becomes 0 and (j) , i) input also becomes 0.

After that, the ISM basic assumptions were tested on the initial reachability matrix. The transitivity concept test [15] states that if Factor F1 affects F2 and F2 affects F3, then Factor F1 should affect Factor F3. The inconsistency in the assumptions obtained through the test results causes the relationship between these factors to be eliminated [5]. The results of the modified transitivity test can be seen in Table 4.

c. Develop Level Partition

After the final RM is obtained, then the next step is to build the reachability and the antecedent set. The reachability set consists of the factor and other factors that support it, while the antecedent set consists the factor and other factors that influence it. After that, the intersection of the reachability and the antecedent sets were calculated for all factors. The determinants of the level of each factor were arranged hierarchically starting from the top level (level 1) in the ISM-based model. The next level was obtained by separating the selected factor from the remaining factors. The partition process was carried out until the level for all factors determined (Table 5,6,7, 8).

The partition results on the nine factors produced four levels, three factors were at level 1, two factors were at level 2, three factors were at level 3 and one factor was at level 4.

d. Develop Conical Matrix

The next step is to convert the final RM into Conical Matrix by grouping Factors at the same level through row and column calculations. The result of the sum of the rows is called the driving power and the column is called the dependence power. The illustration of an Conical Matrix can be seen in Table 9.

e. Build The ISM-based model

Next, construct a diagram showing the direct and indirect relationship between j and I factor. Representation of Factors and their relationships from the Reachability Matrix Interaction is shown in the ISM-based model. The ISM-based model shows a multi-level structural relationship among nine factors that cause consumers to return products. The nine factors involved are divided into four levels in the Figure ISM-based model in Figure 3.

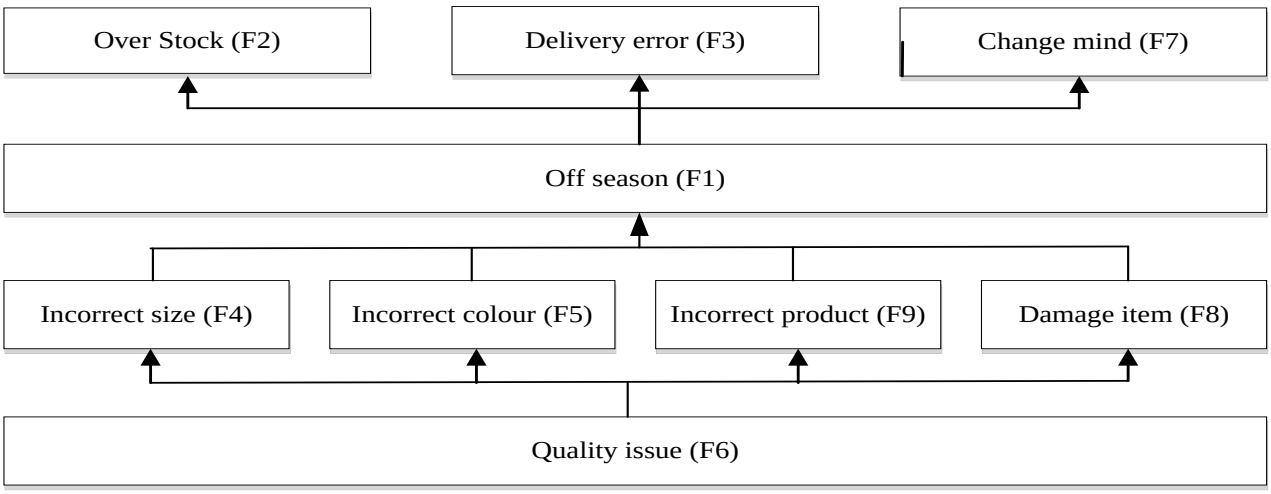

Figure 3. ISM-*based model*

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f. Matriced'Impacts Croises-Multiplication Appliqué and Classement Analysis

The final step of the ISM methodology is the MICMAC analysis. This analysis is to classify the identified factors [16]. The purpose of this step is to analyze the driving power and the dependence power of each factor. Factor representation from Conical Matrix mapped Factor in four clusters, namely: autonomous, dependent, linkage and independent. The results of Factor mapping in the four cluster diagram can be seen in Figure 4 below.

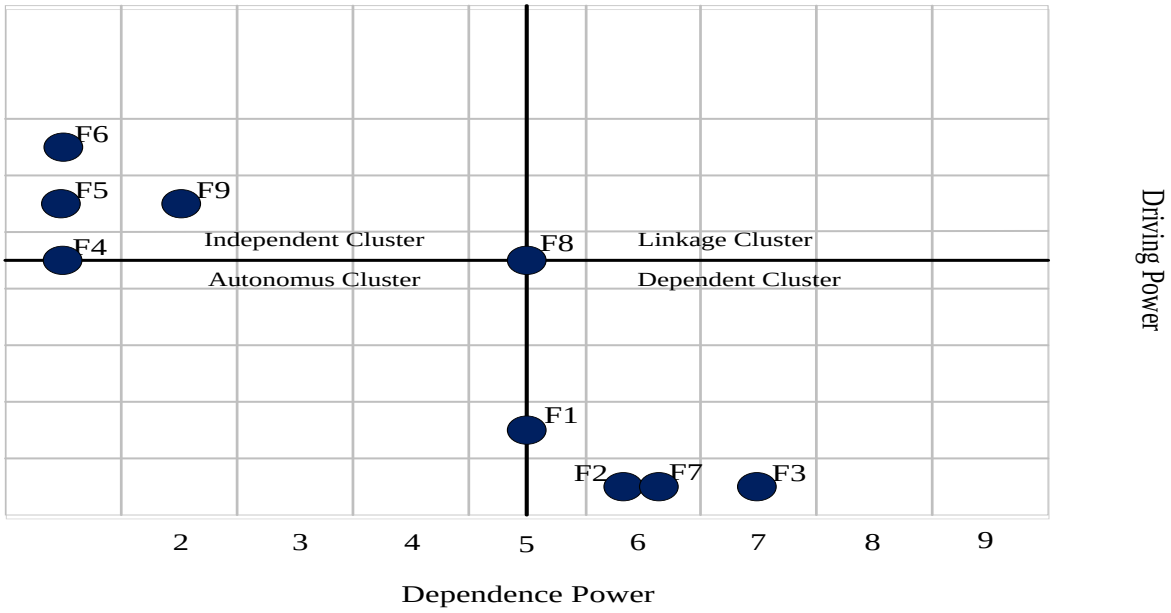

Figure 4. *The driving power and The dependence power Diagram*

Table 2. *Structural Self-Interaction Matrix* (SSIM)

	Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	*Off-season*	-	O	V	O	A	A	O	O	A
F2	*Overstock*		-	O	O	O	A	O	A	A
F3	*Delivery error*			-	O	O	O	O	A	O
F4	*Incorrect size*				-	O	O	V	V	O
F5	*Incorrect colour*					-	O	V	V	O
F6	*Quality issue*						-	V	V	V
F7	*Change mind*							-	A	O
F8	*Damaged item*								-	A
F9	*Incorrect product*									-

Table 3. *Initial reachability matrix*

	Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	*Off-season*	1	0	1	0	0	0	0	0	0
F2	*Overstock*	0	1	0	0	0	0	0	0	0
F3	*Delivery error*	0	0	1	0	0	0	0	0	0
F4	*Incorrect size*	0	0	0	1	0	0	1	1	0
F5	*Incorrect colour*	1	0	0	0	1	0	1	1	0

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	Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9
F6	*Quality issue*	1	1	0	0	0	1	1	1	1
F7	*Change mind*	0	0	0	0	0	0	1	0	0
F8	*Damaged item*	0	1	1	0	0	0	1	1	0
F9	*Incorrect product*	1	1	0	0	0	0	0	1	1

Table 4. *Final Reachability Matrix*

	Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	*Off-season*	1	0	1	0	0	0	0	0	0
F2	*Overstock*	0	1	0	0	0	0	0	0	0
F3	*Delivery error*	0	0	1	0	0	0	0	0	0
F4	*Incorrect size*	0	1*	1*	1	0	0	1	1	0
F5	*Incorrect colour*	1	1*	1*	0	1	0	1	1	0
F6	*Quality issue*	1	1	1*	0	0	1	1	1	1
F7	*Change mind*	0	0	0	0	0	0	1	0	0
F8	*Damaged item*	1	1	1	0	0	0	1	1	0
F9	*Incorrect product*	1	1	1*	0	0	0	1*	1	1

*nilai hasil transitivity

Table 5. *Level 1 of Reachability Matrix Interaction*

Factor	*Reachability Set*	*Antecedent Set*	*Intersection Set*	Level
F1	F1,F3	F1,F5,F6,F8,F9	F1	
F2	F2	F2,F4,F5,F6,F8,F9	F2	1
F3	F4	F1,F3,F4,F5,F6,F8,F9	F4	1
F4	F2,F3,F4,F7,F8	F4	F4	
F5	F1,F2,F3,F5,F7,F8	F5	F5	
F6	F1,F2,F3,F6,F7,F8,F9	F6	F6	
F7	F7	F4,F5,F6,F7,F8,F9	F7	1
F8	F1,F2,F3,F7,F8	F4,F5,F6,F8,F9	F8	
F9	F1,F2,F3,F7,F8,F9	F6,F9	F9	

Table 6. *Level 2 of Reachability Matrix Interaction*

Factor	*Reachability Set*	*Antecedent Set*	*Intersection Set*	Level
F1	F1	F1,F5,F6,F8,F9	F1	2
F4	F4,F8	F4	F4	
F5	F1,F5,F8	F5	F5	
F6	F1,F6,F8,F9	F6	F6	
F8	F1,F8	F4,F5,F6,F8,F9	F8	
F9	F1,F8,F9	F6,F9	F9	

Table 7. *Level 3 of Reachability Matrix Interaction*

Factor	*Reachability Set*	*Antecedent Set*	*Intersection Set*	Level
F4	F4	F4	F4	3
F5	F5	F5	F5	3
F6	F6,F9	F6	F6	
F8	F8	F4,F5,F6,F8,F9	F8	3

Factor	*Reachability Set*	*Antecedent Set*	*Intersection Set*	Level
F9	F9	F6,F9	F9	3

Table 8. *Level 4 of Reachability Matrix Interaction*

Factor	*Reachability Set*	*Antecedent Set*	*Intersection Set*	Level
F6	F6	F6	F6	4

Table 9. *Conical Matrix*

Factor		F1	F2	F3	F4	F5	F6	F7	F8	F9	*DRIVING POWER*	*RANKING*
F1	*Off-season*	1	0	1	0	0	0	0	0	0	2	4
F2	*Overstock*	0	1	0	0	0	0	0	0	0	1	5
F3	*Delivery error*	0	0	1	0	0	0	0	0	0	1	5
F4	*Incorrect size*	0	1	1	1	0	0	1	1	0	5	3
F5	*Incorrect colour*	1	1	1	0	1	0	1	1	0	6	2
F6	*Quality issue*	1	1	1	0	0	1	1	1	1	7	1
F7	*Change mind*	0	0	0	0	0	0	1	0	0	1	5
F8	*Damaged item*	1	1	1	0	0	0	1	1	0	5	3
F9	*Incorrect product*	1	1	1	0	0	0	1	1	1	6	2
	DEPENDENCE POWER	5	6	7	1	1	1	6	5	2		
	RANKING	3	2	1	5	5	5	2	3	4		

Discussion

The nine factors identified becomes the reasons for consumers to carry out the return process that can be categorized into five, namely: product-related, inventory-related, delivery-related, packaging-related and others (Table 10). Some of these categorizations, such as those carried out by [11].

Table 10. Factor Category

Category	Code	Factor
Product-related	F1	*Off-season*
	F6	*Quality issue*
	F4	*Incorrect size*
	F5	*Incorrect colour*
	F9	*Incorrect product*
Inventory-related	F2	*Overstock*
Delivery-related	F3	*Delivery error*
Packaging-related	F8	*Damaged item*
Others	F7	*Change mind*

The results of the ISM-based model and MICMAC analysis found that there were no factors included in the autonomous cluster, it means that all factors involved significantly affected consumers in the return process.

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Furthermore, it is important for companies to pay attention to all factors so that consumer loyalty and company profitability can be maintained. Off-season factor (Factor 1), overstock (Factor 2), delivery error (Factor 3), and change mind (Factor 7) were cluster dependent. The factors in this cluster had a weak driving power and a strong dependence power. So the dependence of Factor on this cluster on other Factors is very large. In the ISM-based model, the factor in this cluster was at the top level.

Factor damaged item (Factor 8) is in the linkage cluster. Factors in this cluster tend to be unstable because they have the driving power and the strong dependence power. It shows the high dependence on other factors. This result is in line with the Figure of the Factor in the ISM-based model, the factor is at level 3 which is the link between the base level and the top level. Furthermore, the last cluster is independent consisting of four factors, namely: incorrect size (Factor 4), incorrect color (Factor 5), quality issue (Factor 6) and incorrect product (Factor 9). The quality issue (Factor 6) in the ISM-based model becomes a factor at level four, that is the most basic level. So it can be said that the quality issue factor is a key factor for consumers to carry out the return process. If this factor can be handled properly, it can reduce the occurrence of the return process from consumers. The return process has the potential to reduce customer satisfaction if the handling time required is long [17], while for the company the return process is seen as an unprofitable process in terms of time and cost. The reason consumers make returns related to factor quality issues is generally due to the incompatibility of the product quality received with the expectations that consumers have [3], such as the quality of textile materials and the quality of other additional materials. This factor has a big influence because it can lead to other reasons for consumers to carry out the return process as shown in the ISM-based model.

These results direct the company to more focus on improvements related to the return process, especially on factor quality issue. Development can be done by adopting an effective strategy, namely by developing the right system in dealing with these factors. To be able to maintain consumer loyalty, the system is expected to support customer support in coordinating the return process, starting from the consumers return products, handling product returns and tracking the status of handling returned products. So that the handling of quality issues can be handled appropriately.

At the methodological level, the framework developed in this study proved to be able to design complex problem structures to be easier to understand. These frameworks and solution approaches can be further expanded to suit the problems at hand. The incorporation of several other variables that have not been revealed the phenomenon can be easily done. Although this research was conducted in the context of the textile industry, the framework can be easily applied to other industries. The insights and learning provided by the outcomes of different scenarios can be used as input for decision making by various stakeholders and decision makers.

CONCLUSION

The mutual relationship between all factors become the reasons of consumers to carry out the return process in the textile industry as shown through the development of the ISM methodology. Nine factors had been identified, namely: off-season, overstock, delivery error, incorrect size, incorrect color, quality issue, change mind, damaged item and incorrect product that are the reasons

consumers carry out the return process. The development of ism-based models and MICMAC analysis led decision makers to understand the complexity of the relationships between these factors. MICMAC analysis can also reveal direct relationships between factors, but it can also reveal hidden relationships between factors, which sometimes greatly affect the system. The results of this analysis provide a structured direction for companies to develop strategies for the success of building problem management systems.

Further research can be carried out on other product industries such as electronics, household needs, and others. Further, it can be done in the same industry but focus on branded fashion products or not, online or offline marketing, types of formal, casual or other clothing. Furthermore, it is also interesting to conduct the research related to the quality issue factor as the key factor of this research, such as how to mitigate the occurrence of the return process related to the factor.

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