

## Supply Chain Agility Evaluation Using Fishbone Method

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**Abstract.** The publishing industry is considered as an industry that has a low *entry barrier*. Supply chain agility refers to the level of speed that the supply chain uses to respond to customer needs. Supply chain agility represents the ability of an organization's internal supply chain functions to provide strategic advantages and innovations to respond to market uncertainty. Supply chain agility is also considered as a key element of an organization's competitive strategy which requires an evaluation method. Fishbone Diagrams or Cause and Effect Diagrams are one of the tools of QC 7 tools that are used to identify and show the relationship between cause and effect in order to find the root causes of a problem. This study used "Supply Chain Agility" as an effect factor, and cause factors derived from The 4 M's theory and 4 Indicators of supply chain agility theory. The result of study are several factors indicate the weaknesses of the company that must be evaluated and several factors indicate the strengths that must be maintained

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### INTRODUCTION

*Supply chain management* has become a topic of concern this last few decades, both for academics and practitioners [1]. More effort is needed to survive and compete in this digital age. In addition to many of its competitors and markets that remain stable and even decline, technological advancements provide a new pattern of consumer behavior that is very different [2]. Like other industries, the publishing industry needs supply chain management which is useful as a system so that companies can achieve the efficiency of activities and costs throughout the system, the total system costs from transportation to the distribution of raw material inventories, work processes and finished goods.

The publishing industry is considered as an industry that has a low *entry barrier*, this assumption can be seen from the data of IKAPI (Indonesian Publisher Association) in the last 9 years, an increase in the number of publishers who joined IKAPI. An increasing number of publishers registered with IKAPI members can't present a weakening publishing business climate. One publisher and printing company that has printed thousands of titles of books and other prints, namely PT Remaja Rosdakarya located in Bandung, West Java. However, with the phenomenon of the digital revolution that changed analog mechanical and electronic technology to digital technology, for example, books that were originally *printed book (p-book)*, became *electronic book (e-book)* made this industry must be more responsive to all changes. The presence of the *ebook* is thought to make consumer buying interest in *print book* decrease, in fact there are many *ebook* that can be downloaded for free. In addition, the issue of book piracy is also very influential on the decline in the strength of demand from consumers. The following sales trends can be seen from Figure 1 below:

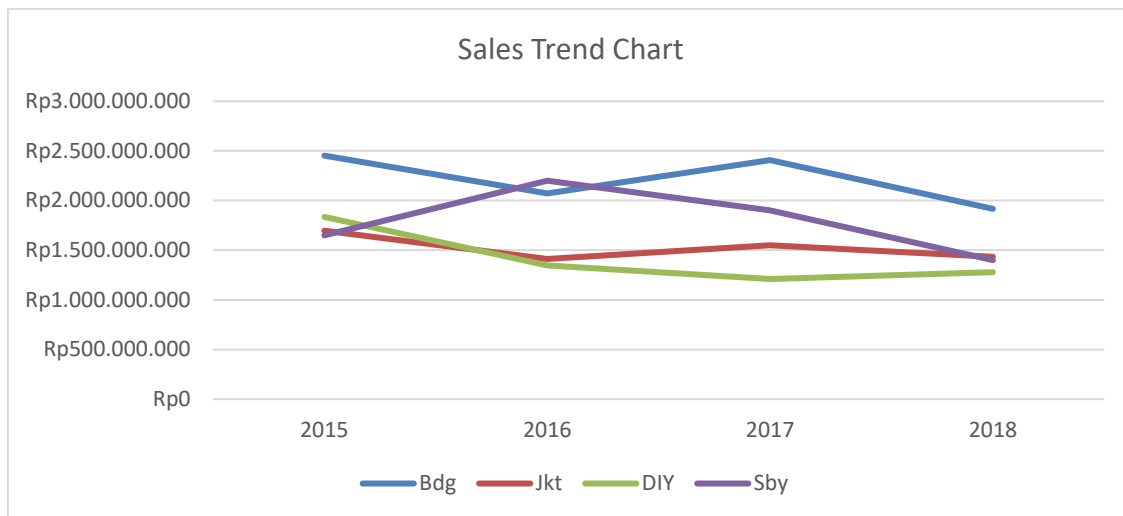


Figure 1. Sales Trend

A company can compete and have a good company performance, it can be supported by *Supply chain management*. A supply chain consists of five main roles, namely *Supplier - Manufacturer - Distribution - Retail Outlets - Consumer* (chains 1-2-3-4-5).]

The concept of *agility* measures the level of an organization's *supply chain* with indicators that include relationships with *suppliers*, mapping market tastes, production speed, *delivery* accuracy to consumer preferences [3]. *Supply chain agility* is the strategic ability of an organization to respond swiftly to the market [4]. *Supply chain agility* is defined [5] as the company's ability both internally, relationships with key suppliers and consumers, to adapt or respond to the market and face potential obstacles quickly.

In a previous study [6] examined the model analysis of the Supply chain agility variable against competitive capability, while this study analyzed the evaluation factors for supply chain agility. As for [7] make a supply chain agility research design on competitive advantage while the method is done with fuzzy logic. As [8]and [9] make a set of supply chain agility evaluations, in this study a descriptive explanation will be made through fishbone analysis.

Literature review on *Supply Chain Agility* starts from the basic idea to increase the operational profitability of the company in [10], then the concept and concentration of *Supply Chain Agility* develops by including issues of organizational sustainability and sustainability [11], and now *Supply Chain Agility* is here to look for opportunities when there is market turbulence and become a risk mitigation company [5]. *Supply chain agility* is considered a key element of an organization's competitive strategy. It was developed systematically by acquiring capabilities that can make supply chains act quickly and diverse to environmental and competitive changes [12]. This research will try to apply the use of the previously examined dimensions and apply them to one of the publishing industries in Indonesia.

Some experts define *supply chain management*, first [13] explaining that SCM is the coordination of a unit of activity, which includes such activities as moving goods or products and *services from the final supplier*, to the final customer, by trying to maximize their economic added value. Furthermore, SCM is defined by [14] suggesting that SCM is the coordination of and integration of all supply chain activities in order to convey value to customers. Whereas what is meant by the supply chain is covering all activities in order to obtain, move products or services from the source to the end user. Then it can be concluded that *supply chain management* is a system that can manage, coordinate, and integrate all

activities carried out by suppliers, production departments, distribution to customers, by trying to maximize economic value added. *Supply chain management* is needed to manage and manage supply chains so that products or services can reach consumers effectively and efficiently. In addition, the condition of the business environment is always experiencing dynamic developments, such as globalization, competition, technological development, product complexity, causing companies to be proactive and always make strategic decisions at every level of the supply chain to maintain company competitiveness.

Supply chain shows the existence of a long chain that starts from the supplier to the customer, where there is an involvement of an entity or is called an actor / player in this context in the very complex supply chain network. The following are the main actors involved in the supply chain:

Supplier (chain 1). The supply chain starts from here, which is the source that provides the first material, where the supply chain will begin. The first material here can be in the form of raw materials, raw materials, complementary materials, spare parts and merchandise. Supplier-Manufacturer (chain 1-2). After the first chain, the second chain starts with the manufacturer which is the place to convert or finish the goods (finishing). The relationship between the two links already has the potential to make savings. For example, saving inventory carrying costs by developing the concept of supplier partnering.

Supplier - Manufacturer - Distribution (Chain 1-2-3). In this stage the finished goods produced are distributed to customers, which usually use the services of distributors or wholesalers who are traders in large quantities. Supplier - Manufacturer - Distribution - Retail Outlets (chains 1-2-3-4). From the wholesaler, the goods are distributed to retail stores. Although there are several factories that directly sell their products to Customer relatively few in number and on average use distributors and wholesalers. Supplier - Manufacturer - Distribution - Retail Outlets - Customer (1-2-3-4 Customer chain is the last chain traversed in the supply chain in this context as an end-user.

The development in the concept of a company's supply chain began with mass production - Lean Supply Chain - Supply chain agility. Each has differences in terms of products, processes, focus, philosophy, number of suppliers and others. Table 1 will show as the differences between the three, as follows:

Table 1. Concept of a company's supply chain began with mass production - Lean Supply Chain - Supply chain agility

	<b>MASS</b>	<b>LEAN</b>	<b>AGILE</b>
<b>DRIVERS</b>	Price Economy of Scale Stable markets Demand led	Market Economy of waste Predictable Markets Make a forecast	Customer Economy of diversity Unpredictable markets Make to Order
<b>FOCUS</b>	Equipment & Facilities	Technology and System	People and Information
<b>SUPPLIERS</b>	Many Low Level of Trust Adversarial Relationship	Fewer High Level of Trust (Long-Term) Co-operative	Selection from many High Level of Trust (Short term) Shared risk/reward

	<b>MASS</b>	<b>LEAN</b>	<b>AGILE</b>
<b>ORGANISATION</b>	Division of Labour	Teaming	Multi Skilling
	Hierarchical	Flatter Organisation	Empowerment
<b>PRODUCT</b>	Few Options	Many Options	Customised
	Inconsistent Quality	High Quality	Fitness for Purpose
<b>PROCESS</b>	rigid	Flexible	Adaptive
	Hands on Labour	Automated	Knowledge Based
<b>PHILOSOPHY</b>	Authoritative	Administrative	Leadership

Supply chain agility refers to the level of speed that the supply chain uses to respond to customer needs [15]. Supply chain agility represents the ability of an organization's internal supply chain functions to provide strategic advantages and innovations to respond to market uncertainty. Supply chain agility is also considered as a key element of an organization's competitive strategy [7]. Conceptual differences and relationships of the different industrial areas can be explained in table 2 below:

**Table 2. Conceptual Differences and Relationships of The Different Industrial Areas**

Mass Manufacturing	Lean Manufacturing	Agile manufacturing
Invest in equipment n facilities	Invest in technology	invest in people information system
high touch labor	Removed layers	multi-skilled work force
Specialization	reduced waste	robust, reconfigurable teams, equipment, infrastructure
little worker input	worker input	partnering in all stages of manufacturing
many layers	established teams	self-directed work teams, management break barriers
slow decision making	greater dependence on suppliers	effective technology n information ontegration
workers could buy products they made	stable process	
Product development time in years	product development time in months	Development time in weeks
inconsistent quality	high quality at point of sale	high quality accros product life

Agility is considered as one of the basic characteristics that will be needed so that the supply chain can survive and develop in a turbulent market environment [16]. As [17] stated that agility is very important for an organi zation to survive and compete more than ever before.

## **METHOD**

This research uses a qualitative approach with descriptive methods. This means that the data and fact disclosure procedures that researchers use are non-statistical or non-

mathematical [18] Qualitative data are personal documents, field notes, words and actions of respondents and supporting documents. Thus, this research method will reveal the actual condition according to the results obtained in the study by measuring based on its quality.

Sources of data in this study were obtained from several speakers. This research was conducted through direct interview techniques and meeting with informants to get the information. Interviewees:

Speaker 1: Aan Soenendar, Deputy Chief Director who is considered capable and masters all the problems and affairs of the company.

Interviewee 2: Surahman, One of the suppliers that has been in contact with the company since 2000.

Data taken is based on primary data and secondary data. Primary data is research data obtained from the first data source at the research location or research subject. Secondary data is data obtained from the second data source from the data needed by researchers.

Data collection techniques used in this study were observation techniques, in-depth interview techniques and documentation. Observation techniques are used to better understand the context of data in all social situations in order to obtain a holistic and holistic view. To support good observational work in this study, researchers also used several Fishbone analysis techniques. From this the researchers will find a clear picture of the strength of the supply chain indicator which can make the company more agile? also weaknesses that must be corrected properly so that the company can catch up.

Fishbone Diagrams or Cause and Effect Diagrams are one of the tools of QC 7 tools that are used to identify and show the relationship between cause and effect in order to find the root causes of a problem. Fishbone Diagrams are used to show the causative factors and the quality caused by these causative factors.

The basic function of the Fishbone/ Cause and Effect/ Ishikawa diagram is to identify and organize the causes that might arise from a specific effect and then separate the root causes. (1) Fishbone Diagram or Cause and Effect This diagram is used to: Identify the root cause of a problem; (2) Get ideas that can provide solutions for solving a problem (3) Assist in the search and further investigation of facts

This study uses "Supply Chain Agility" as an effect factor, and cause factors derived from The 4 M's theory [19] and 4 Indicators of supply chain agility theory [9] consisting of Responsiveness, Competency, Flexibility and Speed. Whereas The 4 M's consists of Machine (equipment), Method, Man (Labor) and Material. The following fishbone diagram on PT Remaja Rosdakarya, as shown below:

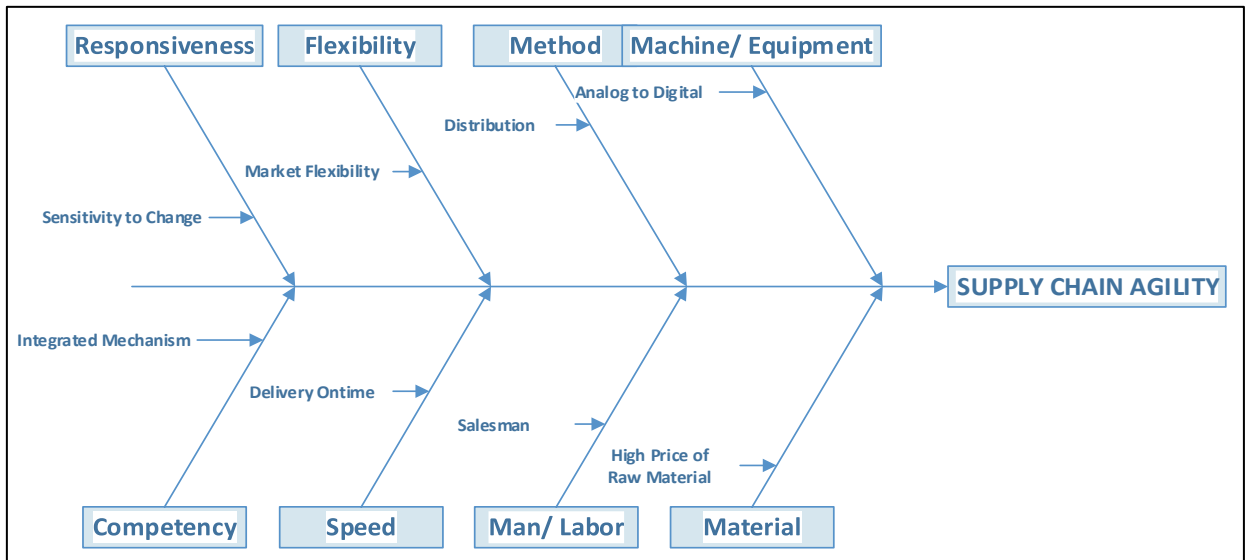


Figure 2. Fishbone Diagram on PT. Remaja Rosdakarya

In-depth interview techniques are used to explore various information and data regarding sales trends, company productivity, policies and considerations, as well as matters that are principal or technical. Likewise with the documentation technique used to complete the data found from observations and in-depth interviews.

## RESULT AND DISCUSSION

Fishbone diagrams serve to help determine the root cause of a problem or quality characteristics using a structured approach. Following is an explanation of each fish bone in the previous diagram:

### Machine/Equipment

The conventional production system uses analog machines which are used by PT Remaja Rosdakarya. This system has advantages in terms of lower costs, but the Minimum of Quantity (MoQ) is higher. If the order is small, it will incur a high cost. Therefore, digitization production system is absolutely needed. PT Teen Rosdakarya's Print on Demand system was put in place to produce orders if the stock from the warehouse was not sufficient for the order quantity.

### Material

Raw material price is increasingly expensive, but even more raw material supplier prices. This problem is considered not so crucial for the company's sustainability. The intended raw material is sheet paper, roll paper, ink, chemical and iron plate. The company is certainly looking for the highest quality raw materials at reasonable prices. The other supplier in question is the script writer, where the material or printed script is the output.

### Method

Distribution method that is run now has advantages and disadvantages. Before 2009 the warehouse system at PT Remaja Rosdakarya was made with a decentralized system, meaning that each BPP (branch marketing office) had a warehouse that contained book stock so that it was easily and quickly distributed to both bookstores and consumers in each nearby

area faster, the process Administration is also carried out at the BPP of each region. Book delivery was also periodical, the fleet used was adjusted to the number of orders. However, after using several systems, in 2009, Rosda changed the decentralization policy to become centralized. BPP warehouse will be abolished and centered to Bandung Main Warehouse, located in the Bandung publishing office. The risk of late delivery has indeed become an unavoidable risk. But the risk of damage to books, monitoring of human resources, loss of books, warehouse maintenance costs, warehouse rental costs, can be eliminated. Gap in real warehouse data and data in the system often occurs a difference of up to 10% of the total inventory of goods. Then starting in 2009, a new idea was centralized to the Bandung Central Warehouse. The drawback is that there must be a delay because shipments to all cities are centered from the Bandung Central Publisher Warehouse. But the advantage of this distribution method is the cost efficiency of branch warehouses which were originally located in 4 major cities on Java.

### **Man/Labor**

Salesman as the most important part in sales, his performance is declining. Evidenced by declining sales, not many new bookstore relationships even some bookshop relationships are reduced. The phenomenon of diminishing bookstore partners is thought to be due to sluggish purchasing power and partly because the cooperation system is considered unfavorable to bookstores. The decline in the performance of the salesman allegedly lost motivation from the salesman because the incentives are not comparable.

### **Flexibility**

The market is so dynamic, demand for books will vary according to their needs and tastes. Publishers can follow the high sales opportunities for certain genre of books. However, Rosda chose to maintain the company's identity with market segments that have been formed and do not always follow market demand.

### **Speed**

The speed of delivery is pursued by PT Remaja Rosdakarya with one day service. But in reality there are just a few delays in acceptance.

### **Responsiveness**

Companies must be responsive to all changes if they want to continue to survive in this highly volatile market. Sensitivity to change companies need to be improved. For example, the ebook phenomenon, which PT Remaja Rosdakarya also sells electronic versions of books even though they haven't used their own ebook platform. However, not all printed books have been produced and sold as ebook versions, because they consider the book category according to market absorption. The company has tried to adapt to the phenomenon of digitalization, but has not reached its optimum point.

### **Competency**

Absolute competence is needed for companies that want to sustain. Competencies that must be possessed include learning encouragement, integrative mechanism, commitment, trust, joint decision making and communication. At present, PT Remaja Rosdakarya is considered to have not integrated its supply chain mechanism as a whole. Among them is the information technology system and the periodic system in the publishing industry which still must be developed because until 2019 the information flow is still conventional.

## CONCLUSION

This study has addressed the questions of how to describe supply chain agility in PT Remaja Rosdakarya. This study addresses the question of how to illustrate that supply chain agility can improve company performance and make companies competitive. One method of 7 tools of QC used, is fishbone analysis.

The initial method has a significant problem, but there is a solution to that problem. while materials are not a big problem because there are many alternative suppliers in this supply chain.

But, man (labor) as the spearhead of marketing has to be evaluated, because the main problem is the decline in company sales. The centralized distribution method applied now has shortcomings, especially in delivery time. Previously, the decentralization method was implemented, and it turned out that there were more risks and shortcomings faced by the company.

To optimize supply chain agility, companies are advised to focus more on 'man' and 'speed'. because the main problem lies in the low sales and ontime delivery. 'material', 'method', 'responsiveness' and 'competency' are still considered weak and need to be improved. while 'machine' and 'flexibility' can be a strength for the company.

Suggestions for further research to be able to measure the supply chain agility in order to know the level of a company's supply chain agility. Many measurement methods that can be used and which can be adapted to the research needs and needs of the company.

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