

## **Value Chain Analysis for Determining Innovation Priority in Batik Small Medium Industry**

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### **Abstract**

As the international trading competition has begun to arise, Batik Small Medium Industry (SMI) needs to maintain and improve its competitiveness by exploring the innovations that can generate value added to batik product. Although many studies provided suggestions regarding innovation for batik industry, there's problem in determining which innovation is bringing important value added. Moreover, many Batik SMI players have lack of knowledge about value creation in performing innovation. This study attempts to determine which innovation should be prioritized for batik SMI based on value chain in batik production processes. The first step is determining activities in Batik SMI then divided the activities into primary and support activities. The next step was identifying possible innovation opportunities through systematic literature review where 8 innovations were obtained. The innovations then mapped to Value Chain Activities model. The innovation related to primary activity is suggested to be prioritized. This study indicates that the use of natural coloring material, the application of electric stove and solar home

system, the use of an ergonomic stool, electric canting, the use of wet on wet coloring technique, and the implementation of e-commerce for promotion and selling-buying activities can be considered to be innovation priority in Batik SMI.

### **Keywords**

Batik industry, innovation, priority, small-medium industry, value chain

## **1. Introduction**

Batik is a piece of cloth that has special characteristics in its pattern or design (known as batik design) and produced through traditional manner by applying dye-resist technique using batik wax (Susanty, Jie, & Helvipriyanto, 2012). Batik is one of world's cultural heritage from Indonesia that should be conserved (Haryanto & Priyanto, 2013) and preserved and become one of the export commodity that influences the national economy (Mangifera, 2015). According to Indonesian Ministry of Trade website in 2013, the value of batik export is rapidly increased from \$23 million in 2009 to \$289 million. Batik exports continue to grow in 2014 with the increase of 24.64% compared with the previous period. Moreover, according to Indonesian Ministry of Industry website, Batik export value in 2015 increased 10% from previous year. As the international trading competition has begun to arise, industries are required to maintain and improve its competitiveness. To improve competitiveness, batik industry players need to explore the innovations that can generate value added to batik product (Rahayu, Syairudin, & Pertiwi, 2015). Thus, innovation activities increasingly targeted to the ability of industry to create value (Konsti-Laakso, Pihkala, & Kraus, 2012). Moreover, the performance of Batik industry was influenced by the innovation performed by the batik industry as an attempt to meet the customer requirement (Borshalina, 2015). Many studies provide suggestions regarding innovations that can be applied in batik industry (Borshalina, 2015; Hermawan & Yoshanti, 2016; Indrianingsih & Darsih, 2013; Kristijanto, Handayani, & Levi, 2011).

The problem for batik SMI is to determine, from lists of possible innovation to be applied, which innovation is more important in bringing added value to the industry. According to Rahayu, Syairudin, & Pertiwi (2015) many batik industry players have lack of knowledge about value creation in performing innovation. That means Batik SMI do the innovation without considering value creation from the innovation. Therefore, it can be argued that it is required for batik SMI to have good understanding towards value chain in batik industry. According to Ensign (2001), the value chain is considered as means of conceptualizing activities needed to create product/service and show particular configuration needed. Effective value chain analysis results in the identification of new ways to perform activities to create value (Prajogo, McDermott, & Goh, 2008). The implementation of effective value chain may improve competitiveness (Mangifera, 2016) and the key to achieve competitive advantage (Mangifera, 2015). Therefore, this study attempts to determine which innovation should be prioritized to be adopted by batik SMI based on value chain in batik production process. This study is useful for grouping activities that categorized as primary activities that bring great added value towards batik product or support activities. So Batik SMI can focus to develop innovation towards value-added activities before developing innovation in supporting activities.

## **2. Methodology**

The purpose of this study is to determine which innovation should be prioritized to be adopted by batik industry players based on value chain in batik production processes. This study use value chain approach to mapped the activities that play a main role in the process of converting raw material into finished product and its distribution and sales activities and mapped activities that act as support activities in that process. After the activities were mapped into value chain model, the next step was identifying the possible innovation through systematic literature review. After possible innovations were obtained, it then mapped to value chain model and the last step was to determine the priority of innovation. Figure 1 shows the step of this study.

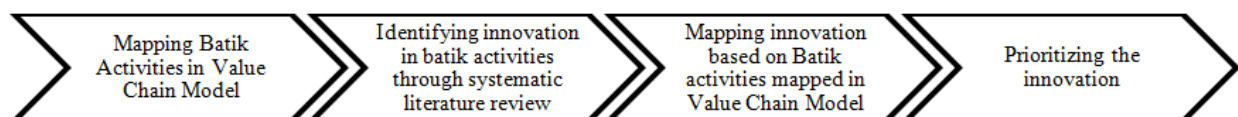


Figure 1 Step of the Study

## 2.1 Value Chain

According to Porter (1998), value activities can be categorized into two broad categories: primary activities and support activities (Büyükbacı, 2012). Primary activities involve the product creation activities, selling and distributing product to the customer, as well as after-sales service activities, while support activities involve activities which support primary activities and each other through the provision of purchased input, technology, human resource, and firm infrastructure (Büyükbacı, 2012). Porter defined that primary activities consist of inbound logistic, operations, outbound logistic, marketing & sales, and service, while support activities consist of the infrastructure of the firm, human resource management, technology development, and procurement (Prajogo, McDermott, & Goh, 2008). Figure 2. Shows the value chain model developed by Porter (1985).

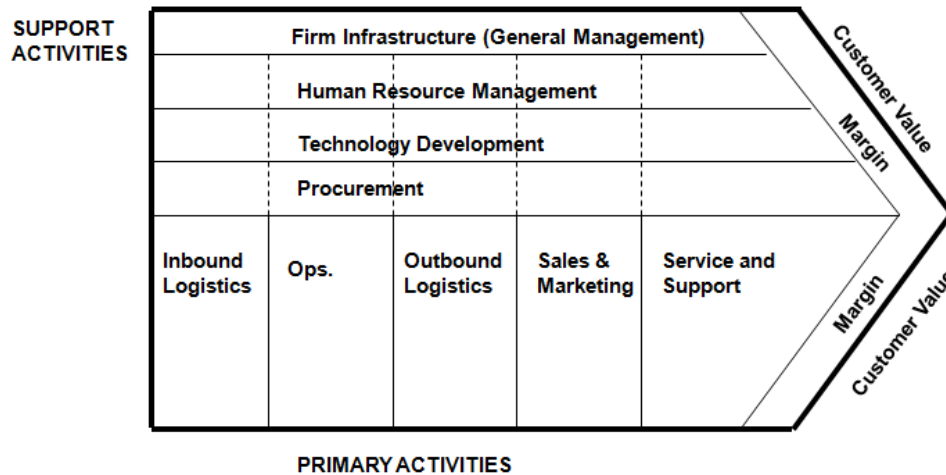


Figure 2 Value chain model from Porter (1985)

According to Porter (1985), primary activities consist of all activities which are related directly to the creation of a product or service, selling, maintenance and support activities while support activities consist of all activities that are performed to support the primary activities. Primary activities consist of inbound logistics, operation, outbound logistics, marketing and sales, and service. Support activities consist of procurement, technology development, human resource management, and firm infrastructure.

- Inbound logistics consist of activities or processes related to receiving, storing, and distributing the input in the internal firm.
- Operation consists of all activities related to the transformation of input.
- Outbound logistics consist of activities related to delivering the product or service to the customers.
- Marketing and sales consist of all activities to promote, persuade, and sell the product or service offered by the company.
- Service and support consist of the activities related to maintaining the value of the product to the customer which occur after the point of sale.
- Procurement consists of the process to obtain the resource needed to operate.
- Technology development consists of activities to manage the technology that is used in the company and process information in the company.

Human resource management consists of the activities related to recruitment, selection, training, human resource development, payroll generation activities.

- Firm infrastructure consists of the activities related to maintaining daily operation, planning, financial, management, legal, as well as maintaining the relationship with government or external party.

## 2.2 Systematic Literature Review

As mentioned earlier, this study aims to determine innovation priority to be adopted by batik SMI based on value chain in batik production process. Before the innovations being mapped in the value chain model, several possible innovations were gathered using systematic literature review. The literature review processes conducted in this study are based on systematic literature review scheme developed by Kitchenham (2007). There are three main steps in systematic literature review namely research identification and collection, studies selection based on criteria, and

primary studies selection. Research identification and selection is a process to perform an initial search for primary studies. The research strategy was generated and the electronic database source for obtaining the articles was determined. In this study, the articles were collected from one electronic source which is Google Scholar. Google Scholar was chosen because there are many studies related to batik from Indonesian journals that are only indexed by Google Scholar. The articles were searched using specific words "Batik" in all possible years. The next step is to study selection based on particular criteria. The selection criteria in this study are the articles must specifically discuss the innovation that can be implemented in Batik Industry and the article must be published in a journal or had been presented at a conference. Finally, the last step is primary studies selection. In this step, the primary articles that will be used in this study were chosen.

### **2.3 Value Chain and Innovation**

Innovation is considered as key to increasing productivity through process improvement and the creation of new, higher value product and service (Mitussis, 2010). The possible innovations for Batik Industry in this study were obtained from literature study. The innovations then were categorized and mapped based on value chain activities.

1) *Inbound logistics innovation*

The innovation that is related to main raw material of batik production, the management activities of raw material.

2) *Operations innovation*

The innovation that is related to the equipment used in processing activities and innovation towards the activities to change main raw material to finished product.

3) *Outbound logistics innovation*

The innovation related to the stored and distribution of the finished product.

4) *Marketing & sales innovation*

The innovation related to marketing and selling activities. It can be innovations that help the industry to promote, persuade, and facilitate customer to purchase the product.

5) *Service innovation*

The innovation that is related to the provision of after-sales service to maintain or improve product value.

6) *Firm infrastructure innovation*

The innovation related to planning, financial, management, legal, as well as maintaining the relationship with government or external party.

7) *Human resource management innovation*

The innovation that is related to recruitment, selection, training, human resource development, payroll generation activities.

8) *Technology development innovation*

The innovation related to the provision of technology to support the activities in the industry.

9) *Procurement innovation*

The innovation related to procurement or purchasing activities (e.g. innovation of payment method, supplier selection, etc.).

## **3. Result**

Based on Value Chain mapping towards the general activities exist in batik industries were obtained the result as explained below.

### **3.1 Primary Activities**

Primary activities consist of inbound logistic, operations, outbound logistic, marketing & sales, and service & support. Below is the explanation of each activity that is classified in primary activities category.

1) *Inbound logistics*

Main raw materials which are used in batik production process consist of three components, which are fabric, wax, and dye (Mangifera, 2015; Novandri, 2013). The inbound logistics activities involve receiving, storing, managing, and controlling activities towards fabric, wax, and dye material and also returning those materials to the supplier when it is required. The main materials obtained from supplier both inside and outside batik producing area. There is no special treatment for storing main raw material. For fabric material, it can be stored in dry and clean place. Wax material should be located in dry and protected from sun exposure, while dye material should be stored in a closed container and also protected from sun exposure (Mangifera, 2015).

Managing material is done by checking the quantity and quality of main materials that were bought and stored to minimizing the cost of ordering material and ensuring the sustainability of production process (Mangifera, 2015).

2) *Operations*

Operations consist of activities to convert raw materials into a finished product (Novandri, 2013; Mangifera, 2015). In batik industry, to convert the fabric, batik wax, and dye to batik product, there is some types equipment are used, such as canting, pan, stove, and gawangan. Canting is used to scoop hot batik wax. Pan is used for placing batik wax when it is being heated. Gawangan is used to hang batik fabric being processed. The processed of making batik is described as follows.

1. Designing process
2. Drawing the pattern in batik process (*molani*)
3. *Nyanting* Process
4. Dyeing process
5. Washing process
6. *Pelorodan* process
7. Drying process

3) *Outbound logistics*

For the batik industry owner that already has a gallery, some of the finished product will be distributed from workshop to the gallery to be displayed. The products that were not displayed will be stored in storage cabinet and once a week will be brought out to avoid the batik become humid and moldy (Mangifera, 2015). According to Novandri (2013) and Mangifera (2015), in general, there are two ways to distributed batik product which are direct selling to the customer and deliver the product to be sold by another party (wholesaler or retailer).

4) *Marketing & sales*

The marketing and selling activities in batik industry might be differing from one industry to another industry. Below are some of marketing and selling activities that usually performed by batik industries.

- Participating in trade show
- Displaying the product in gallery
- Word of mouth marketing

5) *Service*

According to Mangifera (2015), most of the batik industries did not offer after sales service. If there is an industry that provides after sales service, it would be limited to batik product returning service.

### **3.2 Support Activities**

Support activities consist of activities related to firm infrastructure, human resource management, technology development, and procurement. Below is the explanation of activities that are classified in each support activities category.

1) *Firm infrastructure*

Mostly, firm infrastructure activities in batik industry consist of recording activities of daily transaction and maintaining good relations with the government (Novandri, 2013)

2) *Human resource management*

Human resource management activities in batik industry consists of the selection of batik craftsmen and participating in training held by the regional government

3) *Technology development*

According to Mangifera (2015), most of the batik industry still use traditional equipment and have not utilized recent equipment and technology. The previous study found that there is batik industry that switches from traditional stove to gas stove and had utilized the use of a computer in the designing process (Mangifera, 2015; Novandri, 2013).

4) *Procurement*

In batik industry, procurement activities include the determination of supplier for material, equipment, and the payment method.

### **3.3 Systematic Literature Review of Innovation in Batik**

The number of articles found in the first step from Google Scholar using “Batik” as the keyword is 964 articles. From those articles, only 43 articles that are appropriate with the criteria. Finally, there are 23 articles selected for further identification regarding innovation in Batik SMI. Figure 2 shows the literature review process.

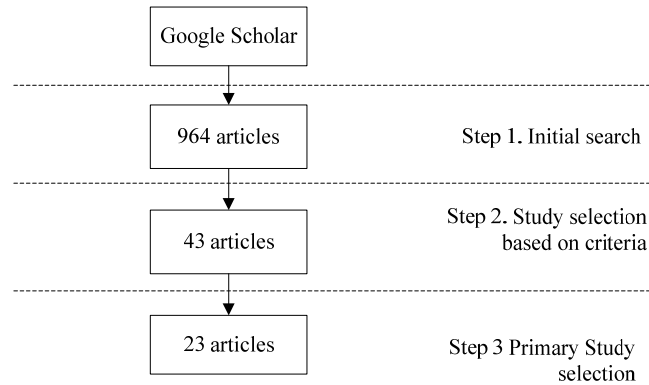


Figure 2 Literature Review Process

According to literature review, there are 8 possible innovations to be implemented in Batik SMI namely, the use of natural coloring material (Wicaksono, 2012; Sunarya, 2012; Indrianingsih & Darsih, 2013; Handayani & Mualimin, 2014; Handayani & Maulana, 2014; Borshalina, 2015; Kanchanarat & Sangchai, 2016), The use of electric *canting* in batik processing (Moyoretno, 2011), The implementation of solar system in batik production floor (Syahputra & Soesanti, 2016), The implementation of wet on wet coloring technique (Libriani, 2014), The use of ergonomic stool for batik crafters (Anjani et al., 2013), the use of e-commerce to promote and selling activities (Lusisana, 2009; Utami & Purnama, 2011; Widiana, Supit, & Hartini, 2012; Amin, Soelistijadi & Priyambodo, 2012; Soesilo, 2012; Susilowati & Yulianto, 2012; Wiyani & Prabowo, 2013; Hariyati, 2013; Widiyanto & Yulianto, 2015; Suprpti, Santoso & Rahmawati, 2016), wastewater treatment (Kristijanto, Handayani, & Levi, 2011), and Supplier selection (Susanty, et al., 2014). The summary of systematic literature review towards innovation in batik can be seen in Table 1.

Table 1. List of Innovation in Batik

No.	Innovation	Reference
1	The use of natural coloring material	Wicaksono (2012); Sunarya (2012); Indrianingsih & Darsih (2013); Handayani & Mualimin (2014); Handayani & Maulana, (2014); Borshalina, (2015); Kanchanarat & Sangchai, (2016)
2	The implementation of solar home system in batik production floor	Syahputra & Soesanti (2016)
3	The use of electric canting	Moyoretno (2011)
4	The implementation of wet on wet coloring technique	Libriani (2014)
5	The use of ergonomic stool for batik crafters	Anjani et al. 2013
6	The use of e-commerce to promote and selling activities	Lusisana, (2009); Utami & Purnama (2011); Widiana, Supit, & Hartini (2012); Amin, Soelistijadi & Priyambodo (2012); Soesilo (2012); Susilowati & Yulianto (2012); Wiyani & Prabowo (2013); Hariyati (2013); Widiyanto & Yulianto (2015); Suprpti, Santoso & Rahmawati (2016)
7	Wastewater treatment	Kristijanto, Handayani, & Levi (2011);
8	Supplier selection priority	Susanty, et al. (2014)

### **3.3 Innovation Priority**

After the activities are mapped to value chain model, the possible innovation listed. After being listed, the possible innovations that were obtained from the previous study were also categorized based on value chain model whether the innovation fell into primary activities innovation or support activities innovation. According to study from (Mangifera, 2016), the top three rank activities that brought value-added towards the margin is Inbound Logistics, Operation, and Marketing and Sales activities. Therefore, it is suggested to prioritized innovation in inbound logistics, operation, and marketing & sales area. On the other hand, the two primary activities left, outbound logistics and service activities still considered to be prioritized than innovation in support activities area.

## **4. Discussion**

Based on value chain map, the activities in batik industries is divided into two categories of activities which are primary activities and support activities. Based on the literature study, there are some innovations that can be implemented in batik industry. The innovation concept suitable to be implemented in SMI in Indonesia to increase business continuity and alignment with the stakeholder is open innovation concept (Hamdani & Wirawan, 2012). Open innovation is the paradigm that state that the valuable idea can come from inside or outside the company (Chesbrough, 2006) so that industries should commercialize external source for innovation (Chesbrough, 2006; Joel & Bogers, 2014). Verbano, Crema, & Venturini (2015) stated that through open innovation, the industries which have limited resource can utilize external resources. There are several organizations that interact with SMI to implement the open innovation concept, such as government, university, large company, and non-profit research organization (Hamdani & Wirawan, 2012). The innovation that is possible to be implemented in batik industry based on previous literature then classified based on the activities category in value chain map. Moreover, according to Kurniawati, Samadhi, & Wiratmadja (2016), value creation can also generate through knowledge management by creating, organizing, sharing, and using knowledge to create value for the organization.

### **4.1 Innovation towards Primary Activities**

#### *1) Innovation towards inbound logistic activities*

Natural coloring material, such as mango leaves, tree bark, tobacco, etc to ensure that the batik produce is environmentally friendly and can be used in Batik processing (Indrianingsih & Darsih, 2013; Borshalina, 2015). The use of natural coloring material is strongly recommended since the use of synthetic coloring material that usually used by the Batik producer has a negative effect. According to Borshalina (2015), the waste of synthetic coloring material was being poorly managed by the industry and contaminates the environment and it is harmful to human health.

#### *2) Innovation towards operations activities*

There are four kinds of innovation obtained from the systematic literature review that is related to operation activities. The first innovation is the use of electric canting in *nyanting* activities (Moyoretno, 2011). According to Moyoretno (2011), canting is used to carve wax on the fabric and considered plays important role in Batik process. The use of traditional canting spent a lot of time due to the need for care in the *nyanting* process. The use of electric canting is believed provides a more stable temperature of the wax, easier to use, and improve production performance. The second innovation is the use of wet on wet technique for dyeing process (Libriani, 2014). According to Libriani (2014), wet on wet technique is coloring technique that is usually used in watercolor painting on drawing paper or oil painting on canvas. Another innovation in operation activity is the use of ergonomic stool (*dingklik*) for Batik crafters. Batik process performed by batik crafter in sitting position on a stool named *dingklik* (Anjani, et al., 2013). According to Anjani et al. (2013), the traditional stool used in batik process is a short-sized stool which has no backrest to sustain the correct of torso posture and would effect to the crafter's body posture. The ergonomic stool design has 36 cm-high, 37.5 cm-long and 38 cm-wide, with a 5° angle from the horizontal surface. To this stool is also added a backrest that is 46.7 cm-high that is tilt 100°. An 18.4 cm-high armrest is also added to support the arm in crafting batik. The design is believed to bring more comfort for the worker. Lastly, Batik industries can implement solar home system in the processing of batik production (Syahputra & Soesanti, 2005). The implementation of a solar cell home system in batik industry can be used to provide electrical power supply to the load on the batik electric stove with a power of capacity of 125 watts each burner (Syahputra & Soesanti, 2005). Installing solar cell home system can ensure continuity of the flow of electrical power to the stove and home lighting in batik production (Syahputra & Soesanti, 2005). If the

solar home system has successfully implemented, the player of Batik SMI can utilize electric stove in batik processing and less rely on the kerosene stove.

3) *Innovation towards marketing & sales activities*

As now people tend to utilize technology tools to seek information, the use of online media to promote batik product and perform buying-selling activities can be considered (Suryani, Anggraeni, & Suryadi, 2015). The online media used to promote and perform selling-buying activities should display detailed information regarding the product such as price, picture, company information and contact person, order mechanism, etc. The utilization of internet will provide easy access for the customer to batik product.

## **4.2 Innovation towards Support Activities**

1) *Innovation towards technology*

Since the wastewater produced from batik production processes has become a problem for the environment, the solution to minimize the pollution caused by batik production processes is required (Kristijanto, Handayani, & Levi, 2011). The implementation of anaerobic and aerobic processes to process the wastewater from batik production might become an alternative to manage the wastewater of batik industry (Kristijanto, Handayani, & Levi, 2011). According to Kristijanto, Handayani, and Levi (2011), the combination of anaerobic and aerobic processes can be performed using anaerobic baffled reactor (ABR). The study from Kristijanto, Handayani, and Levi (2011) found that the use of ABR can effectively reduce the chemical contamination in batik wastewater.

2) *Innovation towards procurement*

AHP method can be used to determine the important criteria for selecting a supplier of fabric and wax. Choosing the supplier according to appropriate criteria is one of the important activities in batik industry since it can reduce the cost of making batik and affect the ability of the industry to gain competitive advantage and achieve customer satisfaction (Susanty, Puspitasari, Hartini, & Sugi, 2014). Moreover, from three batik region in West Java, Indonesia the top and the second rank important criteria to select supplier is the quality of the material and the price of the material. It indicates that the quality of the material is more important than the price of the material because the quality of the material such as fabric and wax will influence the quality of the finished product (Susanty, Puspitasari, Hartini, & Sugi, 2014).

## **4.3 Limitation**

There are several limitations in this study. Firstly, the innovation suggested in this study is based on some previous study. Thus, there might be some possible innovations that have not been included in this study. Other than that, the possible innovation listed in this study have not been confirmed to the batik SMI to obtain the opinion whether the innovation is possible to be implemented or not in their workshop or processing activities. Secondly, the innovation listed in this study did not define the requirement that should be possessed by the batik SMI to implement the innovation since the characteristic of batik SMI might differ to one another. Lastly, the methodology to determine the innovation priority was only based on the previous study and still not defined the exact rank of priority from each activity. A methodology should be developed to determine the priority ranking of innovation among all activities.

## **5. Conclusion**

There were many studies proposed innovation opportunities that can be applied by Batik SMI as one of the attempt to increase their competitive advantage. This study suggested the batik SMI prioritize the implementation of innovation that is related to their primary activities such as innovation related to main raw material, equipment used in production process, innovation regarding the production process, marketing and sales, and service. Since most of the batik industry is categorized as SMI, Batik SMI can implement open innovation concept to overcome resource limitation problem that mostly becomes a barrier for SMI to innovate. According to systematic literature review performed in this study, the use of natural coloring material, the implementation of wet on wet cooking technique, the use of electric canting, the use of ergonomic stool, the implementation of solar home system and electric stove, and the use of e-commerce for promotion and selling activities are considered as innovations that can bring added value towards primary activities in Batik SMI. Other than that, the lists of innovations which are possible to be implemented in Batik SMI were obtained through systematic literature study from one electronic data source. To obtain a more comprehensive result, another data sources can be added in future in the hope of obtaining the list of possible innovation related to



outbound logistic activities, service and support activities, human resource, and firm infrastructure which haven't defined in this study. Moreover, this study performed qualitative study both in mapping the activities and the innovation to VCA model and the determination of innovation priority. Future study can calculate the rank of the innovation to obtain the rank of priority using analytical hierarchy process, factor rating, or any other method and compare the result with the result obtained from VCA model.

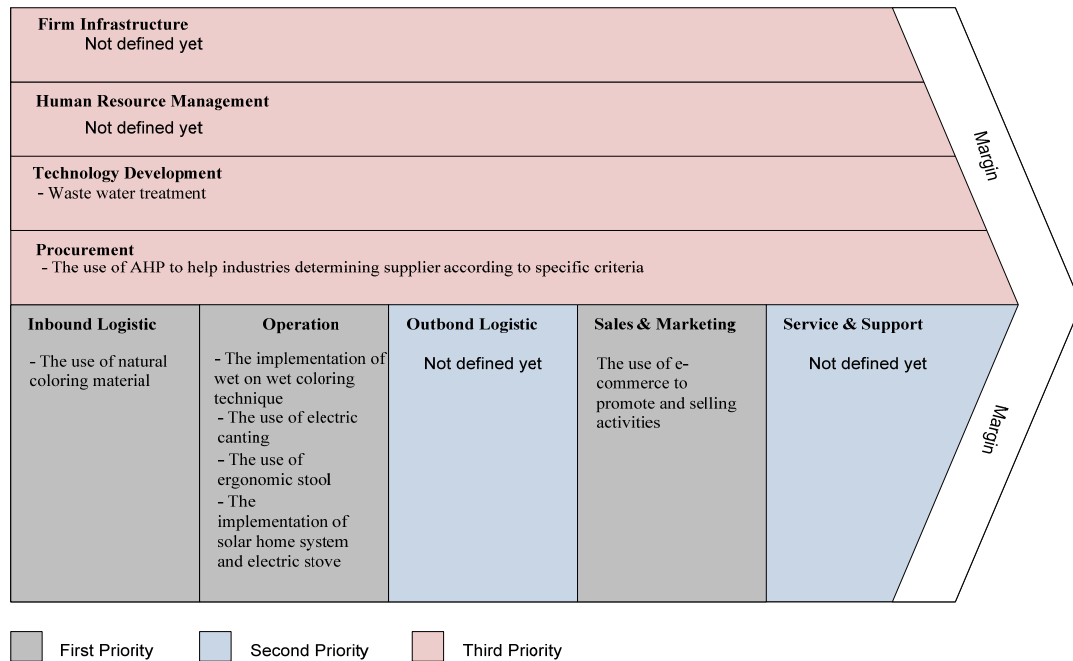


Figure 3 Innovation priority in Batik based on Value Chain Map

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