Batik stamp canting made of waste paper material as a frugal innovation in batik

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Abstract. This article discusses the innovation of batik stamp canting equipment using waste paper material. The first focus is on the emergence and the background of the innovation of batik stamp canting made of waste paper material. The second is on the elaboration of concept of stamp batik canting innovation made of waste paper material. The method applied in this study was qualitative approach with case studies by employing informants’ data sources, artifacts, events and documents. The results indicate that the innovation of stamp canting using paper material has occurred since 2014, and it began to be widely used in batik production process in 2016. The background of stamp canting innovation made of waste paper was triggered by the high price of stamp canting from copper which is commonly used in the production process of stamped batik. The concept applied to develop this stamp canting is frugal innovation. The value of knowledge gained is that innovation is not always carried out to improve the quality of processes or products. Innovation is more significantly needed to solve the problems related to the context.

1. Introduction
Batik innovations in Java Island have resulted in the main equipment which must be used in batik production, i.e. canting. Based on the standard of batik products issued by the government of Indonesia, in SNI (Indonesian National Standard) number 0239:2014, a product can be categorized as batik if canting is used during its production process. Canting is a tool used to apply hot wax on the surface of the cloth. Wax (local term: malam) is the material used as color barrier to create batik ornaments. There are two types of canting, hand-drawn canting and stamp canting. The type of canting equipment used in the production process determines the type of batik produced. Moreover, there are three types of traditional batik, based on the type of canting used, i.e. hand-drawn batik, stamped batik, and combination batik.

Canting is a special tool used in the process of making batik. Drawing motifs or a variety of decoration to the cloth using canting is called as resisting technique as the wax drawn using canting will resist the color during the dyeing process. Such Rintang (resisting) dyeing technique does not only exist in Java. However, in fact, canting, a tool used to carve the material (wax) as a color barrier, is only found when making batik. It can be concluded that canting is an invention or creation of the Javanese [1]. In addition, it is estimated that canting is the result of an innovation which occurred in Mataram kingdom palace in the 17th century [2]. In addition, Canting developed at that time was categorized as a type of hand-drawn canting.
Stamp canting, a tool used for making batik [3], is generally made of wood and metal (copper) [4] cut into a ribbon shape and arranged in such a way as a kind of batik motif stamp which is used to apply wax to the cloth [5]. The application of hot wax to the surface of the cloth using this stamp tool is identified as stamping method. Stamp canting started to appear in the mid-19th century when batik developed into an industry. Furthermore, in the mid-1840s there was an innovation to increase the efficiency and the productivity in batik production process, i.e. by using a stamp canting made of copper plates tethered to a base and given a handle. The method of making batik using canting stamp originated in Semarang, Central Java [6]. Semarang is one of the regions located on the north coast of Java conducting batik activities.

At the beginning of the innovation, copper was not used as the material for making canting stamps as it is now in the current tradition of stamped batik production. However, it has gone through a lot of experiments using various materials. Veldhuisen [2] explained that canting was originally made of a large tuber. The tuber was split and then carved to form some desired decoration and/or ornaments and then dried. After the tuber was dry, it was then used as a tool to print hot liquid wax onto the surface of the cotton cloth. The results of this printed wax using tuber were sleek, and the tuber was also not resistant to hot wax fluid that make it easily damaged. Furthermore, experiments on making stamp canting have continued by using wood. The stamp canting made of wood material was resistant to hot wax fluids; nevertheless, the image printed was still less smooth. Moreover, there was also a time when stamp canting was made of wood with metal pins or pegs on the surface to form the motifs. However, the lines produced by this kind of stamp canting were discontinuous and more like dotted lines.

Stamp canting made of copper material as one of the innovations is eventually used in the production process of batik industry. Canting from copper material was chosen because it is strong, heat resistant, and easy to shape. The methods applied to manufacture stamp canting are welding technique and assembling technique. These methods are used perhaps due to the inspiration acquired from the method applied in making motifs on gold and silver jewelry, considering that canting stamp makers are mostly gold and silver jewelry artisans.

Stamp canting has been continuously experiencing some innovations since the beginning of the development until now. In the early days of using stamp canting in batik-making process, there were some visual problems with the batik ornaments produced. The connection lines between the stamping are often less welded (not sanggit-local term). Accordingly, to overcome the problem, the artisans usually combine the process of using stamp canting with hand-drawn canting. The connection of the lines between the stamped prints that are not sharply joined (not sanggit) is then fixed with a hand-drawn canting. In 1930, a method was found to smoothen the sanggit (unjoined lines) between stamps, i.e. by placing four metal pins or pegs at the corners of the stamp canting as a sign or guide so that the stamping could be precise.

In 2014, there was an innovation particularly in the materials and methods for making stamp canting. A number of alternative materials used in the innovation included the use of aluminum, wood, acrylic, and steel. The manufacturing method applied was subtractive technique using a CNC lathe machine. The manufacturing method applied was proven to be faster in the process of making batik stamps than that in the conventional methods. However, the quality of the prints from stamp canting using those varied materials still could not surpass the quality of batik products made of copper stamp canting [7,8].

The innovation of stamp canting was initiated in 2017 using ABS plastic material and it applied three-dimensional digital printing techniques using a 3D UP Printer in its manufacturing process. The stamp canting made of ABS plastic was found to be lower in production costs than stamp canting made of metal with using subtractive manufacturing method with a CNC machine. Moreover, the effectiveness of the stamping results using metal stamp canting still produces better quality than that by ABS plastic [9].

Stamp canting innovation made of waste paper material began in 2016. The waste paper used is a kind of duplex paperboard which is commonly used as the packaging of various products. Waste from
such paper material is very popular and often used from the simplest to the most difficult products’ packaging [10]. Duplex paper is usually in a sheet form and has the same thickness as that of a copper plate so that it can be cut and arranged in such a way to resemble a stamp batik canting made of copper. In addition, the method of making stamp canting made of paper is almost the same as when making stamp canting made of copper, i.e., welding method. Based on the testing conducted to observe the effective use of stamp canting, it showed that this stamp canting is able to produce neat and strong wax prints, and able to hold the dye absorption; thus, it can produce neat and clean motifs, both for kelowongan (pattern or thin line) and tembokan (blocking) motifs [11]. However, the effectiveness of stamp canting made of paper still can’t exceed the stamp canting made of copper.

Batik stamp canting has undergone a bunch of innovations, both in terms of material and manufacturing methods. Of those various innovations, only stamp canting made of copper, wood, and paper are widely used in batik industry. In addition, the application of other canting innovation results was so far not found in batik industry in Java.

The innovation of stamp canting tool made of waste paper material in batik industry in Java, Indonesia, is an interesting and important phenomenon to study. The stamp canting tool considered the best to make the best quality stamped batik products until now is stamp canting made of copper. In fact, stamp canting made of waste paper are still not able to surpass the quality of batik clothes produced by copper stamp canting. Nevertheless, stamp canting made of waste paper continues to grow and is widely used in the process of making stamped batik production until today. This study discusses the problems related to the innovation of batik stamp canting tool made of waste paper. The first problem discussed in this research is the emergence and background of the innovation of batik stamp canting made of waste paper material. Moreover, the second problem discusses the concept of innovation in the development of batik stamp canting made of waste paper material.

2. Methods
The method applied to discuss the problem in this study was qualitative research with a case study approach. Case study research is a comprehensive research strategy [12] which explores real life, contemporary [13], and with specific time and place limitation [14]. This study focused on the innovation of batik stamp canting equipment in batik industry in Java, Indonesia. The case occurred at the end of the 2nd decade of the XXI century, i.e., from 2016 to now. Due to the fact that this case is a unique phenomenon, this research can be categorized as an intrinsic case study [15].

Source of data was obtained through observation on events and artifacts, interviews and reviews of various documents and literature. Observations were conducted on batik industry MSMEs (Micro, Small, and Medium Enterprises, local term: UMKM) in several batik centers in Java, such as in Pekalongan, Surakarta, and Yogyakarta. The MSMEs used as the objects of observation were those applying stamp canting made of paper in their production. In addition, interviews were carried out with key informants who were directly related to process of making batik by using stamp canting made of paper. The informants selected as the data sources included: Nurohmad from Omah Kreatif Dongaji Yogyakarta, Abdul Ghofar from Batik Preketek Pekalongan, Subekhi from Omahe Canting Pekalongan, and Langgeng from Langgam Batik Boyolali Surakarta. Moreover, document and library data were obtained from several research reports and journal articles related to this study case. Then, the data collected were analyzed interactively to gain solid conclusions.

3. Results and discussion
Nurohmad is a name which appears the most in cyberspace if we enter the keyword ‘paper stamp canting’ in internet search engine. He is the owner of Omah Kreatif Dongaji, a textile craft workshop located in Sawit Hamlet (an administrative area under village government), Punggung Harjo Village (an administrative area under subdistrict), Sewon subdistrict (an administrative area under regency/city), Bantul Regency (an administrative area under provincial government, Special Region of Yogyakarta province, Indonesia. This home industry founded by Nurohmad and his friends in 2016 focuses on the production and development of batik. Moreover, this home industry produces batik and
batik stamping tools (canting) made of paper materials. The workshop also provides training to make batik and how to make stamp canting using paper materials.

During the interview conducted, Nurohmad explained that he and his friends started making stamp canting using paper materials and applied the canting in their production process since 2016. The use of stamp canting made of paper materials in the process of batik production began when there was an order for stamped batik but the price offered was very low. The production cost was not sufficient to make conventional stamp canting equipment from copper material. Thus, to solve this problem, Nurohmad started his effort to make stamp canting using paper material and applied them in his batik production. When communicated with the customer, the stamped batik products made by using stamp canting made of paper were well accepted and approved for mass production. Since then, Nurohmad has started developing stamp canting made of paper and has been using the paper stamp canting for batik production in his workshop.

Nurohmad continues to develop stamp canting made of paper and focuses on the use of waste materials. The waste material used is the second-hand or residual material. The stamp canting developed by Nurohmad uses paper and plywood or multiplex materials. The paper used is mostly worn cardboard for product packaging. The worn cardboard packaging should have adequate thickness and is still in good condition. The thickness of the paper sufficient to make a stamp canting is cardboard with above 230 paper grammage. Some used cardboard packaging that is not exposed to oil and water and not wrinkled can still be used to make stamp canting. Moreover, multiplex waste is usually obtained from used materials in building construction site. The building construction process often uses multiplex to print cast concrete, while the multiplex material is often left over when making molds. The remaining pieces of multiplex in small sizes can no longer be used in building construction. Thus, this remaining multiplex can be used to make stamp canting.

Nurohmad stated that the basic concept of developing stamp canting using waste material is to save and to preserve the environment. Waste is a big problem on earth, particularly materials which may damage the environment and are difficult to recycle. Paper and multiplex waste is categorized as environmentally harmless material. However, if this harmless waste can still be reused, it will support environmental conservation efforts. The basic material of paper and multiplex is wood. Therefore, if we are able to save on the use of paper and multiplex, the number of trees cut will certainly also decrease. Besides, the use of packaging paper and multiplex waste is considered as a cost saving method to make stamp canting. The materials which must be purchased to make this paper stamp canting are only glue and nails, while waste packaging paper and multiplex are available and can be usually obtained for free. This savings in production equipment will definitely reduce production costs and contribute to a decrease in the selling price of the product and to increase the profits.

The activity routinely conducted by Omah Creative Dongaji is to produce stamp made of paper. This uniqueness makes Omah Kreatif Dongaji often be used as an object of research studies conducted by school students and university students, and also gets covered and published by various media. In addition, Nurohmad is also often invited to give training on how to make batik and make stamp canting made of paper in many places, both in Java and outside Java. These various activities make stamp canting made of waste paper is increasingly known widely by the public and eventually used in batik production process.

Langgamm Batik is an MSME/UMKM of batik owned by Langgeng Budi Utomo located at Perum Puri Pratama 1 Jl. Nakula No. 36, Ngemplak, Boyolali, Surakarta, Central Java. The business was established in 2015. Langgeng explained that he used stamp canting made of paper material since 2017. The stamp canting he used was made by himself equipped with the knowledge obtained from a lot of videos on Youtube showing Nurohmad make stamp canting made of paper.

Langgamm Batik initially produced hand-drawn batik only. Since the production process of hand-drawn batik takes a relatively long time, the turnover of business money also becomes longer. There is a desire to produce stamped batik with a relatively faster production process and hoping that the profits will also be gained more quickly. The need to produce stamped batik is limited by the high price of conventional stamp canting made of copper. The first investment for production equipment is
commonly quite high, and Langgeng did not have adequate capital for all the necessary equipment and materials. Then, in these constrained conditions, Langgeng tried to find the solution by seeking knowledge about stamp canting in cyberspace. While browsing, he found information about stamp canting which is affordable and really economical, i.e. stamp canting made of paper. With the knowledge gained from the internet, Langgeng succeeded in making batik stamp canting from used packaging materials or other waste products, such as used calendars, paper map folders, and other possible products. He has used his stamp canting to produce batik and his stamped batik products are selling well. In addition to producing stamped batik, Langgeng also receives orders to make stamp canting made of paper and most of the customers come from outside the city where he lives now, such as Surabaya and Aceh.

Abdul Ghofar or better known as Pak Mamik (Pak is an honorific term for adult male Indonesian as Mr. in English) is a batik entrepreneur from Jlamprang batik village of Pekalongan, Central Java. The name or product brand of Pak Mamik’s business is known as “Batik Preketek”. The location of his workshop as well as his residence is on Jl. Jlamprang, Krapyak Kidul Gg. 8 No. 36 Pekalongan, Central Java. Pak Mamik started to use stamp canting made of paper material since 2016 until now. Paper stamp canting he uses is also made of waste paper. The waste paper is from not only duplex paper but also cardboard. Duplex paper is usually used to make kelowongan (line or pattern) motif stamp. Meanwhile, tembokan (blocking) motifs and lines with a rather wide thickness mostly use stamp canting made of cardboard.

Abdul Ghofar besides being an entrepreneur doing business in batik, he is also a batik instructor. He has batik course class at his home. In addition, he is often invited by government agencies or communities to give training about batik. In his batik training events, Abdul Ghofar often provides some material concerning on making batik stamps made of paper material (Figure 1 and 2). Through these batik training events, the knowledge about stamp canting made of paper is increasingly disseminated widely and the stamp canting made of paper is extensively used for producing stamped batik. Batik cluster in Blora, Central Java province is an example of paper stamp canting user whose knowledge was obtained from the training.

Subekhi, also well known as Mas Boy (mas is an honorific for young male Javanese), has a business in making stamp canting made of paper material named Omahe Canting (English term: house of canting). Subekhi’s business workshop as well as his residence is on Jl. Supriyadi, West Pekalongan, Central Java. He started to create this innovative stamp canting using paper material in 2014.

Subekhi was originally a maker of wooden stamp canting. Stamp canting made of wood is however only capable for printing thick tembokan (blocking) and kelowongan (pattern or line) motifs.
In addition, wooden material is not suitable for making such thin line motifs as stamp canting made of copper. This is because they are easily broken when used in the production process. Subekhi then tried to find alternative materials besides copper to make stamp canting which can be used to print line batik motifs. Copper was avoided because the price of this material was so expensive that the production cost of stamp canting became very high. Subsequently, Subekhi found duplex paper and wooden planks as the substitutes for copper that could be used to print line motifs. Before using paper, he explored various materials, such as aluminum and zinc, but the results were still not optimal.

Figure 3. Stamp canting created by Subekhi made of duplex paper from waste of snack packaging boxes as the main material.

Until now, Subekhi has produced a lot of stamp canting from paper materials to meet the orders from various batik companies, mainly in Pekalongan. Stamp cantings made of paper are more widely ordered instead of stamp canting from wood, because the motifs produced are more diverse and the price is cheaper. The price of stamp canting made of paper is much cheaper than that from wood because the manufacturing process is faster and the price of paper materials is lower. Moreover, using waste paper material will be immensely cheaper. Subekhi explained that he was the first person to create a stamp canting using paper material. In addition, Subekhi also stated that Nurohmad (Omah Kreatif Dongaji, Yogyakarta) and Abdul Ghofar (Batik Preketek. Pekalongan) were able to make stamp canting from paper material because they have learned from him so that they could develop how to make the paper stamp canting.

Subekhi has a significant role in the innovation of stamp canting made of waste paper as the inventor and developer so that the tool can be realized and used in batik industry. The paper stamp canting created by Subekhi is a successful form of innovation. Innovation is a series of activities supported by the power of creativity to produce something new, useful, and used by the community [16–18]. Besides, innovation must have a positive impact on human life contextually [19]. The novelty of the paper stamp canting created by Subekhi lies in the application of materials that have never been used before for making stamp canting. In addition, the stamp canting has been proven to be useful, i.e. it can be used to produce stamped batik and has a positive impact in reducing the production costs. Stamp canting made of paper have also been used widely by the community, both by batik producers and students essentially studying stamped batik development.

Nurohmad and Abdul Gofar own an essential role in the diffusion of innovation results through social media publications and training. Creating knowledge about new products will have a positive impact on the innovation result. Moreover, knowledge creation is a potential strategy to generate the growing market expectations aimed at achieving competitive advantage [20].
knowledge which is mostly done by Nurohmad and Abdul Ghofar, stamp canting made of paper is increasingly used. Sometimes this innovation can replace the role of copper stamp canting which has been popularly known to be the best quality. Innovators in the innovation and creators of knowledge play an equally important role for the innovation itself to succeed. The innovation actor plays as a resource integrator, and diffusion as an important part of the recursive innovation process [21].

The background of the invention or innovation and the use of stamp canting made of waste paper is the high price of stamp canting which are commonly used in the process of batik production, i.e. stamp canting made of copper plate material. Subekhi found stamp canting made of paper material from his desire to create stamp canting with lower production costs than that of conventional stamp canting (using copper material) but with standard capabilities. Nurohmad used stamp canting made of paper for the first time because he wanted to reduce the production costs. Langgeng furthermore used this type of stamp canting because he at first didn’t own much primary capital to procure conventional stamp canting equipment generally used in batik industry.

Although the end quality of the prints produced by stamp canting made of paper is not able to comprise the quality of the products made by copper stamp canting, the innovation is still used in the production of stamped batik because it can significantly reduce the costs of batik production. The innovation that produces stamp canting made of waste paper cannot replace conventional stamp canting in the context of quality, but it can replace conventional canting in the context of saving production costs. Although the prints resulted are not as good as those from stamp canting made of copper, batik products produced by using stamp canting made of waste paper remain standard (have almost the same quality as using copper stamp canting) and are able to meet the consumers’ needs. Innovation that produces stamp canting from waste paper is a form of frugal innovation, i.e. the elaboration of a very cheap ecological process, product or service, concentrated only on the core of functionality with an optimized level of performance [22,23] or in simple words it is a process of making something new at a lower or cheaper price [24]. Frugal Innovation involves a combination of frugal thinking, frugal processes, and frugal results [25]. This combination is very solid in the innovation of stamp canting made of waste paper.

4. Conclusion

Based on the analysis of previously collected and presented data, it can be concluded that the innovation of stamp canting made of paper material has occurred since 2014 which was carried out by Subekhi in Pekalongan, Central Java Province. The results of these innovations began to be widely used in the process of batik production in 2016 due to the diffusion of innovation results disseminated through training activities and publications on social media. The background for the innovation of stamp canting from waste paper is triggered by the high price of stamp canting made of copper which is commonly used in the production process of stamped batik. The concept applied in the development of this stamp canting is frugal innovation aiming to create production equipment at the lowest cost but can function properly to make the products ordered. The value of knowledge gained from this study is that innovation is not always carried out to improve the quality of processes or products; instead, innovation is more essentially required to solve problems according to the context.

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