

THE CREATION OF CORPORATE KNOWLEDGE AND INNOVATION AMONG INDONESIA'S BATIK PRODUCERS: A CASE STUDY OF FOUR MAIN AREAS OF BATIK PRODUCTION IN JAVA

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ABSTRACT

Creation of corporate knowledge is generally recognized as crucial for innovation. Through a combination of tacit and explicit knowledge, companies can develop a concept or model of operation that is not easily imitated, and which can serve as the main source of their competitive advantage. Unfortunately, not much research has been done on how this 'corporate knowledge' is created, so both theories and information on knowledge creation is limited. This study attempts to examine select cases of creative creation of such knowledge in the traditionally family run batik industry in Java, Indonesia. The results of this study reveal that such a process of knowledge exists in the batik industry and is one of the factors that allow it to thrive. The primary method used in this study is the multivariate technique, which was used in tandem with SEM statistics and Lisrel software, to survey 220 batik businesses in Yogyakarta, Solo, Cirebon and Pekalongan. It was found that the most important stage in the process of knowledge creation is the conversion of tacit knowledge into explicit knowledge. The company's environmental conditions are also very important for the creation of knowledge processes.

Keywords: Corporate; Tacit and explicit knowledge; Innovation; Batik; Competitive advantage; Java.

1. INTRODUCTION

The batik industry is considered one of the creative industries manufacturing products which can also be recognized as forms of art. According to UNESCO (2017), a creative industry is an organized sector or activity whose primary purpose is to produce or reproduce, promote, distribute or commercialize goods, services, and cultural activities which can be inherited or handed down from generation to generation. Batik is used also as an international heritage of Masterpieces of the Oral and Intangible Heritage of Humanity since October 2, 2009 by UNESCO.

In Indonesia there are 16 sub-sectors which meet the criteria as creative industries, with batik production be counted among them. The amount of batik production in Indonesia is not known with certainty. In general, if combined with mass-produced batik and traditional and manual written batik (which is the focus this paper), batik production is very large. The Ministry of Industry

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noted the export value of batik and batik products until 2017 reached US \$ 58.46 million with the main markets of Japan, the United States and Europe. This is partly due to the campaign of batik as national clothing which is widely used officially and also popular among various communities (Setkab, 2018).

As a creative industry, batik creation is generally undertaken by small and family-run businesses (Wijaya, 2012). The resulting product is a piece of fabric which is decorated with a certain hand-drawn traditional motif. The lowest quality of 'real' batik is produced through a simple stamping process, whereas the highest batik quality is always hand-dyed and hand-drawn (Nurainun et.al., 2008). So-called medium quality batik is produced through a combination of stamping and hand dyeing/drawing. The batik industry is more accurately referred to as a 'craft,' and is generally a family practice which is cultivated from generation to generation. In addition to hand-drawn batik, there are also printed batiks, which are often not considered as 'real' batik, because they are produced using automation. These printed batiks manufactured in mass and are generally very cheap. It should be clear that what is discussed in this paper is batik as a creative industry, which is mainly the hand-dyed, hand-drawn batik, and not printed batik produced by machines. It would be difficult for a layman to distinguish between the two types of batik, therefore, factory-printed batik is becoming a threat to the creative batik industry (hereafter referred to simply as the batik industry) discussed here.

Despite the threat from factory-made batik, the batik industry has developed creatively and innovatively by continuing to produce new products. The batik industry, which many experts feared would be destroyed due to competition as a result of globalization, continues to thrive. Due to creativity and innovation, batik producers are creating new and innovative batik products in many regions in Indonesia. The batik industry continues to grow from year to year and contributes considerably to Indonesia's economy.

In this paper, the corporate knowledge and innovation for batik industry is important in the survival of batik industry. The creation of organizational knowledge, according to Soo, Devinney, and Medgley (1999), is very important for companies and industries, especially when said knowledge is associated with innovation. Sanchez and Heene (2004) states that knowledge becomes the reason for every action undertaken by a company. Soo, Devinney, and Medgley (1999) argue that when goods and services grow more sophisticated, a company's competitive platform is shifted as well. Companies must begin to develop valuable and "elusive" (unique) knowledge to produce a sustainable competitive advantage.

The shift of competitive platform, according to Marquardt and Reynolds (1994), can be referred to as a shift from *manu-facturing* to *mento-facturing*. This phenomenon can be witnessed in the increasing number of products produced by the mind (*mento*) or intelligence rather than by human hands (*manu*). These endeavours are commonly known as creative industries. Creativity, intelligence, and ideas are, according to Clarke and Clegg (1998), becoming the main skills that must be possessed by a company or organization in order to maintain their survival and success. Both authors argued that this shift is in keeping with the emergence of the knowledge-based information economy era.

Thurow (1999) also witnessed a shift in the corporate economic base, i.e. a shift from an industrial-based economy to a knowledge-based economy. The implications of this shift are that the trigger

for economic growth also shifts from the initial availability of input-driven materials to the availability of innovation-driven growth. According to Thurow (1999), if in the past, economic growth is associated with the utilization of scarce resources, then at present economic growth is precisely coupled with the abundance of knowledge resources. These shifts that occur in turn require a shifting of a business's competitive strategy. According to Hamel and Prahalad (1995), this results in a strategic shift from the initial focus of market share to the seizure of future opportunities.

Based on the description above, this study focuses on the following questions: How are small batik producers able to survive in this increasingly competitive global economy? How does knowledge creation occur in the batik industry, and especially, how does it occur in batik-producing regions on Java? An emphasis is placed on knowledge creation as the existence of knowledge is one of the prerequisites for innovation and has become a source for the industry's competitive advantage.

Furthermore, this study attempts to confirm theory of knowledge creation, by: (i) explaining the inter-variable relationships that result in knowledge creation; (ii) comparing knowledge creation in the four batik-producing regions; (iii) comparing the creation of knowledge among batik producers in the northern Java with batik producers in southern Java.

2. METHODOLOGY

2.1. *Theoretical Framework: Knowledge Creation Theory*

Knowledge is the key to a company's capacity for innovation and competitive advantage. The success of many Japanese companies, according to Nonaka and Takeuchi (1995) for example, is not because of the proficiency of their manufacturing processes, or access to cheap capital, or the strength of their government lobbying, but because of their ability to create knowledge.

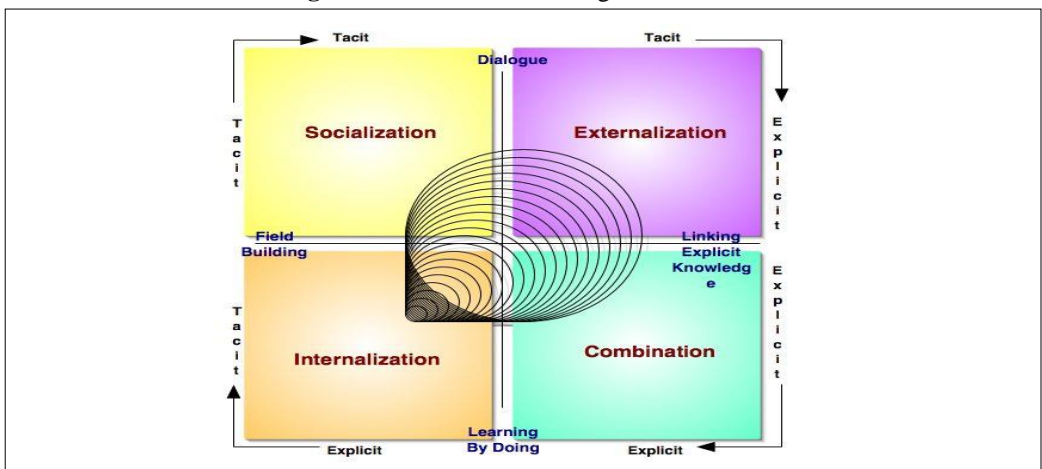
Knowledge, it should be noted, is a belief in, a commitment to, and a function of a certain attitude, perspective, or purpose. Knowledge creation is a dynamic human process that involves justifying personal belief in something to be true and accepted by public. According to Burton-Jones (1999) knowledge is cumulatively stored information and skills derived from the use of said information. By its very nature, knowledge can be divided into two categories: the intangible and the tangible. Intangible knowledge, also known as tacit knowledge, is stored in the human mind, so it is difficult to exchanged and confer to others. Tacit knowledge includes beliefs, imagination, intuition, mental models, and technical skills such as the knowledge possessed by a batik craftsman. Meanwhile, the tangible knowledge, or explicit knowledge, is knowledge that has been codified in the form of documents or images that can be easily transferred to others.

The creation of knowledge, according to Nonaka and Takeuchi (1995) is done in four ways: (i) Socialization, or the dissemination of knowledge which is still in the mind; (ii) Externalization, the morphing of knowledge or ideas in the mind into concepts, designs, motives, and drawings; (iii) Combination, which combines the knowledge of two or more explicit knowledge bases; (iv) Internalization, or re-understanding of new knowledge that has been formed through the process of cognition. These for methods for creating knowledge can otherwise be referred to as SECI.

Companies can play an important role in this knowledge creation process by providing conditions conducive to creativity. This can take the form of providing facilities for creative output within the company, the goal being to support the creation of knowledge so that individuals are willing to spread their knowledge within the company. Company facilitation of knowledge creation can include: (i) Clarity of organizational goals or objectives, (ii) Autonomy of members of the organization, (iii) Fluctuations and "creative turmoil"; (iv) The process of redundancy resulting in internalization (v) A diverse workspace, or the absence of monotonous tasks.

The knowledge conversion model according to Nonaka and Takeuchi (1995) can be described as follows:

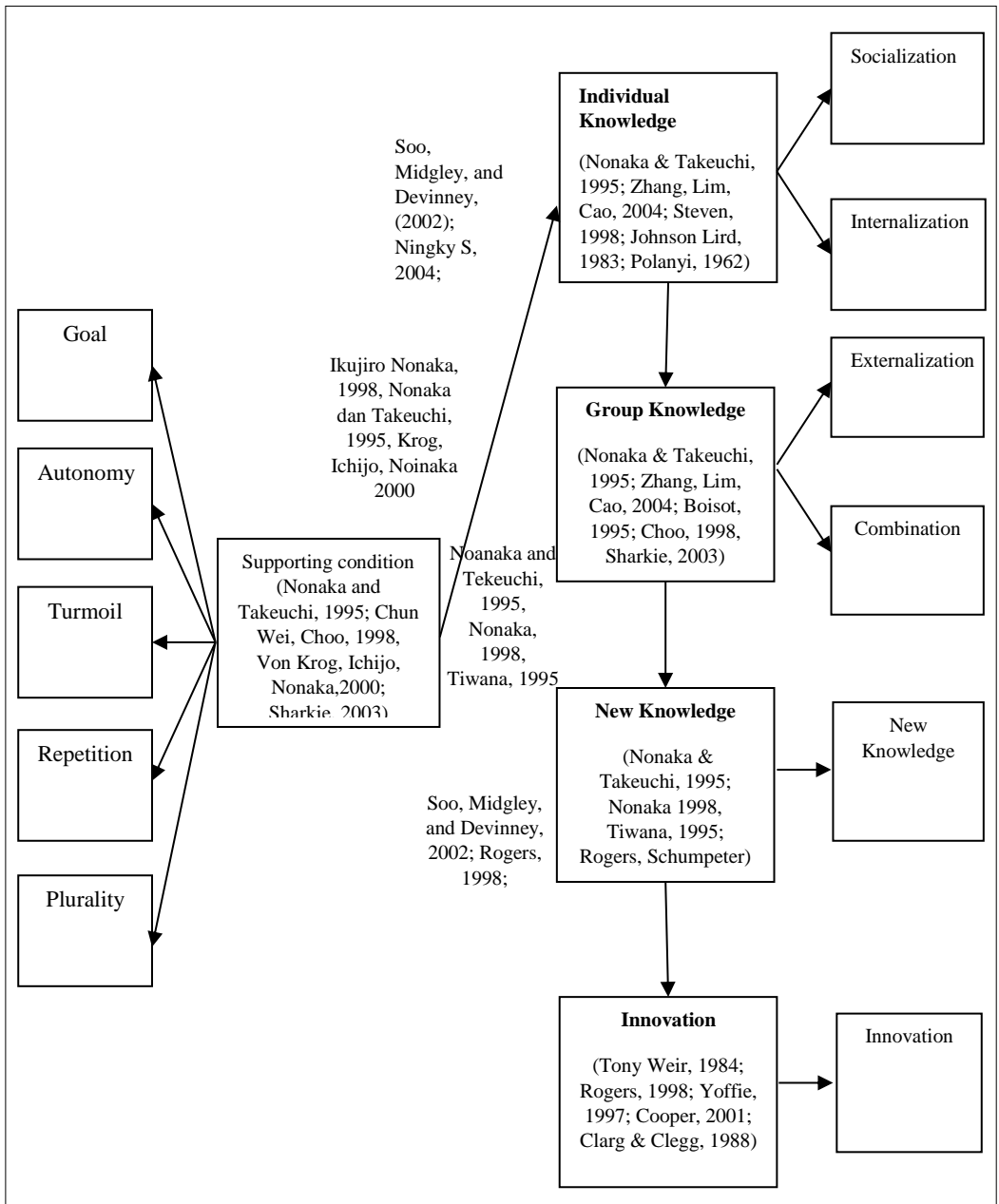
Figure 1: Model of Knowledge Conversion



2.2. Conceptual Model

Based on the brief explanation of above, the conceptual framework used in this research can be visualized as follows:

Figure 2: Conceptual Framework



Following The conceptual model presented above, this study examines the company knowledge creation model through the functions of variables consisting of (i) supporting conditions, (ii) tacit or individual knowledge (including: socialization and internalization), (iii) explicit knowledge or knowledge groups (including: externalization and combination); (iv) new knowledge, and (v) innovation.

The structural relationships tested in this study are based on the assumption that knowledge creation is a process whereby tacit knowledge belonging to the individual is converted into explicit knowledge. Then, this explicit knowledge is disseminated and combined with other explicit knowledge to form new knowledge. This new knowledge is then utilized to create products and systems, i.e. innovation. This knowledge creation process works well if supported by the favourable and facilitating conditions mentioned above.

2.3. *Research Methods and Hypothesis*

This research uses the quantitative research methods by executing tests related to the process of business-knowledge creation. Analytical techniques involved the use of many variables (multivariate), including the development of a model of structural equations as described by Hair (1998). As for the data analysis, this study borrowed the statistical tool known as structural equation modelling (SEM), which was accomplished using LISREL 8.50 software (Ferdinand, 2002).

The batik industry was chosen because: (i) batik productions has strong cultural roots in Indonesian society and the potential to be developed as an product; (ii) according to a report from the Bank of Indonesia (2002), the batik industry is feasible and relatively safe investment for banks; (iii) batik products are classified as innovative, given their varying motifs, colour, and medium; (iv) batik producers have shown that they can survive and thrive in various regions, and is an industry which involves many people relative to the economic multiplier effect.

Research was conducted in four cities in Java Island, Indonesia namely Cirebon, Pekalongan, Yogyakarta, and Solo. These four cities were chosen because, in addition to having distinctive economic/environmental characteristics, batik products in these four areas can be categorized into two groups representing the most of batik patterns in Indonesia: 'batik pesisiran' (coastal batik) which is represented in Cirebon and Pekalongan and 'batik keraton' (palace batik) represented in Yogyakarta and Solo.

The research period lasted from 2005 to 2010 in Cirebon, Pekalongan, Yogyakarta and Solo. The population represented in this research all worked or were associated with medium and large-scale batik producers, as measured by the Central Statistics Agency. The total number of companies involved in the research was 220, distributed as follows: Cirebon - 31, Pekalongan - 105, Yogyakarta - 32, and Solo - 52.

The sample was determined using probability sampling technique, proportionally stratified random sampling, and calculations were made using SCALC statistical software with 0.107 sampling error and 95% confidence level with the assumption of homogeneous relative variation and a balanced proportion for each stratum. In all 171 companies were included in the samples. The number of samples on the stratum within each area is as follow: Cirebon - 24, Pekalongan - 82, Yogyakarta -

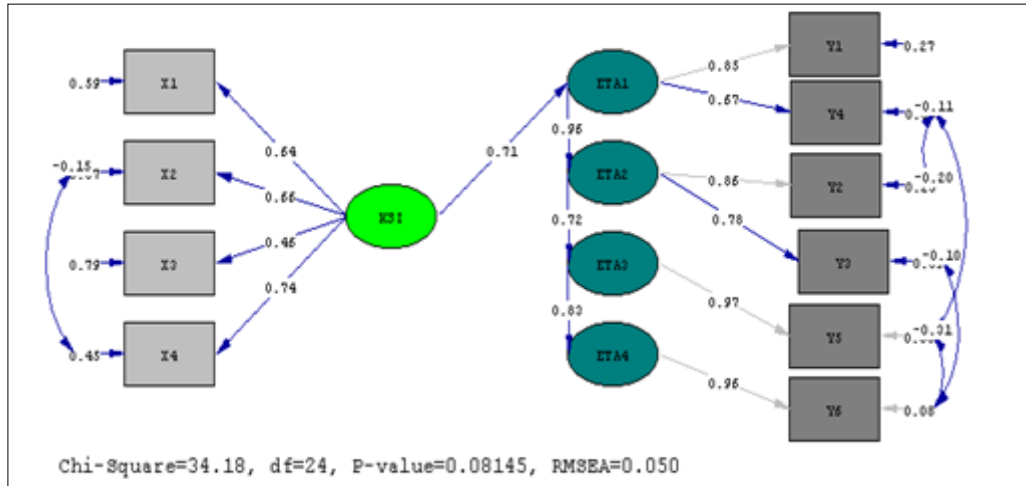
25, and Solo - 40. The number of respondents was limited to one person for each business i.e. those who really understood the company's operations. The data collection technique involved a questionnaire with closed answers and the unit of analysis is in the level of business organization.

We do not analyze data in each region because the sample is not sufficient to use SEM (Widhiarso, 2010). Therefore, our hypothesis is for all 4 regions studied. The research hypotheses for Pekalongan, Cirebon, Yogyakarta and Solo areas are: (i) The exogenous latent variable of the enabling condition is significantly correlated with the latent variable of tacit knowledge; (ii) The latent variable of endogenous tacit knowledge correlates significantly with the latent variable of endogenous explicit knowledge; (iii) Endogenous latent variables of explicit knowledge correlated significantly with latent variables of endogenous new knowledge; (iv) Endogenous latent variables of new knowledge correlated significantly with latent variables of endogenous innovation; (v) The process of knowledge creation among batik producers in four areas of the batik industry is marked by differences in each area; (vi) There are significant differences between the processes of knowledge creation among producers of "batik pesisiran" and "batik keraton."

3. RESULTS AND DISCUSSION

3.1. Structural Analysis Model

Figure 3: Image of the 4th Model Path Coefficient (Final Model)



Information:

ξ_1 : exogenous variable Condition

η_1 : endogenous variable Individual Knowledge

η_2 : endogenous variable Explicit Knowledge (organization)

η_3 : endogenous variable of New Knowledge

η_4 : variable endogen Innovation

ζ : error equations of exogenous variables with endogenous

3.2. Analysis of Research Result

Based on the data obtained in Pekalongan, Cirebon, Yogyakarta and Solo, it is clear that there is a process of knowledge creation within these regions medium and large-scale batik businesses. This explains why the batik producers in these areas are able to survive (Nonaka and Takeuchi, 1995). Batik producers in these areas are therefore able to face the rigors of competition even when faced with competing against batik products from other countries.

This process of knowledge creation can be seen through the conversion process involving the relationship of various variables present in the process of knowledge creation as presented in the hypothesis in the previous section. Relationships among these variables also indicate a knowledge conversion process in the SECI process as follows:

First, there is a real relationship between the supporting conditional variable created by the company (KSAI) with the variable conversion of intangible knowledge (ETA1) as shown by the magnitude t ($= 8.7$) even though the loading value is not that high ($= 0.71$) compared to other variable relationships in this model. From the structural model used, this value is the smallest of the overall values in the model relationship established.

Second, there is a relationship between the variables associated with intangible knowledge and explicit knowledge (ETA2) as indicated by the magnitude of t ($= 11.01$) and the highest loading value ($= 0.96$). The magnitude of loading values at this stage of externalization, at the same time, indicates this stage is the most crucial in the entire process of knowledge creation. This stage can also be said to be the key stage during the process of knowledge creation, because at this stage the conversion process from tacit knowledge to tangible knowledge occurs. This process includes socialization, information sharing, experience sharing, discussion, observation, and observation.

Third, there is a real relationship between the explicit knowledge variable and the new knowledge variable where t ($= 10.19$) and the loading value of ($= 0.72$), greater than the value observed from the relationship between supporting conditions and intangible knowledge. The decline in value at this stage is thought to be consistent with the selection process of newly created knowledge. At this stage the role of business owners or executives is important, as they decide whether to use new knowledge that is generated during production, so it is up to them as to whether there is innovation or not.

Fourth, there is a real relationship between the new knowledge variable and innovation where the t value is ($= 7.50$) and the loading value is ($= 0.83$). This means that at this stage the process of knowledge re-creation becomes important, especially for the framework of innovation. This innovation is very important for the batik producers, as it is vital for survival in the face of harsh competition.

The results of this study also confirm the results of previous studies conducted by other experts on the importance of the creation of knowledge among companies and industries, notably the research of Nonaka and Takeuchi (1995) and Soo, Devinney and Medgley (1999).

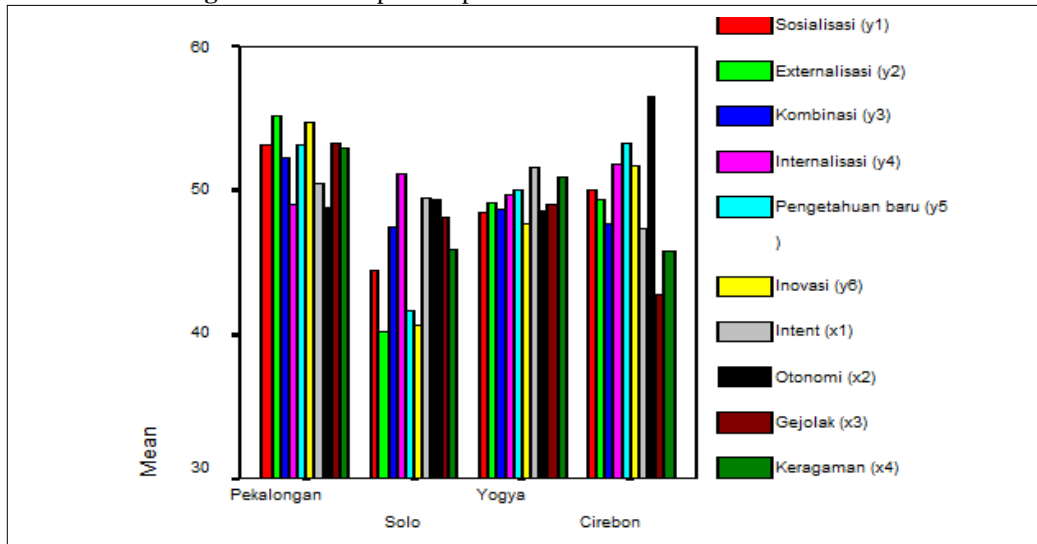
Fifth, in order to determine the nature of the differences between variable characteristics and indicators of knowledge creation processes in Cirebon, Pekalongan, Yogyakarta, and Solo, this

research attempted various tests and comparisons which were both parametric and nonparametric. Ultimately, considering all of the indicators tested in this research model are not normally distributed ($\text{sig} < 0,05$) and therefore parametric tests could be performed.

Non-parametric tests were performed using Kruskal Wallis test kits. The results of these tests indicate that almost all indicators have significant differences among batik industrial regions except the internalization and goal indicators. These tests were then followed by Dunnet's multiple tests which use significantly different indicators. The Dunnet test produced an interesting output, in which there were no similarities within the process of knowledge creation between regions.

Interestingly, Yogyakarta and Cirebon represent unique cases, though they are classified as different batik motif regions. Though Cirebon batik is a member of the "batik pesisiran" motif family, and Yogyakarta represents the "batik keraton" pattern, there were no real differences between these regions.

Figure 4: Bar Graph Comparison of Four Batik Industrial Areas



The results of standardization of comparison between tacit knowledge creation to explicit in four regions, the most dominant and least dominant process in each region vary: (i) For Pekalongan the most dominant knowledge conversion step is externalization and the weakest is internalization; (ii) For the Solo region, the most dominant is the internalization variable and the weakest is the externalization; (iii) in Yogyakarta, the most prominent is the internalization variable and the weakest is socialization; (iv) for the Cirebon region, the most prominent is the internalization variable and the weakest is the combination variable.

Meanwhile, when associated with the assessment of the results of the analysis of the process of knowledge creation in these four areas, if ordered from highest to lowest they are as follows: Pekalongan, followed by Cirebon, Yogyakarta, and then Solo.

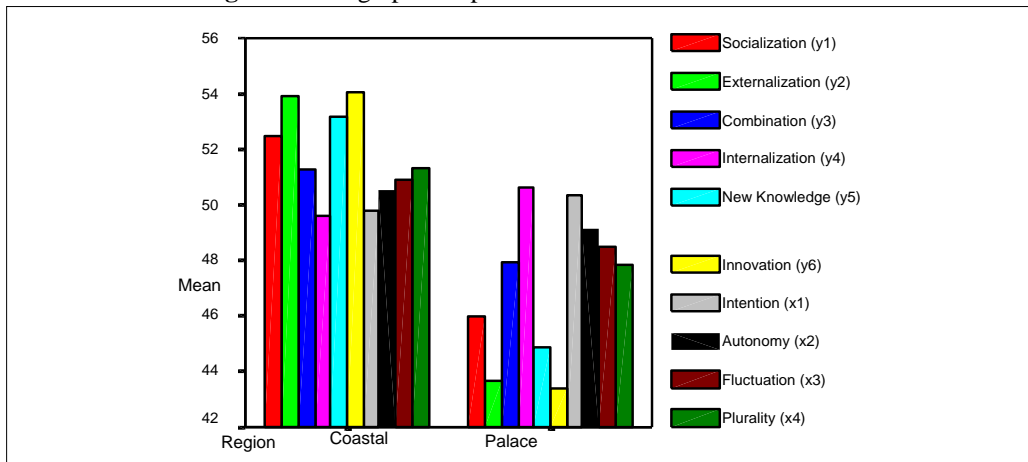
3.3. Differences between Coastal and Palace Style Batik

Based on the differences displayed between coastal and palace batik, the process of knowledge creation in both areas were tested in each using the Man Whitney test. The Mann Whitney test results for different indicators between these two regions show that there is a real difference of 0.05 measures in terms of the process of knowledge creation. This can be seen from the value of Asymp. Sig., which is smaller than 0.05.

The results of the Mann Whitney test the two study groups showed that there were significant differences at the ($= 0,05$) level on the indicators of Socialization (Y1), Externalization (Y2), Combination (Y3), Internalization (Y4), New Knowledge (Y5) and Innovation (Y6), and Diversity variables (X4). As for the indicators that form the latent variables, Supporting Conditions, which include Objectives (X1), Fluctuations (X2), and Diversity (X4) do not show any significant difference. As for the indicators that form the latent variable Supporting Conditions, namely Objective (X1), Fluctuation (X2), and Diversity (X4) did not show significant differences between the two regions studied.

Overall the following graph shows that coastal batik has an advantage compared with palace batik in the process of knowledge creation. The results of data analysis also show the process of knowledge creation among coastal batik producers is better than the process of knowledge creation in the area of palace batik producers.

Figure 5: Bar graph comparison of two areas of batik motif



The structural relationships tested in this study are based on the assumption that knowledge creation is a process whereby tacit knowledge that exists among individual producers is converted into explicit knowledge. Furthermore, explicit knowledge is disseminated and combined with other explicit knowledge resulting in new knowledge. New knowledge is used to create products and systems to produce innovation. This knowledge creation process works well if supported by enabling conditions, namely: (i) clarity of company intent or purpose, (ii) autonomy of member

companies, (iii) fluctuations and "creative turmoil"; (iv) the internalized redundancy; and (v) the existence of diversity.

4. CONCLUSION

Based on the results of this study, the following conclusions can be drawn: First, there is a process of knowledge creation in the four batik industries studied and this is thought to be the cause of the success of batik companies in these four regions to survive and even be able to compete with similar products from abroad.

Secondly, there is no similarity in the process of creating knowledge of companies in four areas of the batik industry. However, what is unique is between Yogyakarta and Cirebon, although both come from different batik-producing regions, none shows a real difference.

Thirdly, successive positions of creation of superior knowledge are Pekalongan, Cirebon, and then Yogyakarta, and finally Solo. This position also explains that the process of knowledge creation in the batik-producing regions of coastal (pesisiran), namely Pekalongan and Cirebon, is better than the regions that produce batik patterns of the palace (kraton), namely Yogyakarta and Solo.

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