GREEN TECHNOLOGY AND INDUSTRIAL REVOLUTION 4.0 FOR A GREENER FUTURE

Assessment of producer's perspective on the production of environmentally friendly fashion products: a case study in Indonesian natural dyes batik craftsmen

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Abstract

Batik is well known as an intangible cultural heritage. In Indonesia, batik is produced in several areas, with its own characteristics. The batik production process goes through several stages, in which overall processes require the aid of chemicals. Conventionally, the batik production process results in environmental pollution due to direct waste disposal without any significant processing. Along with the increase in public awareness of environmental protection, the batik dyeing process currently backs to natural dyes. The study was conducted to examine the production intention of natural dyes batik. A total of 209 producers of natural dyed batik became respondents in this study. Data collection was carried out directly through filling out paper-based questionnaires as well as using online forms. The findings of this study revealed that producers' attitude and satisfaction gave significant positive influences on the production intention of natural dyes batik products. Moreover, the findings exhibited the significant effects of social value, quality value, and green value on the attitude and satisfaction of the producer. Attitude was also determined by economic value, but satisfaction was insignificantly affected by economic value. Production intention was strongly predicted by satisfaction and also determined by attitude. The results of this study support in enhancing the concept of natural dyes batik production, which also provide an important role toward sustainable production.

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Introduction

Batik is an Indonesian art masterpiece as a blend of art and technology inherited by the ancestors. Batik fabric is a variety of decorative fabrics produced by resist dyeing using wax as a color barrier. Batik production process included motif drawing, dyeing, and wax removal. The most commonly used dyes in the batik production process include naphthol, indigosol, Procyon, and Remazol.

Batik is produced by various regions in Indonesia with regional characteristics. Among the regions in Indonesia whose economy is dominated by the batik industry is Pekalongan. In 2011, there were 1342 small industries in Pekalongan, of which about 83.1% were batik industries (Fajri 2013). With a production capacity of around 300 to 1000 pieces of cloth per month (Nindita et al. 2012), each industry has the potential to generate 202.4 m^3 of waste. Considering that only about 0.6% of the industry has a sewage treatment unit (Fajri 2013), while the rest discharges wastewater directly into the environment, a serious move

should be applied. Textile wastewater generally contains heavy metals such as chromium, copper, and cadmium. This waste can contaminate soil and surface water which in turn contaminates ground water. As a pollutant, the accumulation of heavy metals results in various disorders of the body's organs because heavy metals cannot be degraded (Malarkodi et al. 2007).

In the last two decades, green technology has received more attention. Green technology refers to all environmentally friendly technologies that do not interfere with or damage the environment and natural resources. The overuse of chemicals and overexploitation of resources lead to a worsening greenhouse effect, disturbed ecosystems, and global warming. With regard to the hazard posed by the use of synthetic dyes, natural dyes are reused back commercially. The use of natural dyes has increased along with the increasing awareness of consumers to get environmentally friendly textiles and the need to preserve the environment. This is driven by the carcinogenic nature of some synthetic dyes (Bechtold et al. 2007; Saxena and Raja 2014; Hassan et al. 2015). In addition, Indonesia has many types and sources of natural dyes. However, many studies have shown that the potential benefits of natural dye batik are not always recognized in all areas and in all management systems. This is due to natural dyes having a complex chemical structure (Patel and Vashi 2010), long coloring process, inconsistent color reproducibility, and relatively expensive costs (Makkar 2010; Comlekcioglu et al. 2015). At the same time, the implementation of the natural dyes batik development policy depends on the willingness of craftsmen to participate and make changes to their batik products. As a result, it is critical to gain a better knowledge of how these artisans may be persuaded to use natural dyes in their batik production. In such endeavors, identification of socio-psychological conceptions and ideas that influence craftsmen's intention to use natural dyes in batik production can help build and adapt present policies. In these circumstances, research on producer behavioral intent must combine theories of rational and ethical approach in the development of research models (Valizadeh et al. 2018; Nguyen et al. 2021).

Studies indicated that rational and ethical approach parameters such as satisfaction, attitude, social atmosphere, and economic are the factors responsible for producers' perceptions in the agricultural sector (Govindasamy et al. 2003; Adrian et al. 2005; Kiss 2019; Valizadeh et al. 2018; Nguyen et al. 2021). Furthermore, environmental awareness and perceived quality have been identified as the primary factors influencing the producers' behavior in the food sector (Bossle et al. 2015; Silva et al. 2020; De Canio et al. 2021). These factors have also been linked to consumer behavior, as in the case of hybrid vehicles, organic food, and restaurants which determine the benefits and sustainability of the company (Hamzah and Tanwir 2021; Qasim et al. 2019;

Thielemann et al. 2018). In the case of natural batik, some reports on customer behavior in the selection of batik are also available. In addition, other studies were conducted on the general description of the batik industry (Rahayu 2012; Suryani 2013; Alamsyah 2018; Rhofur 2019; Martuti et al. 2020).

According to the above description, although studies on producers' intentions have been conducted, studies on the intentions of batik craftsmen in using natural dyes in the production process have not been widely investigated. To ascertain the factors influencing the intention to produce natural dyes batik, it is necessary to apply the rational approach and the ethical approach. This research is primarily needed to determine the behavior and motivation of batik craftsmen to use natural dyes. Therefore, the goal of this study is to gain a better understanding of the factors influencing producers' intentions toward batik with natural dyes. The use of natural dyes is expected to minimize environmental pollution and increase the economic value of renewable natural materials and the selling value of batik itself. Furthermore, recommendations are made for policymakers to promote the craftsmen's intention to use natural dyes in the batik industry in Indonesia.

Review and hypothesis

Figure 1 depicts the conceptual model of the proposed framework. Totally, 10 hypotheses were drawn from seven constructs, i.e., social value, economic value, quality value, green value, attitude, satisfaction, and production intention of natural dyes batik. The proposed model, as shown in the figure, illustrates that it is possible that attitude and satisfaction determine the production intentions. Both of these factors are related to social, economic, quality, and green values.

The concept of attitude includes making judgments about people, problems, or events. It is possible that people's perspectives will change as they gain information and experience. It is the region where conduct is most strongly influenced. The way someone behaves could reflect their experiences or background. People's perspectives can be learned and shaped by information and experiences. Additionally, as attitudes are propensities to act, they are linked to actual producer behavior. Previous studies have shown that producer attitudes have a significant impact on production behavior (Ruiz-Molina and Gil-Saura 2008). In this context, attitudes are represented by effect, cognition, and behavior, both positive and negative, which refer to the person's level of preference, people's knowledge of the attitude object, and responses and intentions toward the object, respectively (Mantle-Bromley 1995, Hussein 2017). In addition, attitude describes a psychological inclination that is shown by rating

Fig. 1 Conceptual model
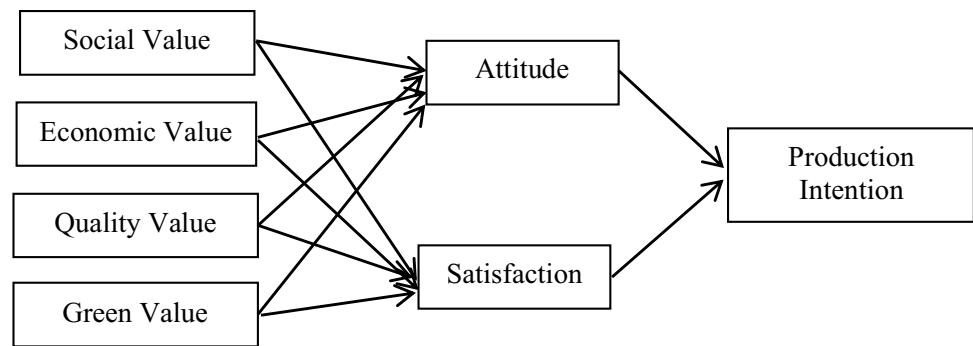
a certain system with a certain level of favorability over a certain amount of time, which prompts people to act in a particular manner in relation to the issue. In one instance, a certain attitude substantially predicts a single behavior on a particular attitude object (Tan 2011).

The utility of a product or service in improving the producer's perceived self-concept in relation to a specific social, demographic, socioeconomic, or cultural group is referred to as social value. Self-image is related to social value. It is believed that producing natural dyes batik could improve the social status of the producers. In the context of green products, social value is a perceived net utility gained from green product production based on social pressure or status gain. Social value has a significant positive influence on the behavior of sustainable producers (Qasim et al. 2019). Emotional value is the value obtained after a producer delivers a product or service and discovers that the resulting product has a higher value, resulting in an emotional response. The emotional benefits gained by producers through interaction with other producers in the community could be defined as the social value (Luna-Cortés et al. 2019). Producers are motivated to behave in the same manner as their social class by social affiliation. Producers tend to create products that reflect their social standing. Producers believe that green production is a modern way of life. The production of natural dyes batik is critical to their social identity. Hence, based on the above description, this study hypothesizes the following.

Hypothesis 1a. Social value will positively affect producer attitude.

Producer satisfaction is defined as the difference between the total benefits expected from a product/service and the total costs incurred in producing that product/service. Furthermore, producer satisfaction refers to the difference between the actual performance experienced and the producer's expectation. A person's subjective evaluation of a situation that results in a positive emotional response is referred to as producer satisfaction. Given the intense competition, a successful response to producer satisfaction significantly defines a company's survival and long-term profitability.

In order to establish and maintain a strong and long-term relationship with customers, producers must perform better, resulting in higher service/product quality (Wu 2014). A previous study on producer satisfaction discovered that in most areas surveyed, flat and pit parlors were preferred over stall barns with pipeline systems (Wagner et al. (2001). Furthermore, despite higher consumer prices, producer satisfaction in terms of saleable product quantity, selling prices, and customer number was highest in producer markets (Kiss (2019). Producer satisfaction is critical in assessing market growth prospects and defining the potential of recruitment targets for both existing and new outlets (Govindasamy et al. (2003). Therefore, the willingness to shift marketing and production priorities is required in order to meet customer demands, which leads to long-term profitability and satisfaction. In this study, perceived satisfaction can be defined as producer acceptance of natural dyes batik and the level of comfort involved in production. Satisfaction is defined as the pleasure or contentment that results from carrying out a necessary or desirable action and experiencing the result (Shee and Wang 2008). In a positive sense, satisfaction is defined as a collection of feelings or attitudes toward a variety of factors that determine a specific situation. A higher level of producer satisfaction indicates a greater willingness to carry out the process. A great deal of effort has been taken into estimating user satisfaction. It was revealed that user satisfaction is a complex concept that varies depending on the experience or case character (Liaw and Huang 2013). Therefore, the following hypothesis was developed.

Hypothesis 1b. Social value will positively affect producer satisfaction.

In the case of the producer, economic value is associated with production profits as well as relationships with suppliers and customers in relation to realized costs (Jelčić and Mabić 2020). Economic value is the monetary value that a person assigns to an economic good based on its utility. Economic value is frequently estimated by measuring a person's willingness to pay for a good in currency units. It is characterized by more reasonable pricing, product value

in line with price, and more cost-effective products (Wei et al. 2020). This case demonstrated that economic value determines satisfaction, though emotional value predicted client satisfaction more accurately than economic value (Jelčić and Mabić 2020). In this work, natural dyes batik production provides perceived economic value to producers through tangible benefits such as low material and production costs and maximum price. Economic value is believed to determine purchase intention. Thus, it is hypothesized the following.

Hypothesis 2a. Economic value will positively affect producer attitude.
Hypothesis 2b. Economic value will positively affect producer satisfaction.

Perceived quality is another dimension of brand value that is very important for producers in choosing the materials for production. It is important to note that product quality is an important company resource to achieve a competitive advantage. Perceived quality reveals an assessment (perception) of overall product advantages compared to its alternative product/service. Based on this definition, it is also known that perceived quality is the product's ability to be accepted in providing satisfaction compared relatively to the available alternatives' products. Because perceived quality is a component of brand value, high perceived quality will encourage consumers to prefer our brand over competitors. Product quality has a significant impact on purchase motivation, which influences consumer purchasing decisions (Li et al. 2012). They discovered that perceived brand quality and customer service influenced consumers' willingness to continue purchasing luxury fashion brands in the future. Another study found a link between perceived quality and willingness to purchase, brand purchase intentions, and brand choices (Netemeyer et al. 2004). Considering the importance of natural dyes batik quality in ensuring business sustainability, the following hypotheses are developed.

Hypothesis 3a. Quality value will positively affect producer attitude.
Hypothesis 3b. Quality value will positively affect producer satisfaction.

Green value is the producer's overall assessment of the benefits of a product or service in terms of capital and earnings, based on the producer's environmental desires, sustainable expectations, and environmentally friendly needs (Wei and Jung 2017). Meanwhile, perceived green value is defined as a person's moral sense in honoring pro-environmental actions that benefit them by lowering both environmental damage and energy costs (Hamzah and Tanwir (2021). In the case of natural dyes batik, the increase in demand is ignited due to natural

dyes batik purchase may enhance social status. Wearing natural dyes batik indicates an environmentally friendly manner, thus giving a high contribution to society. This behavior relates to the fact that wearing natural dyes batik signals to others that a person is pro-social rather than pro-self-individual. The current prevalence of environmental consciousness is characterized by "green perceived value," which is based on the consumer's environmental preferences, sustainable expectations, and green requirements (Chen and Chang (2012). Green product manufacturers should focus more on value perception by emphasizing the physical and psychological benefits of green products (Hur et al. 2013). Despite the addition of green attributes to green products in order to increase green product consumption, greenness is insufficient to encourage consumer demand for the products. As a result, it is critical for producers to recognize the needs that drive purchases. Green product purchases are linked to consumers' individual perceived values, such as increased customer satisfaction, increased customer retention, and decreased price sensitivity (Hur et al. 2013). The considerations lead to the following hypothesis.

Hypothesis 4a. Green value will positively affect producer attitude.
Hypothesis 4b. Green value will positively affect producer satisfaction.

Perceived intentions represent more normative beliefs leading to behavioral outcomes. Perceived intention is a context-specific perception that is derived from normative beliefs. Production intentions can be used to verify the application of new products in line with environmental concerns, thus helping managers define whether the concept worthy of further establishment and determining which geographic markets and consumer segments to target through the channel. Production intention is of importance in predicting actual behavior. To predict production intention, it is important to understand the social, economic, quality, and green values that ultimately generate attitudes and satisfaction. Therefore, the following hypotheses are proposed.

Hypothesis 5. Attitude will positively affect production intention.
Hypothesis 6. Satisfaction will positively affect production intention.

Methodology

Sample

Currently, data collection could be effectively carried out through web-based surveys. The empirical data for the present study were collected through Google Forms and a

paper-based questionnaire. A broadcast of the survey goals was posted for 1 week on WhatsApp groups of the batik community. Considering that most batik producers are not familiar with filling out online forms, a paper-based questionnaire was also applied. The sample criteria in this study were selected based on the provisions of those who experienced at least 1 year as a natural dye batik producer. There were 40 respondents who filled out the online form and 169 respondents who filled out the paper-based questionnaire. To avoid duplicate responses, a single IP address or email account was applied. The final sample included 209 valid responses.

Among the respondents, 32.5% were male; 90% were under the age of 50; 91% were high school graduates; and 42% had experience in producing natural dyes batik for 1–5 years. Table 1 summarizes the demographics of the respondents. The demographic profile showed that producers are mostly of productive ages and well experienced.

Measure

Measurement variables, as shown in Table 2, considered each construct used in this study. Variables were either selected or modified from previous studies. A total of seven constructs were applied. Social value was measured on four items and developed from a previous study (Hamari et al. 2020). The validated four items were used to measure economic value. The quality was also measured on four items based on previous research (Hamari et al. 2020). Then, green value was measured by five different items. Subsequently, attitude was measured using two items based on previous studies (Hsu and Lin 2016; Paul et al. 2016). Satisfaction was then measured using four items based on the previous study by Hsu and Lin (2016). Finally, production intention for natural dyes batik products was measured through four items taken from Paul et al. (2016) and Yadav and Pathak (2016). A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was applied in the questionnaire. This scale requests respondents to declare the level of strongly disagree or agree with a sequence of statements on a certain topic.

Furthermore, to find out the extent of the instrument's representation of the specific behavior to be measured, content validity was carried out prior to the data collection process. Content validity of an instrument is the extent to which the items in the instrument represent the components in the overall content area of the object to be measured and the extent to which the items reflect the behavioral characteristics to be measured (Fernandes 1984; Nunnally and Bernstein 1994). Content validity was determined using the agreement of 3 experts, 2 batik experts and 1 psychological measurement expert. To determine the content validity index based on expert agreement, the content validity index proposed by Aiken (1980) was used. Questionnaire items that have been compiled based on indicator variables was assessed by three experts by filling in a score (score 1 = not relevant; score 2 = less relevant; score 3 = quite relevant; score 4 = relevant; score 5= very relevant). The assessment results of the three experts as validators were then calculated using the Aiken V index formula, and the value was 0.89. It showed that the content validity index of the instrument used was very valid. Considering the respondents backgrounds, the questionnaire was given in Indonesian.

Descriptive statistics of the questionnaire items that are available in Table 2, including the mean values of social value, economic value, quality, green value, attitude, satisfaction, and production intention for natural dyes batik products, were quite high and relatively favorable. The mean values of the lower costs of production of natural dye batik were low compared with the other constructs at 3.622 because most producers assume production of natural dyes batik is a long process, thus requiring higher costs. All data have a standard deviation of almost 0 and show that no deviation is found in the data distribution and no outlier exists in the data. The sample perception is uniform.

Table 1 Demographic profile

Measure	Items	Frequency	Percent
Gender	Male	68	32.5
	Female	141	67.5
Age	20–24	24	11.5
	25–29	22	10.5
	30–34	38	18.2
	35–39	35	16.8
	40–44	51	24.4
	45–49	22	10.5
	>50	17	8.1
Domicile	Banten	1	0.48
	Jawa Barat	9	4.3
	Jawa Tengah	197	94.26
	Jawa Timur	1	0.48
	DIY	1	0.48
Education	High school	190	90.91
	College	5	2.39
	Undergraduate Degree	14	6.7
Experience	1–5 years	87	41.63
	6–10 years	50	23.92
	11–15 years	60	28.71
	>16 years	12	5.74
Production capacity/ month	<100 pcs	26	12.44
	101–200 pcs	27	12.92
	201–300 pcs	12	5.74
	301–400 pcs	13	6.22
	>401 pcs	31	14.83

Table 2 Descriptive statistic results

Constructs/questionnaire items	Mean	Standard deviation
Social value (SCV)		
My friends would think producing natural dye batik is a good idea (Hamari et al. 2020)	4.072	0.677
Producing natural dye batik improves the way I am perceived (Hamari et al. 2020)	3.967	0.473
Producing natural dye batik makes a good impression (Hamari et al. 2020)	4.043	0.482
Economic value (ECV)		
Production of natural dye batik needs lower costs	3.622	0.862
Natural dye batik is more marketable	3.746	0.617
Selling natural dye batik increases my income as batik craftsman	3.986	0.729
Natural dyes are less expensive	3.713	0.920
Quality (QV)		
The natural dye batik is of good quality (Hamari et al. 2020)	4.392	0.691
The natural dye batik is of well-made (Hamari et al. 2020)	4.273	0.632
The natural dye batik is long lasting	4.278	0.764
Natural dye batik has excellent colour fastness	4.364	0.808
Green value (GV)		
Natural dyes for batik dyeing generate less wastewater	4.522	0.619
Natural dyes explore local materials	4.263	0.628
Natural dyes generate harmless wastewater	4.301	0.570
Natural dyes need simple wastewater treatment facility	3.885	0.689
Attitude (ATT)		
I like the idea of producing natural dye batik (Paul et al. 2016)	4.100	0.512
I have favorable attitude towards producing natural dye batik (Paul et al. 2016)	4.091	0.523
My attitude toward producing natural dye batik is favourable (Hsu and Lin 2016)	3.895	0.769
Satisfaction (STF)		
Producing natural dye batik makes me feel very satisfied (Hsu and Lin 2016)	3.856	0.718
Producing natural dye batik gives me a sense of enjoyment (Hsu and Lin 2016)	3.995	0.786
Producing natural dye batik makes me feel very contented (Hsu and Lin 2016)	3.885	0.689
Producing natural dye batik makes me feel very delighted (Hsu and Lin 2016)	3.962	0.757
Production intention (PDI)		
I'm willing to produce natural dye batik (Yadav and Pathak 2016)	4.072	0.738
I will make an effort to produce natural dye batik (Yadav and Pathak 2016)	4.120	0.719
I will consider switching to environmental friendly materials for ecological reasons (Paul et al. 2016)	4.153	0.716
I expect to produce natural dye batik for the positive environmental contribution (Paul et al. 2016)	4.488	0.706

Tools for analysis

Data analyses were conducted using the statistical package with a graphical user interface for variance-based structural equation modeling using the partial least squares path modeling method (SmartPLS). The software was used to test the hypotheses of this study. SmartPLS was used for descriptive analysis to analyze preliminary results.

Testing of common method bias of the measurement model

Common method bias is an effort made to see the strength or size of the gap between the observed correlation and the true correlation between constructs or variables. Therefore, common method bias test in this study was objected to avoid the causes of errors in measuring or testing data. To show the issue of common method bias or not, it can be analyzed using the full collinearity test (Kock and Lynn 2012). Through this procedure, a construct model that may be contaminated by common method bias can be seen based on variance inflation factors (VIFs). VIF > 3.3 indicates pathological collinearity as well as a contaminated model by common method bias. On the other hand, VIF from the full collinearity test of greater than 3.3, the model is considered free from common method bias. Table 3 describes full collinearity test results and reveals

that latent variables have a VIF value greater than 3.3 and that no common method bias occurred in this study.

Testing of reliability and validity of the measurement model

Confirmatory factor analysis (CFA) was applied to evaluate the measurement model. The measurement model confirms the factor loadings of the seven constructs: social value, economic value, quality value, green value, attitude, satisfaction, and production intention for natural dyes batik products. Model validity and reliability verification was carried out by analyzing convergent and discriminant validities and the overall fit with data. The internal consistency of the indicators of each studied construct was examined using the most common method by determining the coefficient alpha of a given construct (Maichum et al. 2016). The loading factor showed that all items used to measure the variable are valid.

The factor loading was determined to be higher than 0.700 (Hair et al. 2009). It was found that all standardized factor loadings were significant, ranging from 0.608 to 0.922. Composite reliability measures were used to examine the construct reliability, thus assessing the extent to which items in the construct measure the latent concept. Composite reliability (CR) and the average variance extracted (AVE) contribute to the convergent validity of the CFA results (Hair et al. 2009). It was determined that the approximation of CR and AVE, which measures the amount of variance explained by the given construct, should be higher than 0.700 and 0.500, respectively (Hair et al. 2009). Table 4 shows that the CR and AVE values ranged from 0.820 to 0.946 and 0.534 to 0.814, respectively, surpassing the respective recommended levels of 0.700 and 0.500. The AVE value describes the variance or diversity of the manifest variables posed by the latent construct. Thus, the greater the variance or diversity of the manifest variables that can be contained by the latent construct leads to greater representation of the manifest variable on the latent construct. The AVE value of 0.5 represents

adequate convergent validity, which means that, on average, one latent variable is able to explain more than half of the variance of its indicators. The CFA results show that the measurement model had suitable convergent and discriminant validities. It was also revealed that the hypothesized measurement model was reliable and considerable to justify the structural associations among the constructs.

Table 5 describes the Heterotrait-Monotrait ratio (HTMT), objected to determine the correlation level of an indicator with its construct. It was shown in the table that all HTMT values <0.9 revealed that all constructs were valid with discriminant validity.

The structural equation model was arranged by smartPLS using a maximum likelihood parameter that assessed the hypothesized conceptual model of this study, as given in Fig. 2.

The results of the structural model and the standardized path coefficient represented positive effects among the constructs in the structural model are available in Table 6. Totally, eight of ten hypotheses were accepted. The positive relationship between social value toward attitude of natural dyes batik products ($\beta1 = 0.343$, $t = 4.677$) indicated that H1 was accepted. According to H2, the positive estimate of coefficients of social value and satisfaction of natural dyes batik production had significant positive effects ($\beta2 = 0.270$, $t = 3.878$); thus, H2 was accepted. The impact of economic value ($\beta3 = 0.148$, $t = 1.811$) had insignificant positive effects on attitude of natural dyes batik production and rejected H3. Economic value had an insignificant positive effect on the satisfaction of natural dyes batik production ($\beta4 = 0.024$, $t = 0.422$). Furthermore, quality value gave significant positive effect to attitude of producing natural dyes batik ($\beta5 = 0.216$, $t = 3.331$) and satisfaction ($\beta6 = 0.167$, $t = 2.537$). Green value significantly affected attitude ($\beta7 = 0.209$, $t = 2.730$) and satisfaction ($\beta8 = 0.422$, $t = 6.025$,) of natural dyes batik production. Finally, attitude ($\beta9 = 0.256$, $t = 3.690$) and satisfaction ($\beta10 = 0.541$, $t = 9.151$) of natural dyes batik production showed significant positive influences on production intention of natural dyes batik.

Table 3 Result of full collinearity test

	ATT	ECV	GV	PDI	QV	SCV	STF
ATT				1.702			
ECV	1.487						1.487
GV	1.609						1.609
PDI							
QV	1.404						1.404
SCV	1.491						1.491
STF				1.702			

Table 4 Reliability and validity of the constructs

Constructs/questionnaire items	Question item	Standardized factor loading	Composite reliability	Average variance extracted
Social value (SCV)				
	SCV1	0.796	**0.864**	**0.679**
	SCV2	0.849		
	SCV3	0.827		
Economic value (ECV)				
	ECV1	0.656	**0.827**	**0.547**
	ECV2	0.832		
	ECV3	0.792		
	ECV3	0.662		
Quality (QV)				
	QV1	0.808	**0.847**	**0.581**
	QV2	0.717		
	QV3	0.812		
	QV4	0.707		
Green value (GV)				
	GV1	0.608	**0.820**	**0.534**
	GV3	0.794		
	GV4	0.759		
	GV5	0.749		
Attitude (ATT)				
	ATT1	0.847	**0.844**	**0.646**
	ATT2	0.856		
	ATT3	0.698		
Satisfaction (STF)				
	STF1	0.922	**0.946**	**0.814**
	STF2	0.884		
	STF3	0.921		
	STF4	0.882		
Production intention (PDI)				
	PDI1	0.894	**0.886**	**0.663**
	PDI2	0.919		
	PDI3	0.754		
	PDI4	0.663		

*Factor Loading > 0.5

**Composite Reliability > 0.7

*Average Variance Extracted > 0.5

Table 5 Heterotrait-Monotrait ratio (HTMT)

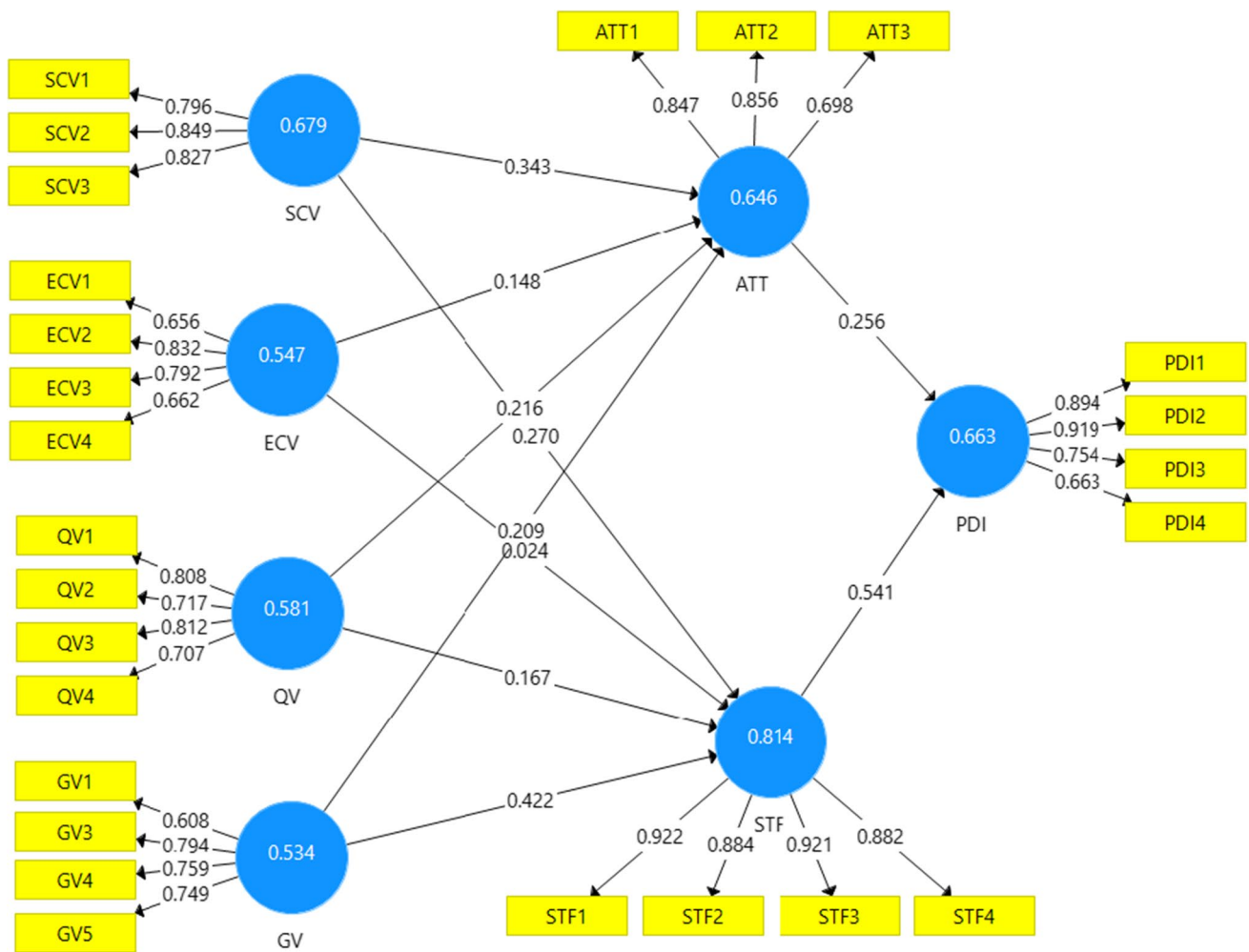|	ATT	ECV	GV	PDI	QV	SCV	STF
ATT							
ECV	0.549						
GV	0.704	0.497					
PDI	0.737	0.599	0.712				
QV	0.503	0.721	0.521	0.733			
SCV	0.699	0.304	0.770	0.578	0.234		
STF	0.795	0.366	0.757	0.751	0.345	0.644	

Fig. 2 Standardized factor loading

Table 6 Hypotheses' result for the structural model

		Path coefficient	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
H1	SCV ➔ ATT	0.343	0.071	4.812	0.000
H2	SCV ➔ STF	0.270	0.066	4.075	0.000
H3	ECV ➔ ATT	0.148	0.078	1.896	0.059
H4	ECV ➔ STF	0.024	0.057	0.421	0.674
H5	QV ➔ ATT	0.216	0.063	3.455	0.001
H6	QV ➔ STF	0.167	0.066	2.528	0.012
H7	GV ➔ ATT	0.209	0.071	2.940	0.003
H8	GV ➔ STF	0.422	0.067	6.342	0.000
H9	ATT ➔ PDI	0.256	0.072	3.578	0.000
H10	STF ➔ PDI	0.541	0.063	8.587	0.000

Results and discussion

This study investigated the extended framework of the perceived model, in which social value, economic value, quality value, and green value are added as antecedents of attitude and satisfaction with natural dyes batik production. The purpose was to examine Indonesian natural dyes batik producers on the production intention of natural dyes batik products. The result recommended that producers' intention for this group to produce natural dyes batik products can be predicted by social value, economic value, quality value, green value, attitude, and satisfaction. A detailed discussion of each factor is given below.

First, there were positive relationships between **social value toward attitude** and **satisfaction** of producers in producing natural dyes batik. Producers would have a positive attitude and satisfaction toward producing natural dyes batik when they have a high level of social value. Perceived impression of natural dyes batik production as well as the image as environmental care people are good motives in producing natural dyes batik. Producers would satisfy and enjoy the process of natural dyes batik production. A different trend was obtained by Hamzah and Tanwir (2021), in which subjective norms insignificantly affected purchase intention. This is due to the consumers' social network, involving co-workers and fellow as well as relatives gave insufficient effect in determining their compliance to purchase the product. Another reason is their social influencers are not entirely knowledgeable of the advantages of applying pro-environmental behavior. Similarly, no significant relationship between social value and behavioral intention to consume organic products was found. That is, taking organic products does not result in perceived social recognition or social image enhancement (Qasim et al. 2019).

Second, **economic value significantly defined attitude** but **insignificantly determined producer satisfaction** with producing natural dyes batik. The belief in low production costs and more marketable products leads to the higher level of producing natural dyes batik attitude. Moreover, the exclusivity of natural dyes batik products may enhance sales, thus, in turn, increasing profits. The low production costs gave an impact on the lower selling price. As a result, producers have a favorable attitude toward the resulting products. Producers are currently more environmentally aware of the hazard of textile dyes and chemical agents used in the conventional dyeing process. Their awareness is able to increase their responsibility to protect the environment through the use of natural dyes to minimize environmental pollution. This is in accordance with the finding of Qasim et al. (2019) that economic value is among the performance factors

assessed by consumers. They tend to purchase premium, costly products as long as the products provide a high return. On the other hand, despite their responsible attitude toward the environment, producers are not satisfied with the results obtained, especially during the Covid-19 pandemic. Sales of natural dyes batik tend to fall during the pandemic because people prioritize daily necessities over natural dyes batik products. This is supported by the fact that inflation was around 0.07% in May 2020, indicating a decline in people's purchasing power (Yuniarti et al. 2021). Producer profits are affected by the decline in purchasing power.

Third, **producers' attitude and satisfaction are also affected by quality value**. Natural dyes batik products generated at premium quality could improve the favorable attitude of producers. They could get more ideas to sustainably produce good batik products by maintaining superior quality. A confident attitude leads to a better comprehension toward the utility of technology, thus inducing a tendency to apply these technologies. Producers who exhibited conviction about applying and learning technologies and perceived a net gain from applying these technologies indicated a higher trend to use accurate agriculture technologies (Adrian et al. 2005). According to a previous study, every producer has nearly the same attitude, believing that good production methods result in high-quality products (Verbeke et al. 2005). Furthermore, producing excellent quality of natural dyes batik, in terms of long lastness, good color fastness, as well as well-made products, enhances producers' satisfaction. Producer satisfaction plays an important role in determining the success of natural dyes batik production. Producers' satisfaction is also of importance in determining the growth and future success of natural dyes batik industries. This is due to the fact that the quality and focus of production in meeting customer demands have a direct impact on customer satisfaction, which in turn will form a long-term bond of mutual trust (Thielemann et al. (2018), Govindasamy et al. (2003), Mutonyi et al. (2016).

Fourth, the study found that **green value significantly determined producer attitude and satisfaction**. The facts that natural dyes batik production generates less and harmless wastewater lead to a positive attitude, thus very helpful in achieving their goals. They could continue producing natural dyes batik without worrying about the negative impact on the environment. The negative impacts toward the customer body as well as the surrounding environment by the production of natural dyes batik are negligible. In terms of satisfaction, the pro-environment facts of natural dyes batik induce producers' contentment. The other facts are the employment of unused natural resources and local material in the production of natural dyes batik. This selection causes an attitude of pride and satisfaction for producers.

Finally, **attitude and satisfaction were found to give significant positive impacts on production intention** of natural dyes batik products. Satisfaction had the most significant influence on producers' production intention, which reveals that satisfaction was the strongest predictor of production intention of natural dyes batik products followed by attitude. The overall results assured that the perceived model and its behavior were suitable for the investigated group. This study's findings support previous studies that higher positive consumer attitudes toward environmentally friendly product purchase behavior result in stronger consumer intentions to implement a behavior under their control (Ajzen (2015), Tommasetti et al. (2018), Maichum et al. (2016). Although, in some cases, consumer motives for pro-environment attitudes and loyalty to sellers are not triggered by positive attitudes toward purchasing environmentally friendly products (Hamzah and Tanwir 2021; Ruiz-Molina and Gil-Saura 2008).

Theoretical implications

Indonesia, as a tropical country, provides abundant types of natural resources having the potential to be applied as natural dyes. Although the application of natural dyes has been widely investigated, research on producers' intention toward natural dyes batik has not been found yet. Previous research was limited to the relationship exploration of green subjective standards, awareness of green products, and attitudes toward green purchasing intentions through the Internal Environmental Control Locus (INELOC) between craft shopping tourists in the Batik town of Pekalongan (Sunarjo et al. 2021). This research was driven by curiosity and the desire to expand knowledge in the producers' intention area. It is believed that it gives a specific contribution to the academic body of knowledge in the research area of natural dyes batik producer intention.

In the field of natural dyes batik, studying producers' intentions, this research confirms the role of the theory of planned behavior in the acceptance of natural dyes. This study confirms the appropriateness theory of planned behavior in understanding producers' intention toward natural dyes batik production in Indonesia. This model has demonstrated the applicability of the approaches, in which social value, quality value, economic value, and green value all have a direct effect on attitude and satisfaction. Meanwhile, attitude and satisfaction have a direct impact on production intention.

Practical implications

Adopting natural dyes batik not only increases producers' income but also protects the environment by avoiding harmful chemicals. Becoming popular in Indonesia, natural dyes batik is promoted by many government policies. To increase the intention of adopting natural dyes batik production, the government must gain access to factors that influence producers' intentions and ethical aspects. Based on the research results of factors affecting producers' intention toward natural dyes batik production in Indonesia, the following suggestions are given.

1. Raising awareness among producers about the importance of natural dyes in batik, as well as the health and environmental consequences of not using natural dyes. This study was based on the relationship between the factors in planned behavior and the relationship between producer attitude and satisfaction with their intentions. The values of the consequences of natural dyes application were shown to have a direct and indirect positive effect on the ethical perception of applying or not applying natural dyes through the belief of responsibility.

   Satisfaction will positively affect producers' intention toward natural dyes batik production in Indonesia. Besides, producers' intentions would also be affected by attitude.
2. Communicating to producers via various means about the benefits of natural dyes over synthetic dyes on the health of producers and customers.
3. Forming information spillover groups between craftsmen who have developed natural dyes batik and those who have not. Those who have not previously practiced natural dyes batik will be given precise and practical information on the benefits of natural dyes, forming natural dyes intentions. The exchange of information among these craftsmen will influence their attitudes.

Conclusion

Production intention of environmentally friendly fashion products has been evaluated successfully. This work focused on the natural dyes batik producers in Indonesia. The results showed that production intention was affected significantly by the producers' attitude and satisfaction. In the meantime, the attitude and satisfaction of the producer were highly influenced by social value, quality value, and green value parameters. Economic value, however, provided a contribution to the producer's attitude, but insignificantly contributed to the producer's satisfaction. Overall, production intention of natural dyes batik was strongly predicted by satisfaction and also determined by attitude. The results of this study support in enhancing the concept of natural dyes batik production, which also provide an important role toward sustainable production.

The current research has some limitations that need further investigation in the future. The study only focused on producers' intention toward natural dyes batik in some areas

of Central Java; the findings are therefore not generalizable to all batik craftsmen in the country. Therefore, future studies should include producers from different areas. The use of intentions instead of actual behavior is another limitation of this study; thus, future studies need to investigate the impacts of factors in the model on natural dyes batik production implementations. The results on the difference and characterization of the demographic variables such as gender, age, domicile, education level, experience in batik production, as well as the annual capacity of batik production should be taken into account that how they impact the intention toward natural dyes batik production in the next studies.

Declarations

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