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Measuring Risk Factor Analysis Using PCA Method In Batik Businiess (Case Study: SMEs Batik Cirebon)

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Abstract. The number of business units that sell Batik creates a very high level of competition so that they are required to find alternatives or solutions to be superior to competitors. In addition, it is also necessary to manage business risks and pay attention to factors that support the risk of the Batik fashion business they are running. The purpose of this study was to determine and categorize the main factors supporting the risk of fashion Batik business in Cirebon. This study uses 15 initial variables of Batik fashion business risk which will be tested by means of factor analysis. The method used is Principal Component Analysis (PCA) with SPSS software. Data collection techniques using questionnaires and interviews. The sample used was 50 random respondents in the Batik fashion business unit in Cirebon. Four main factors were obtained from the variables that have been identified in the risk of Cirebon Batik fashion business. Factor 1 is called operational factors, factor 2 is called financial factors, factor 3 is called strategic factors, and factor 4 is called external factors.

Keywords: Business Risk, Fashion Batik, PCA

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1. Introduction

There are 16 sub-sectors of the creative industry according to BEKRAF including game application and development, architecture, product design, fashion, interior design, visual communication design, performing arts, film, animation, and video, photography, craft, culinary, music, advertising, publishing, fine arts, television and radio. The Head of the Creative Economy Agency (BEKRAF) said, by looking at the facts and data there are at least three sectors that are very influential in this growing creative industry. The three sectors include fashion, culinary, and craft [1]. Based on survey results from BEKRAF and BPS, it shows that the fashion industry has an influence on the creative economy of 18.15%, which is the second highest of any sector [1].

Fashion is a "cross-cutting concept" that includes several industries, such as apparel, footwear, leather, jewelry, perfume and cosmetics [2]. Setting up a fashion business is not easy, there are several considerations and things that need to be prepared. Fashion business owners must be prepared to face all the events that exist. Business risk in the company is an uncertainty that can cause losses to the company [3] so that research needs to be done to find out and categorize the main factors that support the success of a business [4]. But in reality, fashion business owners pay less attention and readiness in facing events or risks that can come at any time. Inevitably, the business they run goes out of business. This is because fashion is included in the fast moving industry where the product life cycle is short, market demand is changing, difficult to predict, and the level of competition is high [5], even though the fashion business in Indonesia can affect the level of Gross Domestic Product (GDP).

The Cirebon batik small and medium industry (IKM) has grown rapidly in the last 10 years or so, this can be seen from the increasing number of batik businesses in Cirebon Regency. Based on data from the Cirebon Regency Disperindag, in 2014 alone there were 530 business units with a total workforce of 4,410 people. Currently, Cirebon batik is not only marketed to the domestic market but also to the international market. The ease of exporting goods and services allows products from abroad to easily enter Indonesia. If this is not properly anticipated, it will pose a threat to the sale of batik products. That way it is required to find alternatives or solutions to be superior to competitors. In addition, batik entrepreneurs also need business risk management or risk management and pay attention to the factors that support the risk of the batik fashion business they are running.

The first stage in the risk management process is the risk identification stage [6]. Risk identification is a process that is systematically and continuously carried out to identify possible risks or losses to the company's wealth, debt, and personnel. The second stage is risk analysis and evaluation and the third stage is a response or reaction to overcome the risk [7]. Basically, risk management is concerned with the means used by a company to prevent or overcome a risk faced [8].

Seeing the brief discussion above, a study was conducted on the factor analysis of Batik business in Cirebon with the aim of knowing and grouping the main factors supporting the risk of Batik fashion business in Cirebon using the factor analysis method.

2. Methods

This research was conducted at Central Batik Trusmi Cirebon in October 2020. By using 50 random samples to the perpetrators of the Cirebon Batik Trusmi business unit through interview techniques and distributing questionnaires to experts or business unit actors.

Interviews conducted with experts regarding factors that support business risk, especially in fashion batik. Table 1 shows the variables that support the business risk of fashion batik:

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Table 1. Business Risk Support Variables

The variables that make up factors
Suppliers
Difficult to predict demand
Quality and production standards
Not innovative
Loss of income
Late paying rent
Difficult to determine market prices
Rising raw material prices
The level of customer satisfaction decreases
Consumer model interest changes
Competitors issue a lot of new products
High competitors
Competitors follow the output model
Loss of the market
Less market widespread

The data analysis method used in this research is the factor analysis technique. Factor analysis is a data reduction technique, which reduces the excess of variables and groups a large number of variables into a small number of homogeneous sets and creates a new variable that represents each set into a smaller or simpler part. Observed variables are called manifest variables, while shared factors are referred to as latent variables [9].

The procedures for conducting factor analysis include:

1. Conduct data standardization, validity, and reliability
2. Finding the eigenvalue of the correlation matrix (R)
3. Determine the main component of the eigenvalue.

Factor analysis has 2 types of methods that can be used, namely principal component and principal axis [10]. In principal component the amount of variation in the data contained in all indicators is considered. Principal component aims to determine the least number of factor extractions but absorbs as much information as possible contained in all indicators or accounts for most of the variance of all indicators. While the principal axis is appropriate if the main purpose of factor analysis is to identify the underlying dimensions using the variance matrix between factors. Factor analysis also has two types of analysis that can be used to determine the factor extraction of the indicators tested, namely confirmatory and exploratory [11]. In confirmatory factors that will be generated are predetermined. As well as by considering the number and which indicators are related to the factor. While exploratory the number of factors produced is not determined at the beginning of testing, so that indicators related to factors can be known after testing is carried out.

There have been many previous studies on factor analysis, especially on principal components. In the banking world in China, the principal component was conducted to examine the comparison of five popular systemic risk ratings where the results of the principal component provided a stable systemic risk rating [12]. Principal components can also be demonstrated using the partial least squares (PLS) method to examine the statistical effects of the intrinsic characteristics of perovskite and inverse perovskite on their stability [13].

3. Results and Discussion

3.1 Quistionnaire Testing

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3.1.1 Validity Test

The validity test is used to measure whether a questionnaire is valid or not [14]. The validity test shows the extent to which a measuring instrument is valid in measuring the variable being measured. The results of the validity of the questionnaire with Pearson's product moment correlation with a significance level of 5% show that all $r_{count} > r_{table}$ values are 0.2787. So that a positive correlation is obtained between each questionnaire item score and the total score of all questions in the questionnaire and it can be concluded that the instrument used is valid.

3.1.2 Reliability Test

Reliability test is a test of the reliability of measuring instruments to determine the extent to which a measurement can provide the same results when measured again on the same subject, as long as the aspects measured in the respondent do not change. The reliability testing technique used is Cronbach's Alpha, which is a coefficient that describes how well the items in a set correlate positively with each other [15]. The results of the reliability test with the Cronbach's Alpha coefficient obtained an α value of 0.618, which means it is greater than the r_{tabel}, which is 0.6. These results indicate that the questionnaire used is a consistent and reliable measuring tool.

3.2Data Analysis

3.2.1Bartleet's and KMO's Test

A small KMO value indicates that factor analysis is not the right choice. To be able to do factor analysis, the KMO value is considered sufficient if it is greater than or equal to 0.5. The figure below shows that sig < than α where the sig value in the table is 0.000 < 0.05. So that the variables are correlated and can be processed further.

Table 2. KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,516
Bartlett's Test of Sphericity	Approx. Chi-Square	191,723
	df	105
	Sig.	,000

3.2.2Measure of Sampling Adequency (MSA) Test

Each variable that has an MSA value below 0.5 must be removed and the MSA test is repeated without following the variable that is less than 0.5. After the variables that do not meet the MSA requirements are removed one by one, a variable is formed that has a loading value> 0.5.

Table 3. Anti Image Correlation

Variable	MSA Value	Minimum Standard Value
Supplier inaccurate (X_1)	0,709	0,5
Difficult to predict Demand (X_2)	0,700	0,5
Not innovative (X_4)	0,543	0,5
Loss of income (X_5)	0,663	0,5
Late paying rent (X_6)	0,543	0,5
Difficult to determine market prices (X_7)	0,709	0,5
Increasing Raw Material Prices (X_8)	0,680	0,5
Competitors released many new products (X_{11})	0,711	0,5
High competitors (X_{12})	0,705	0,5

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Competitors follow the output model (X_{13})	0,619	0,5
Less market widespread (X_{15})	0,628	0,5

3.3Principal Component Analysis Method (PCA)

The eigenvalue is the sum of the variances of the factor values. It can be seen in the figure below that there are 4 factors formed. In determining a group of variables that deserve to be formed as a factor, the criterion is based on the eigenvalue > 1. The four factors contribute a cumulative percentage of 58.109%, which means that the four factors can explain the variables that play a role in the risk of Cirebon Batik fashion business.

Tabel 4. Eigenvalue, % Variance, Cumulative %

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,758	18,385	18,385	2,758	18,385	18,385	2,110	14,064	14,064
2	1,962	13,078	31,463	1,962	13,078	31,463	2,003	13,356	27,421
3	1,652	11,013	42,475	1,652	11,013	42,475	1,613	10,751	38,172
4	1,358	9,054	51,530	1,358	9,054	51,530	1,600	10,667	48,839
5	1,316	8,776	60,306	1,316	8,776	60,306	1,531	10,204	59,043
6	1,117	7,448	67,754	1,117	7,448	67,754	1,307	8,710	67,754
7	,935	6,235	73,989						
8	,823	5,487	79,476						
9	,717	4,782	84,257						
10	,648	4,320	88,577						
11	,556	3,704	92,281						
12	,448	2,990	95,271						
13	,365	2,431	97,702						
14	,269	1,795	99,497						
15	,075	,503	100,000						

Extraction Method: Principal Component Analysis.

The amount of contribution of each factor to the risk of Cirebon Batik fashion business can be seen from the variance value of each factor. The factor that has the highest variance value is the factor that has the highest role in the risk of Cirebon Batik fashion business. In this study, the first factor is a factor that has the highest role in the risk of Cirebon Batik fashion business with a variance value of 24.288%.

There is a graph that explains the results of determining the number of factors, the graph can be seen in the **figure 1**. scree plot image. In **figure 1**. scree plot, it can be seen that point 1 to point 2 has a sharp difference in distance. This means that the correlation between factor 1 and factor 2 is much different, for point 2 to point 3 and point 4 there is a difference in distance that is not much different. So these 4 factors can explain 11 variables.

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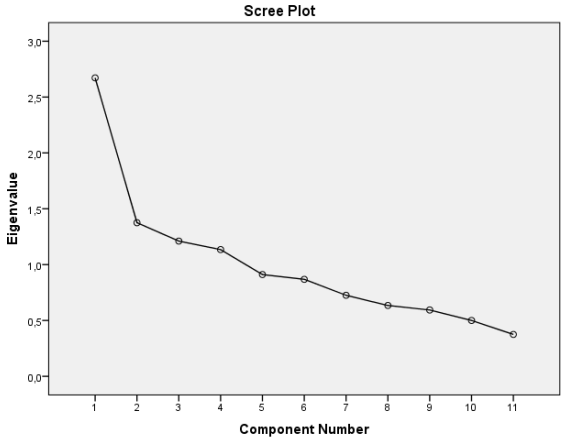

Figure 1. Scree Plot

3.4 Factor Rotation

Factor rotation aims to get factors with loadings that are clear enough for interpretation. Because in these factors many variables are correlated so it is difficult to interpret. In this study using varimax rotation. Varimax rotation aims to minimize variables by looking at factor loading. The higher the loading value means the closer the variable relationship to the factor. In this study, variables that have factor loading above 0.30 are included in one factor. **Table 5**. is a factor grouping of rotation results.

Table 5. Group of Rotation Factors

Variable	Factor Group			
	1	2	3	4
X_1	**0,603**			
X_2	**0,648**			
X_4				**0,835**
X_5		**0,683**		
X_6			**0,778**	
X_7			**0,744**	
X_8	**0,617**			
X_{11}	**0,671**			
X_{12}	**0,622**			
X_{13}		**0,664**		
X_{15}		**0,547**		

3.5 Factor Matrix Interpretation

After the formation of factors, each of which consists of the variables under study. These variables are grouped and named, where the name of the factor depends on the variables that make it up. So that this naming is subjective and there are no definite provisions regarding the naming. Factor naming is explained as follows:

a. Factor 1 is Operational

Factor 1 is named operational because the variables that represent it consist of X_1 = supplier uncertainty, X_2 = difficult to predict demand, X_8 = rising raw material prices, X_{11} = competitors issue many new products, X_{12} = high competitors. Factor 1 has a variance value of 24.288%. Factor 1 is named operational because it looks at the variables formed by factor 1 itself, besides that operational risk is included in the risk of production processes, products, human resources, and technology [16].

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b. Factor 2 is Finace
Factor 2 is named finace because the variables that represent it consist of X_5 = loss of income, X_{13} = competitors follow the output model, X_{15} = less widespread market. Factor 2 has a variance value of 12.502%. Factor 2 is named finance because it looks at the variables formed by factor 2 itself, besides that, the risk of finance is about financing both at market prices and in terms of company operations [16].

c. Factor 3 is Strategy
Factor 3 is named strategy because the variables that represent it consist of X_6 = late payment of rent, X_7 = difficulty determining market prices. Factor 3 has a variance value of 11.006%. Factor 3 is named strategy because it looks at the variables formed by factor 3 itself, besides that the strategic risk is included in the company's business strategy [16].

d. Factor 4 is External
Factor 4 is named external because the variables that represent it consist of X_4 = Not innovative. Factor 4 has a variance value of 10.313%. Factor 4 is named external because it looks at the variables formed by factor 4 itself, besides that, external risks include reputation, environment, and competitors [16].

4. Conclusion

This study aims to determine and categorize the main factors supporting the risk of Batik fashion business in Cirebon. Based on the results and discussion that has been done, there are 15 risks identified in the Batik fashion industry business in Cirebon. Through the principal component method based on eigenvalue, the risk variables of Cirebon Batik fashion business were extracted into risk factors of Cirebon Batik fashion business. The formation of factors must fulfill the factor analysis procedure, the first is the selection of variables using KMO and Bartlett's test, MSA. For the formation of the factor itself includes cumulative determination and determination of the number of factors. The criteria for determining the cumulative by looking at the cummunality value where all the initial tables are worth 1, this means that before extraction, the variable 100% forms the factor itself. While the criteria for determining the number of factors uses an approach based on eigenvalue, extraction value, and scree plot. After that, rotate the factors where the factors formed have an eigen value greater than one. Determination of variables on factors is indicated by a large pattern loading greater than 0.30 which is then entered into one factor. Finally, interpret the results of factor analysis based on the significance of factor loading and factor naming. From the research that has been done, 11 variables are formed with 4 factors that have an eigen value greater than one.

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