Product Design and Process Design That Influence the Quality of Shirt Products

Dudi Haryadi*[1], Ilham Fauzan[1]
Universitas Langlangbuana, Indonesia[1]
*Coresponding Email: haryadidudi@unla.ac.id

Abstract:
Clothing is no longer just a common thing, but also requires aesthetics and attractive designs that can increase the wearer's confidence. Along with the development of the times, people are increasingly selective in choosing products. The clothing industry must take advantage of this opportunity by continuing to innovate in creating new, unique and high-quality clothing models, in order to meet market needs and compete well. This study aims to measure the level of product quality produced due to the influence of Product Design and Process Design on the Quality of Shirt Products at PT.Nirwana Indo Apparell. This research was conducted with a quantitative approach. The methods applied are descriptive and verification analysis. Data were collected through company data, literature studies and distributing questionnaires to 60 respondents and their calculations using the SPSS 26 program. Data analysis was carried out using the path analysis method. Based on the results of the study, it was found that product design is included in the fairly good category, process design is included in the fairly good category, and product quality is also included in the fairly good category. In addition, Product Design also has an influence on product quality, as well as process design which affects product quality. Overall, product design and process design simultaneously affect product quality.

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INTRODUCTION

The clothing industry in Indonesia has experienced rapid growth, driven by high demand, especially on certain big days. Although it had recorded significant growth, the industry faced major challenges in the first quarter of 2023, where textile export performance declined drastically, especially in certain subcategories such as textile fibers and knitted fabrics. This decline was influenced by unstable global economic conditions and the threat of recession. To remain competitive, companies must continue to innovate, creating products with attractive designs and high quality, to meet the increasingly selective tastes of consumers.

Companies are required to be able to produce high-quality products. Therefore, in order to produce good product quality, it is necessary to pay attention to factors such as product design and process design because these factors can help companies improve product quality and provide smoothness in the company's production process. PT.

Nirwana Indo Apparel, a garment company located on Jl. Ciganitri, Lengkong, Kec. Bojongsoang, Bandung, faces major challenges in improving the quality of its products, especially men's and women's shirts. The main problems faced are product defects, such as material defects, holes, and stains, as well as product designs that do not match consumer demand and are considered less unique. In addition, the lack of careful planning in product design and production processes, including irregular machine layouts, inexperienced operators, and incorrect product planning, also affect quality.

The following is data on PT. Nirwana Indo Apparell's Defective Products on one shirt order project within a period of 6 months (March - August 2023):

Table.1 Defective Product Data PT. Nirwana Indo Apparell

Month	Production Quantity (units)	Defect Type (Units)			Number of Defective Products (Units)
		Fabric (Material)	Hole	Dirty Stains	
March	4.160	24	35	25	84
April	4.000	40	50	30	120
May	4.170	63	42	21	126
Juny	5.000	100	150	25	275
July	4.100	54	60	50	164
August	3.900	42	62	52	156
Total	25.330	323	399	203	925

Source: Company Data Defective Products PT. Nirwana Indo Clothing (2023)

From Table 1 above, it can be concluded that in the 6-month period (March-August 2023) there were several errors in the product manufacturing process that caused defective products. From the 6 months, each month produced unstable defective products, there was an increase in March to June and a decrease in defective products in July and August. Of course, the three defective products have a negative impact on the company. According to the company's management, products that do not meet the expected standards can result in replacement costs or returns of defective products which can increase the company's operating costs. Thus disrupting the company's financial performance, in addition, defective products can result in customer disappointment, which can ultimately affect customer loyalty and trigger a decline in sales.

Success in improving good product quality has a crucial role in the success of the company is to maintain high quality, so that every product produced meets the desired standards can obtain satisfactory product quality. Directly product quality and product design have a significant relationship, the quality of the product produced is influenced by good product design. In addition, planning in the production process must also be considered in order to achieve a smooth process that can minimize obstacles by considering all aspects, one of which is process design, a good and structured process and adequate supporting facilities can produce good product quality.

Product design is the activity of designing a product by selecting materials that will be processed and produced into products or goods that are more valuable and useful. According to Imam Djati Widodo in Sidadari (2020), "Product design is a systematic approach to integrating product planning." Product design is to reduce damage to the product. Good product design can produce high-quality products, according to customer needs, and can be produced efficiently. In order to produce products that are in accordance with the design and of good quality, several things need to be considered.

also the manufacturing process, namely process design. Process design is a company activity from the beginning of receiving the design then poured into the raw materials and then processed into finished products. Process design is related to decisions in managing production methods that involve humans, materials and certain equipment (Stevenson & Reid & Sanders, 2022:26). It can be concluded that process design is a series of production activities that apply design concepts in the production process by utilizing efficient human resources and equipment. The goal is to produce high-quality products that meet customer needs. Poor product quality is caused by planning in the production process that is not carried out systematically. According to Heizer and Render (2023), product quality is the ability of a product to fulfill its function. It can be concluded that product quality is the ability of a company to produce goods or services that have high value and product quality.

To produce quality products, the influencing factors are product design and process design. Which has been conducted previously by Ilham Fadillah 2023 "The Influence of Product Design and Process Design on Product Quality (Survey on Employees of PT. Wijaya Agape Tasikmalaya)" where the study showed that good product design has a major influence on product quality. Elements such as aesthetics, functionality, and usability play a role in increasing consumer perceptions of quality. In addition, efficient process design also supports product quality. Organized and standardized processes help reduce errors and increase product reliability. This study provides deeper insight into the importance of product design and process design in achieving the expected quality.

This shows that product design and process design are expected to influence and produce good product quality if the implementation is carried out as optimally as possible. Therefore, in relation to the background and problems that occur in the company. The author is interested in conducting research which is poured into a thesis entitled Product Design and Process Design That Influence the Quality of Shirt Products at PT. Nirwana Indo Apparel (survey on production employees).

METHODS

This study combines descriptive and verification methods with a quantitative approach. Descriptive methods are used to describe the characteristics of phenomena accurately and systematically. Meanwhile, verification methods are used to test hypotheses through empirical data collection and statistical analysis. With this combination approach, the study is able to provide a comprehensive picture of the phenomena studied, as well as findings that can be validated empirically. This study aims to measure the value of each existing variable and test the influence of product design and process design applied by PT. Nirwana Indo Apparell.

In this study, there are two types of data used, namely primary data and secondary data. Primary data is obtained directly from the company through interviews, questionnaires, or observations. This data is collected directly in the field, namely at PT. Nirwana Indo Apparell, by involving interviews with various related parties such as leaders and employees in the production department. In addition, primary data is also taken from company data and respondents who are the research samples, namely employees of the production department of PT. Nirwana Indo Apparell. The data collection method is explained in detail, and this study also utilizes secondary data obtained from various other literature to support the results of the analysis.

This study uses the census method because the population studied was only 60 people, less than 100. Census, or total sampling, is a technique in which all members of the population are sampled. According to Sugiyono (2022), if the population is less than 100 people, the census method should be used, in which all members of the population

act as research subjects or respondents. The selection of this method aims to ensure the involvement of all members of the population in the study, so that the data obtained is more accurate and representative. Thus, each individual in the population has an equal opportunity to contribute information without any being missed.

The method applied in this study is path analysis. The aim is to explain the influence, both directly and indirectly, between the independent variables and the dependent variables with the intention of revealing the cause and effect relationship. According to Sugiyono (2022), path analysis is carried out using correlation and regression, so that it can be known up to the last dependent variable and must be through a direct path or intervening variable. This method allows research to test cause-and-effect relationships based on theoretical proportions. Path analysis can be used in various fields, This method can be implemented using various statistical software such as SPSS.

Path analysis aims to understand the influence of a variable on another variable, for example the influence of X1 and X2 on Y. In this analysis, each independent variable (X1 and X2) is measured for its impact on the dependent variable (Y) in order to obtain a comparative picture of how much influence each variable has. Path analysis is usually depicted in the form of a path diagram that shows the relationship between variables. If the method used refers to standard procedures, then the literature or methodological references must be mentioned. Research using path analysis is generally quantitative in nature with the aim of testing hypotheses related to causal relationships between variables. Research subjects usually consist of individuals, groups, or institutions that are relevant to the research topic, while the objects of research are the variables being measured. The time and location of the research vary according to the context of the study being conducted. Sampling can use probability or non-probability techniques, depending on the purpose and population of the study. Data are collected through questionnaires, interviews, or other appropriate data collection methods, then analyzed using statistical techniques, including path analysis, to identify relationships between variables.

RESULTS AND DISCUSSION

The researcher will present the research results based on data collected from 60 respondents using quantitative methods. The analysis was conducted through descriptive and verification approaches. After the data was collected through a questionnaire, descriptive analysis was used to understand how respondents responded to the variables studied. Meanwhile, verification analysis aims to determine the relationship between these variables.
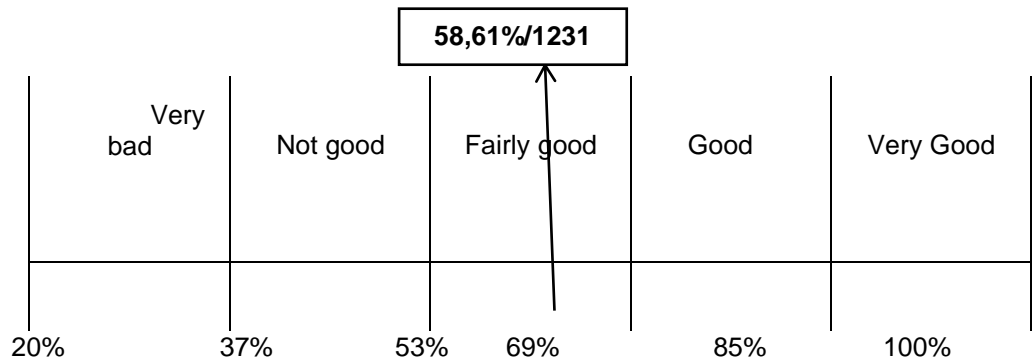
Descriptive Research Results

		58,61%/1231		
Very bad	Not good	Fairly good	Good	Very Good

20%   37%   53%   69%   85%   100%

Figure 1. Product Design Continuum Line
Source: Processed data (2023)

Based on the data, the actual score for the product design variable is 1231 with a percentage of 58.61%. This percentage indicates that the value is in the category of "quite good." In other words, the results of the assessment of the Product Design variable at PT. Nirwana Indo Apparell indicate that the implementation and management in efforts to realize product design in the company are at a "quite good" level.
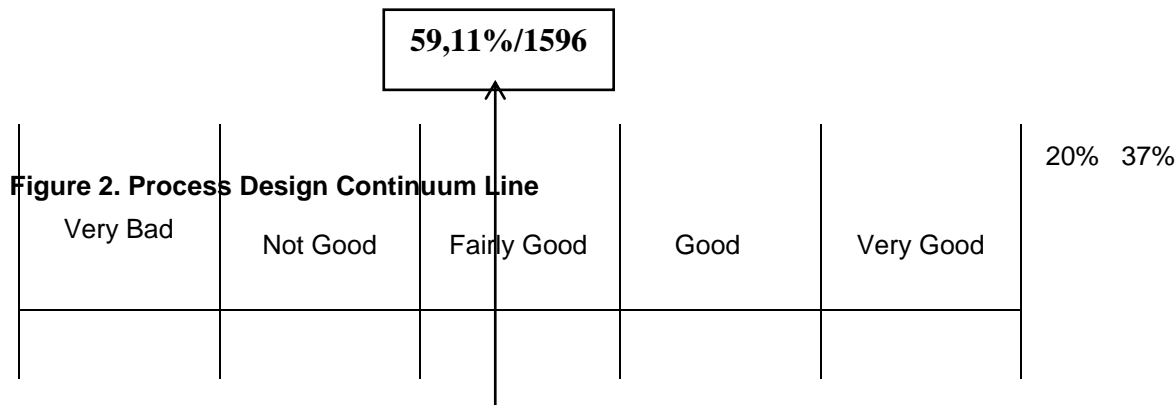
59,11%/1596

20% 37%

Figure 2. Process Design Continuum Line

Very Bad	Not Good	Fairly Good	Good	Very Good

Figure 1. Process Design Continuum Line
Source: Processed data (2023)

Based on the data, the actual score for the Process Design variable is 1596 with a percentage of 59.11%. This percentage indicates that the value is in the "quite good" category. In other words, the results of the Process Design variable assessment at PT. Nirwana Indo Apparell indicate that the process design implementation efforts in the company are at a "quite good" level.
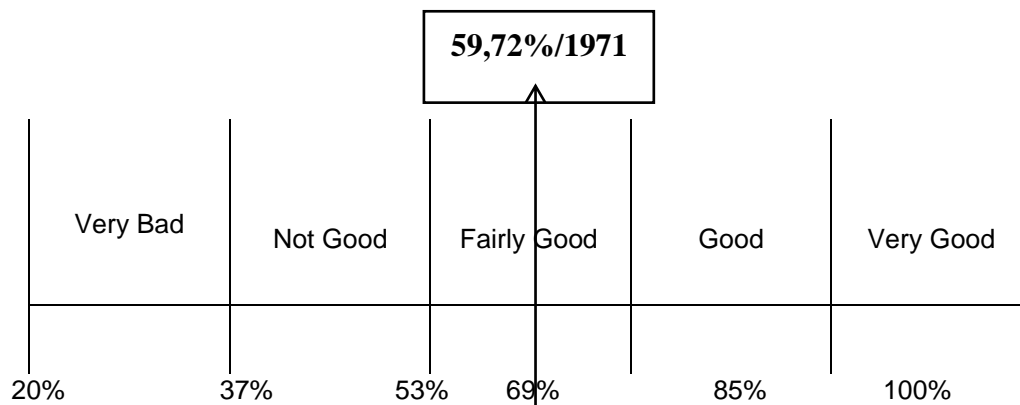
Figure 3. Product Quality Continuum Line
Source: Processed data (2023)

Based on the data, the actual score for the Product Quality variable is 1971 with a percentage of 59.72%. This percentage indicates that the value is in the category of "quite good." In other words, the results of the assessment of the Product Quality variable at PT. Nirwana Indo Apparell indicate that efforts to improve product quality in the company are at a "quite good" level.

Verification Research Results

Verification analysis is used to test the hypothesis and determine the effect of independent variables on the dependent variable. After collecting data from the questionnaire using an ordinal scale (Likert scale) obtained from the respondents' answers, the data is converted into an interval scale using the Interval Method (Method of Successive Interval or MSI). Verification analysis is then used to test the hypothesis to determine the extent to which Product Design (X1) and Process Design (X2) affect Product Quality (Y) using the path analysis method.

Correlation Coefficient Analysis

The results of the Pearson correlation coefficient calculation using SPSS version 26 are as follows:

Table 2. Correlation Coefficient

Correlations		Design Product	Design Process
Design Product	Pearson Correlation	1	,892**
	Sig. (2-tailed)		,000
	N	60	60
Design Process	Pearson Correlation	,892**	1
	Sig. (2-tailed)	,000	
	N	60	60

Source: Processed data (2023)

Based on the results of the data processing above, it can be explained that the correlation between the variables Product Design (X1) and Process Design (X2) is 0.892. This correlation value indicates a unidirectional relationship between the two variables. Based on the correlation coefficient interpretation guidelines, the number 0.892 is in the interval 0.800-1,000, which indicates that the relationship between X1 and X2 is very strong.

Path analysis

Table 3. Path Analysis

Model		Coefficients[a]			T	Sig.
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1,547	3,042		,509	,613
	Desain Produk	,560	,277	,319	2,024	,048
	Desain Proses	,752	,218	,545	3,451	,001

Source: Processed data (2023)

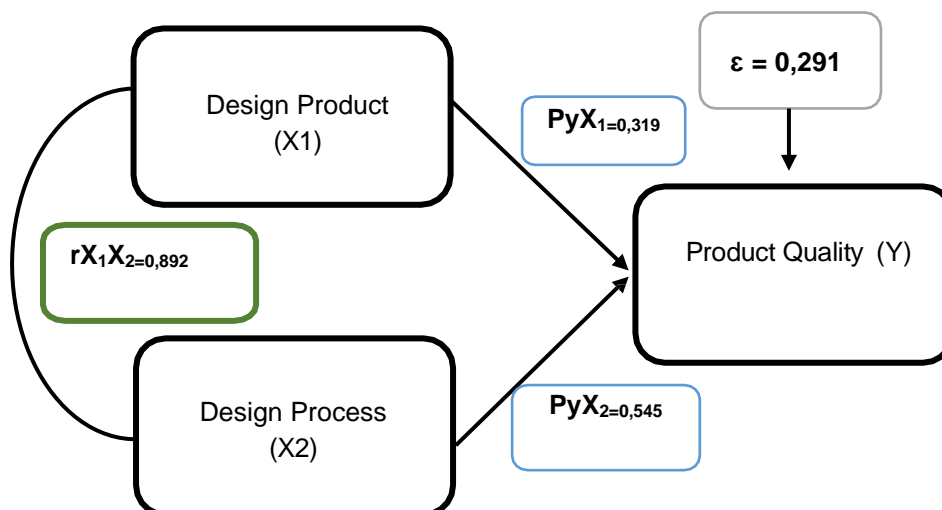Next, the equation is shown in the following image with a path diagram:

Figure 4. Path Analysis Diagram
Source: Processed data (2023)

Table 4. Recapitulation of the Magnitude of Direct And Indirect Influences

Variable	Path coefficient	Direct influence (%)	Indirect influence (through) in %		Total Influence (%)
			X1	X2	
X1	0,319	10,2%	-	15,5%	25,7%
X2	0,545	29,7%	15,5%	-	45,2%
Total influence (%)					70,9%

Source: Processed data (2023)

Based on the calculation results above, Product Design has a direct influence on Product Quality of 10.2%, and an indirect influence through correlation of 15.5%. It can be seen that in product design the indirect influence is more dominant than the direct influence. Overall, the total influence of Product Design on Product Quality reaches 25.7%, which shows a positive influence on improving quality. In addition, Process Design has a greater direct influence on Product Quality, which is 29.7%, and an indirect influence through correlation of 15.5%. The total influence of Process Design on Product Quality reaches 45.2%, indicating that Process Design has a more influential role in improving Product Quality because its direct influence is more dominant than product design.

Coefficient of Determination

Table 5. Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,842[a]	,709	,699	4,90690

Source: Processed data (2023)

The table 5 above shows that the coefficient of determination obtained is 0.709 or 70.9%. This means that the variables Product Design and Process Design contribute 70.9% of the influence on Product Quality. While the remaining 29.1% is influenced by other variables not included in this study. The epsilon value calculated from ε = 1 - 0.709 = 0.291 indicates the influence of other factors outside the study of 29.1%.

CONCLUSION

Based on the results of the study at PT. Nirwana Indo Apparell, it can be concluded that the company has shown quite good performance in the implementation of product design and process design, although there are still some aspects that need to be improved. In terms of product design, the company has conducted periodic evaluations to improve quality, but there are shortcomings in production planning, component integration, and the use of scientific methods that cause inefficiency. Nevertheless, the company continues to strive to improve this process in order to improve the quality of its products. On the other hand, process design is also considered to support the achievement of the desired product quality, with the effectiveness of managing production tasks, although there are shortcomings in the arrangement of equipment in the production room that affect efficiency. The quality of the shirt products produced is generally in accordance with industry standards, but the company still faces obstacles in the timeliness of production caused by inadequate planning. The study shows that product design and process design have a significant influence on product quality, both directly and indirectly, with efficient process design playing a more dominant role in ensuring consistent quality. The combination of innovation in both aspects is very important to achieve competitive advantage and company profitability.

REFERENCES

Fadilah, I.F. et al. (2023). "Pengaruh Desain Produk Dan Desain Proses Terhadap Kualitas Produk (Survei Pada Karyawan PT. Wijaya Agape Tasikmalaya) ".Jurnal Nuansa: Publikasi Ilmu Manajemen dan Ekonomi Syariah Vol. 1, No.(3 September 2023)

Heizer, et al. (2023). *Manajemen Operasi: Keberlanjutan dan Manajemen Rantai Pasokan (Edisi 12).* Jakarta: Penerbit Salemba Empat.

Mardhiana,Chandra. (2019)." Pengaruh Inovasi, Desain Produk dan Desain Proses Terhadap Kualitas Produk Pada Perusahaan CV.KS Tasikmalaya". Universitas Siliwangi. http://repositori.unsil.ac.id/746/

Rahayu, AS. (2019). "Pengaruh Desain Produk Dan Desain Proses Terhadap Kualitas Produk (Sensus Pada Perusahaan Roti yang ada di Kota Tasikmalaya)" . Universitas Siliwangi http://repositori.unsil.ac.id/4316/

Sidadari. R. (2020). *Desain Produk: Konsep, Proses, dan Implementasi,* Bandung: Penerbit ITB.

Stevenson (Eds). (2022). *Manajemen Operasi konsep dan Esensi.* Dwi Novitasari: STIE Widya Wiwaha.

Sugiyono, (2022). *Metode Penelitian Kuantitatif. Bandung*: Alfabeta