

# Effect of Information Technology and Product Quality on Competitive Advantage in the Chemical Industry

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**Abstract**— The purpose of this study is to analyze the impact of information technology and product quality on competitive advantage in chemical companies in Indonesia. Today, the competitive advantage in the chemical industry has become the principal capital for companies to compete in the global market. Based on previous studies, the authors seldom find research investigating the relationship between information technology and overall product quality with a competitive advantage, especially in the context of chemical companies in Indonesia. That basis is the novelty of this research. This research uses quantitative methods with a sample of 114 chemical companies in Indonesia. The sampling technique uses an intentional random sampling method, and the data analysis uses multiple regression analysis with SPSS 25. The results of this study are information technology, and the quality of the product has a significant positive relationship with the advantage of competitive. This research implies that companies must be able to innovate to continue developing the quality of existing products while maintaining a good strategy in business development. To be able to continue competing in the global market and satisfy the needs of customers. The use of information technology in companies must be more developed to increase competitive advantage.

**Keywords**— *Competitive Advantage, Information technology, Product Quality*

## 1. Introduction

Competitive advantage in the chemical industry has become the principal capital for companies to compete in the global market. Currently, the chemical industry produces chemical products that have become an essential requirement for industrial actors that produce goods for consumers in the market.

Basic chemicals become an essential requirement for companies and organizations that focus on the

production of processed products that require basic chemical raw materials in the production process [1]. The chemical industry in developing countries You must have a competitive advantage to meet the challenges of competition and unstable economic conditions. They use resources effectively and efficiently in the generation of market needs both in the domestic market and especially in the global market [2]. The main problem now is that companies in the chemical industry in Asian countries cannot maintain a competitive advantage because they do not meet the minimum criteria to remain competitive globally [3].

Dynamic changes as a result of rapid changes in information technology to meet customer demand are quite high and increasing levels of global competition. The chemical industry in Indonesia is a sector that is ready to face the industrial era 4.0 to compete at the level of the ASEAN countries. The chemical industry development sector in Indonesia is a government 4.0 priority [4]. Currently, information technology is an essential component that must be owned by the company to accelerate its business processes. The use of information technology in the management of the supply chain and the operational procedures of the company provides the ability to disseminate information in a timely and accurate manner, thus improving the management and decision-making process in terms of providing the materials needed to produce the product. Companies must have electronic supply chain management in the form of sophisticated information technology [5] [6].

Competition in the chemical industry market worldwide is becoming increasingly difficult because other countries have cheaper and excellent quality products. Many foreign-made products dominate the market in Indonesia. Therefore, domestic products must maintain product quality by reducing costs as low as possible to compete with products made abroad. Companies must have high-quality products to compete and survive in the market [7].

The Indonesian government continues to encourage competitiveness in the chemical industry

because it has made a significant contribution to the Indonesian economy. This industrial sector increased the added value of national raw materials, provided employment, and generated foreign exchange earnings. However, the domestic chemical industry still has many problems, for example, the limited production capacity of necessary chemicals, high imports of raw materials, and low-quality products [8]. Based on the above arguments, this research is feasible from the Indonesian perspective, and to improve the competitiveness of the Indonesian chemical industry. It should require the latest technological information and high product quality.

From previous research, there are rarely studies examining the relationship between information technology and product quality with a competitive advantage in the research framework model. Furthermore, this investigation is limited to discussing problems in the context of chemical companies in Indonesia. Therefore it is the novelty of this research

## 2. Literature Review

### 2.1. Competitive Advantage

To achieve a competitive advantage, a company must have several essential elements that can outperform its competitors [9] [10]. The competitive advantage is the capability of an organization to create a position that can maintain over its competitors [11]. Competitive advantage is an activity carried out by a company by comparing the activities carried out by competitors so that the company has power compared to its competitors [12] [13]. The competitive advantage consists of a differentiation strategy and a low-cost strategy. The differentiation strategy is to obtain superior product quality, while the low-cost approach is to reduce costs as low as possible [14]. Also, there are several ways to increase competitive advantage, such as excellent product quality, speedy fulfillment of customer orders, efficient use of capital [15].

The company must have assets and production capacity that is better than its rivals, so it must be used very well to build a competitive advantage. Competitive advantage depends on three main characteristics of resources and skills; transferability; and replicability [16].

Our research focuses on these two main dimensions of competitive advantage: flexibility and responsiveness [17] [18].

### 2.2 Information Technology

Technology is all the knowledge, processes, tools, methods, and systems used in the creation of goods or services. It has become commonplace, that technology is only in the form of hardware, such as highly sophisticated machines, computers, or electronic devices. [19]. The technology, namely, as follows: First, technology is a means of completing tasks and includes those necessary to convert resources into products or services. Second, the technology consists of the knowledge and resources required to achieve goals. Third, technology is a set of scientific knowledge and techniques that can apply in the design of products or processes in the search for new knowledge. [20].

Information is the result of data processing, so it becomes a necessary form for the recipient and has a useful basis for making decisions that may be felt directly or indirectly in the future [21]. It is required to process the data and the processing unit.

Information technology is a technology that can be in the form of hardware, software, or use software that used to obtain, transmit, process, store and use data in a significant way to achieve quality information. [22].

### 2.2. Relationship Between Information Technology and Competitive Advantage

Information technology is an organizational component to increase added value to increase time, energy, and financial efficiency. The use of information technology to make companies profitable, market access, product excellence, and profitability [23]. Companies that have advantages in the field of information technology can quickly deliver products and a variety of innovative products with great attractiveness, lower prices, better advantages compared to their competitors [24]. Information technology makes companies have fast and secure services and different benefits for companies to increase their competitive advantage [25].

H1; Information technology significantly influences the competitive advantage of chemical companies in Indonesia

### 2.3. Product quality

Product quality is one of the main tools to position the market and seller satisfaction. Quality affects the performance of a product or service; As such, this is related to value and customer satisfaction [26, p. 249]. Product quality can be determined by a set of uses or functions, such as durability, product

dependency, exclusivity, comfort and external appearance (color, shape, wrapping) so that it can be a corporate strategy to maintain the competitive advantage [27]. Product quality management has three elements that are effective business tactics, namely awareness, training, and the environment. First, organizations must raise awareness of product quality among their people. Therefore, they will not only do a better job but will produce ideas that will provide sustainable quality products. Second, employees need skills. Product quality management not only emphasizes the implementation of traditional training programs, but also requires leadership training, quality concepts, and problem solving. Finally, the environment characterized by managing product quality to obtain a competitive advantage in marketing is an environment where barriers to quality are removed. [28]

A collection of product brand features with features that contribute to the ability to meet customer demand specifications. [29]. Product quality in this study was measured using 8 (eight) dimensions, namely; Performance, features, reliability, compliance, durability, serviceability, aesthetics, and perceived quality, along with indicators for each dimension by Halim 2014 [29].

#### 2.4. The relationship between product quality and competitive advantage.

The results of previous studies of Kurniasari and Utama showed that there is a positive influence on the quality of information on purchasing decisions in users of social networks. The factors that influence competitive advantage are the quality of the product. Consumers tend to prefer companies that produce products with attractive and innovative features. Product quality can be determined by a set of uses or functions, such as durability, product dependency, exclusivity, comfort, and external appearance (color, shape, packaging). The quality of the company's products must be maintained well, because the better the quality of the existing products in a product, the customer will be more interested in buying, even repeatedly buying these products may be the company's strategy to maintain an advantage. competitive [27],

H<sub>2</sub>: Product quality significantly influences the competitive advantage of chemical companies in Indonesia

### 3. Research Methodology

In this study, we use quantitative methods. The period or time horizon in this study is cross-sectional. In this study, the authors used raw data in the form of questionnaires on chemical companies in Indonesia. The sampling technique uses an intentional sampling method, and to determine the sample size using Slovin's formula, the author distributes questionnaires to 159 companies, but only 114 companies complete the survey.

Considering the several hypothesized associations with which the constructs are interrelated, we utilized multiple regression to test our model. We started by assessing the measurement models, validity, reliability, and teste our hypotheses using SPSS software. We use multiple regressions to test the model.

The independent variable predicted the dependent variable. In this research, the independent variable is the: Information technology and Product quality while the dependent variable is the competitive advantage

### 4. Results and discussion

#### 4.1 Result

Based on the results of the analysis, the profiles of respondents obtained were: based on the sexes of 76 men and 38 women; by age, the respondents were between 35 and 55 years old. In this study, 24 questions were declared valid so that they could be processed for additional tests. Cronbach's alpha reliability coefficients ranged from 0.710, 0.820 to 0.895, and the data were analyzed using inferential statistics (multiple regression analysis methods). Multiple regression tests the effect of relationship variables that have a dependent variable and more than one independent variable [28]. From the results of the calculation, it can be concluded that there is a positive and significant effect. Follow Table I below::

**Table 1 Result of multiple regression analysis**

Variable	Sig	t count	Regression coefficient	Remark
X1 to Y	0,005	2,956	0,254	Significant
X2 to Y	0,000	2,742	0,297	Significant
Constanta = 40,257				
Adjusted R <sup>2</sup> = 0,452				
F count = 25,264				
Sig = 0,000				

## 4.2. Discussion

According to the research results, information technology has a significant influence on competitive advantage seen from the value of sig, which has a value  $<0.005$ . This research supports the research carried out by Arora and Rahman (2017), testing and presenting ways to influence the alignment of information technology and competitive advantage [30]. In the current technological age, the company is implementing technology such as teleconferencing and video conferencing for existing communication facilities within the company using the Zoom Meeting, Go To Meeting, and Microsoft Team applications. Also, to enhance competitive advantage, almost all companies have used e-SCM in managing raw material operations.

Based on the results of this study, it was found that a significant effect between product quality on competitive advantage. According to the results of research from previous journals presented by Kurniasari dan Utama (2018) said there was a significant positive effect between product quality on competitive advantage.[27] Furthermore, it also agrees with research conducted by Singh 2013 that surviving and developing on the quality of competing products in the world today is an essential strategy, and product quality of an organization can achieve a competitive advantage in marketing. [28]. According to the results of this study, companies dedicated to chemical raw materials must have separate instructions for handling chemical products. Some companies already have product guidance such as MSDS (Material Safety Data Sheet) and COA (Certificate of Analysis); both guidelines have enough detailed information on how to handle chemicals. The products offered by this company have appropriate standards and quality regulations, they also have international quality certifications, the materials or packaging used will be ecological or will not depend on the nature of their chemical ingredients. Providing excellent service and product quality to customers will have a good impact on the image in the eyes of customers. It can be concluded that the quality of the products in the field also significantly influences the competitive advantage of the company.

## 5. Conclusions And Management Implications

This study examines the relationship between harmonized information technology and product quality so that companies gain a competitive advantage in the chemical industry in Indonesia. This research has limitations only in the chemical industry in Indonesia, which is mainly located in Jabotabek.

Our study has two significant findings related to the chemical industry in Indonesia: (i) there is a positive relationship between the capacity of updated information technology and competitive advantage. The influencing the alignment of information technology is an essential relationship for corporate competitive advantage (ii) there is a positive relationship between product quality and competitive advantage. It was demonstrated that the development of quality products implemented effectively could increase the competitive advantage of the company.

Our findings have at least two important practical implications for managers. First, the use of information technology for strategic purposes should be applied more at the industry level. The use of information technology can provide a competitive advantage in an industry, especially in the chemical industry, in this study. However, that does not always mean that it cannot be used strategically in other sectors. Second, to increase your competitive advantage, you need to grow and develop the quality of existing products. Companies must be able to innovate to continue developing existing products while maintaining a good strategy in business development. In this way, the company can continue to compete in the market and satisfy the wishes and needs of customers.

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