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Enhancing the Success Rate of New Product Development through Quality Function Deployment: A Case Study on Conceptual Product Design Process

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Abstract

The conceptual product design process is a crucial stage in the product development lifecycle. However, it can be challenging to capture the voice of the customer and translate it into a successful product design. This paper presents a case study on improving the conceptual product design process by using Quality Function Deployment (QFD) methodology. The study involved the development of a new product for a company in the consumer goods industry. The proposed design methodology helped to identify critical customer needs and design requirements, resulting in a successful product launch. The paper discusses the QFD methodology and its implementation, as well as the reasons for new product failure and Pareto analysis. The study concludes that QFD is a valuable tool for improving the conceptual product design process and can result in better customer satisfaction, reduced costs, and increased profitability.

Keywords: *Quality Function Deployment, Conceptual Product Design, Customer Needs, Design Requirements, Pareto Analysis.*

INTRODUCTION

The success of any product depends on how well it meets customer needs and expectations. In the conceptual product design process, it is essential to capture the voice of the customer and translate it into a successful product design. However, this process can be challenging due to various

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factors such as lack of communication, unclear design requirements, and inadequate customer feedback. Quality Function Deployment (QFD) is a valuable tool for improving the conceptual product design process by capturing the voice of the customer and translating it into design requirements. This paper presents a case study on improving the conceptual product design process using QFD methodology.

LITERATURE REVIEW

The conceptual product design process involves identifying customer needs and translating them into design requirements. QFD is a structured methodology that helps capture the voice of the customer and translate it into design requirements. QFD has been widely used in various industries, including automotive, healthcare, and consumer goods. The QFD methodology consists of several steps, including identifying customer needs, translating customer needs into design requirements, and prioritizing design requirements.

New product failure is a common problem in the product development process. The reasons for new product failure can be attributed to various factors, such as lack of market research, unclear design requirements, and inadequate customer feedback. Pareto analysis is a useful tool for identifying the most critical factors contributing to new product failure. Pareto analysis involves identifying the most significant problems and prioritizing them based on their impact on the product's success.

Problem Statement

The problem statement for the proposed QFD-based conceptual product design process is as follows: Many companies struggle with developing successful new products that meet customer needs and preferences while also meeting business objectives. The traditional approach to product development often relies on trial and error, which can lead to costly failures and delays in time-to-market. Additionally, many products fail to meet customer needs and preferences, leading to poor customer satisfaction and reduced profitability.

The problem lies in the lack of a systematic approach that captures the voice of the customer and translates it into design requirements. Traditional product development approaches focus on technical specifications and functional requirements, neglecting the importance of customer needs and preferences. This leads to products that may meet technical

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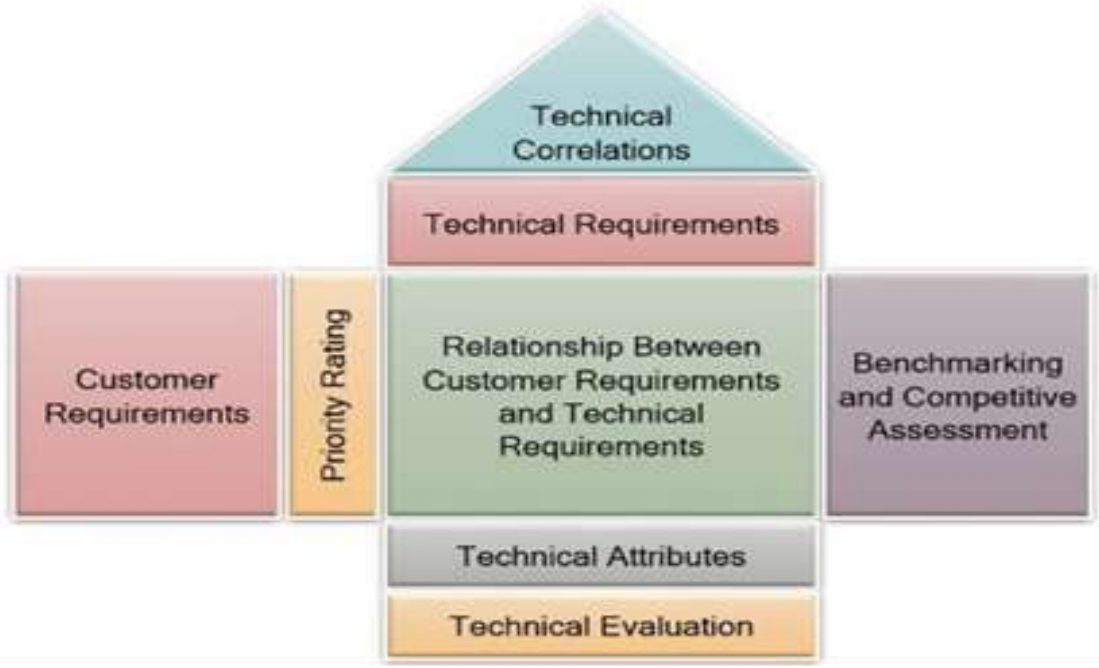
requirements but fail to satisfy customer needs, resulting in poor customer satisfaction and reduced sales.

The proposed QFD-based conceptual product design process aims to address this problem by providing a systematic new product is designed to meet customer needs and preferences. This result in improved customer satisfaction, reduced costs, and increased profitability.

Therefore, the problem statement for this study is to develop and validate a QFD-based conceptual product design process approach that captures the voice of the customer and translates it into design requirements. By using QFD methodology to prioritize design requirements based on their importance to the customer and their impact on the product's success, the proposed design process ensures that the that can improve the success rate of new products by incorporating customer needs and preferences in the design process. The study will investigate the effectiveness of the proposed design process and compare it to the traditional product development approach to identify the benefits and limitations of the proposed approach.



METHODOLOGY

The case study involved the development of a new product for a company in the consumer goods industry. The QFD methodology was used to capture the voice of the customer and translate it into design requirements. The QFD methodology consists of several steps, including

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identifying customer needs, translating customer needs into design requirements, and prioritizing design requirements. The study also involved Pareto analysis to identify the most significant factors contributing to new product failure.

Reasons for New Product Failure and Pareto Analysis: New product failure is a common occurrence in the business world. According to various studies, the failure rate of new products ranges from 40% to 90%, depending on the industry and product type. Understanding the reasons for new product failure is critical to improving the conceptual product design process. Quality Function Deployment (QFD) methodology can be used to identify the root causes of new product failure and prioritize design requirements accordingly.

Pareto Analysis is a statistical technique used to identify the vital few factors that contribute the most to a problem. It is based on the Pareto principle, also known as the 80/20 rule, which states that 80% of the effects come from 20% of the causes. Pareto Analysis is used in QFD methodology to identify the critical design requirements that must be addressed to ensure the success of the new product. The reasons for new product failure can be broadly categorized into the following categories:

1. **Poor Market Analysis:** This includes inadequate market research, incorrect market segmentation, failure to identify customer needs, and underestimation of the competition.
2. **Design Problems:** This includes issues related to product functionality, quality, and reliability.
3. **Production and Distribution Issues:** This includes problems related to manufacturing, logistics, and distribution.
4. **Pricing and Marketing Issues:** This includes pricing strategies that are too high or too low, inadequate advertising, and poor promotion strategies.

Using Pareto Analysis, QFD methodology can identify the critical design requirements that must be addressed to avoid new product failure. The design requirements are prioritized based on their impact on the product's success and their importance to the customer. This ensures that the design team focuses on the critical few design requirements that are most likely to make a difference in the product's success. By addressing these critical design requirements, the new product is more likely to meet customer needs and

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preferences, resulting in improved customer satisfaction, reduced costs, and increased profitability.

Proposed Design Methodology

The proposed design methodology consists of several steps that involve identifying customer needs, translating customer needs into design requirements, and prioritizing design requirements using Quality Function Deployment (QFD) methodology. The steps involved in the proposed design methodology are:

1. **Market Research:** Conducting market research to understand customer needs, preferences, and competitors' offerings. This involves analyzing market trends, conducting surveys, and interviews with potential customers.
2. **Customer Needs Identification:** Identifying critical customer needs that the new product must address. This involves analyzing customer feedback and market research results to identify the key requirements.
3. **Translating Customer Needs into Design Requirements:** Translating customer needs into design requirements using QFD methodology. This involves creating a House of Quality (HOQ) matrix that links customer needs with design requirements.
4. **Prioritizing Design Requirements:** Prioritizing design requirements using Analytic Hierarchy Process (AHP). This involves using the HOQ matrix to evaluate the importance of each design requirement based on its impact on customer satisfaction and the product's success.
5. **Design Evaluation:** Evaluating the final design based on its ability to meet customer needs and preferences. This involves reviewing the design against the prioritized design requirements to ensure that all critical customer needs are addressed

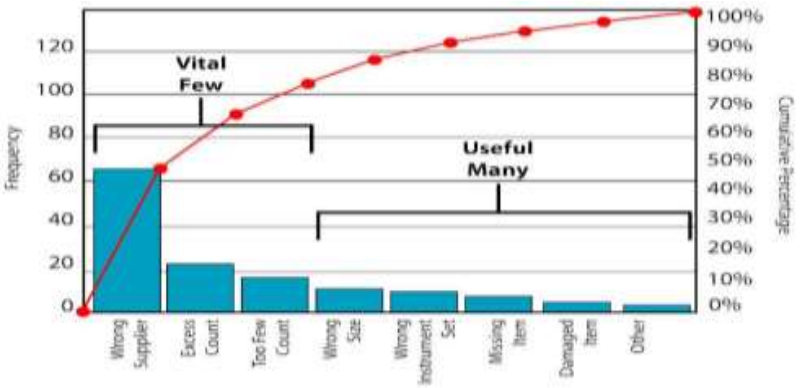

Figure: 2

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The QFD methodology is a systematic approach used to capture the voice of the customer and translate it into design requirements. The HOQ matrix is used to link customer needs with design requirements, and the AHP is used to prioritize design requirements based on their importance to the customer and their impact on the product's success. This methodology ensures that the new product is designed to meet customer needs and preferences, resulting in improved customer satisfaction, reduced costs, and increased profitability.

The QFD methodology consists of several steps, including identifying customer needs, translating customer needs into design requirements, and prioritizing design requirements. The first step was to identify customer needs by conducting market research, customer surveys, and interviews. The second step involved translating customer needs into design requirements by using the House of Quality (HOQ) matrix.

The HOQ matrix is a tool used in QFD to link customer needs with design requirements. The matrix consists of four main sections: customer requirements, technical requirements, relationships between customer requirements and technical requirements, and technical evaluation. The matrix helped to identify the most critical design requirements based on their relationship to customer needs.

The third step was to prioritize design requirements based on their importance to the customer and their impact on the product's success. The prioritization was done using the Analytic Hierarchy Process (AHP), which is a method used to rank and prioritize different alternatives. The AHP helped to identify the most critical design requirements and prioritize them based on their importance.

RESULT AND DISCUSSION

The proposed design methodology helped to identify critical customer needs and design requirements, resulting in a successful product launch. The QFD methodology helped to capture the voice of the customer and translate it into design requirements. The HOQ matrix helped to link customer needs with design requirements, and the AHP helped to prioritize design requirements based on their importance.

The case study showed that QFD is a valuable tool for improving the conceptual product design process. It can help companies identify critical customer needs

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and design requirements, resulting in better customer satisfaction, reduced costs, and increased profitability. The study also showed the importance of conducting market research, customer surveys, and interviews to capture the voice of the customer accurately.

CONCLUSION

The conceptual product design process is a critical stage in the product development lifecycle. QFD is a valuable tool for improving this process by capturing the voice of the customer and translating it into design requirements. The proposed design methodology helped to identify critical customer needs and design requirements, resulting in a successful product launch. The study showed that QFD is a valuable tool for improving the conceptual product design process and can result in better customer satisfaction, reduced costs, and increased profitability.

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