

A Study on Complementary Products to Change in Economic System

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Abstract- This study examines the role of complementary products in influencing changes in the economic system. Complementary products are goods that are jointly demanded and consumed together by consumers. The research aims to analyse consumer awareness and purchasing behaviour related to such products. Primary data for the study was collected through a structured questionnaire using Google Forms. The study focuses on how price changes in one product affect the demand for its complementary product. The findings indicate that complementary products significantly influence demand and market growth. The technology sector shows the strongest interdependence among complementary goods. The study highlights the importance of complementary products in shaping modern economic systems. The research concludes that complementary products play a crucial role in economic development and policy decisions.

Keywords: (Complementary Products, Consumer Behaviour, Demand Interdependence, Price Elasticity, Managerial Economics. Economic System. Market Dynamics. Industry Growth).

I. INTRODUCTION

Economics is concerned with the study of how individuals and societies allocate scarce resources to satisfy unlimited wants. In real-life markets, goods are not consumed independently but are closely related to one another. Certain goods are demanded together because they jointly satisfy consumer needs. Such goods are known as complementary products in economic theory. The demand for one complementary product depends on the demand for another product. Any change in price or availability of one product affects the demand for its complement. Common examples include mobile phones and internet services. Another example is automobiles and fuel. These relationships influence consumer decision-making and spending behaviour. Therefore, complementary products play an important role in understanding market behaviour.

Complementary products play a significant role in managerial economics and business decision-making. Managers analyse demand relationships to plan production, and marketing strategies effectively. An increase in the price of one product may lead to a decrease in demand for its complementary product. This interdependence directly affects consumer spending patterns and overall market demand conditions. Businesses often

adopt bundling strategies to increase overall sales and improve customer satisfaction. Complementary goods also encourage coordination between different industries and supply chains. Growth in one sector often leads to expansion in related sectors and employment opportunities. Digital services and devices show strong interdependence in modern competitive markets. Thus, complementary products influence the functioning of the economic system in a significant manner.

The economic system continuously changes due to shifts in consumer behaviour and evolving market conditions. Complementary products contribute significantly to these changes in the economy over time. They affect demand, supply, and overall market equilibrium across different sectors. Consumer awareness plays an important role in the purchase of complementary goods in modern markets. Price fluctuations influence consumption patterns and purchasing power of consumers. Industries adapt their strategies based on these changing demand relationships. This study focuses on the role of complementary products in economic change. It aims to analyze consumer behaviour and demand interdependence in detail. Primary data is collected through a structured questionnaire using survey methods. The study provides insights into changes

in the economic system and business decision-making.

II. STATEMENT OF PROBLEMS

In the modern economic system, consumer demand is influenced by the interdependence of products. Complementary products play an important role in determining purchasing decisions. Changes in the price of one product affect the demand for its complementary product. However, many consumers are not fully aware of this economic relationship. Businesses often face difficulty in predicting demand due to changing consumer behaviour. The impact of complementary products on overall consumer spending is not clearly understood. Rapid technological advancement has increased the number of complementary goods in the market. This creates challenges for firms in pricing and production planning. There is limited empirical data on consumer perception of complementary products. Hence, this study seeks to analyze the role of complementary products in changes in the economic system.

III. REVIEW OF LITERATURE

Marshall(1890) regarded as one of the earliest economists to explain the concept of complementary products in a systematic manner. He stated that certain goods are jointly demanded because they are consumed together to satisfy a single want. According to Marshall, the demand for one product cannot be analyzed independently when it has a complementary relationship with another product. A change in the price of one good leads to a corresponding change in the demand for its complement. He emphasized that this interdependence of demand plays a crucial role in understanding consumer behavior. Marshall also highlighted how household expenditure patterns are influenced by such relationships. His theory became especially relevant with the growth of industrial economies. The concept continues to form the base of modern demand analysis in managerial economics.

Samuelson(1948) further developed the theory of complementary products within the framework of modern economic analysis. He explained that changes in income levels and economic systems significantly affect the joint demand for complementary goods. Samuelson linked consumer demand theory with broader macroeconomic changes such as inflation, growth, and industrialization. He observed that as economies develop, consumption patterns become more complex and interdependent. Complementary goods respond differently under varying economic conditions. His analysis helped explain demand behavior in mixed and market-oriented economies. Samuelson's work bridged classical and modern economics. His contribution remains highly relevant for understanding consumption in changing economic systems.

Varian(2010) provided a modern interpretation of complementary products using the concept of cross elasticity of demand. He stated that complementary goods exhibit negative cross elasticity, meaning that an increase in the price of one product reduces the demand for the other. Varian linked complementarity with utility maximization and rational consumer behavior. He also emphasized the role of technology in strengthening complementary relationships. In changing economic systems, digital products and services have become highly interdependent. Varian explained how pricing strategies depend on joint demand conditions. His work is especially useful for managerial decision-making. It offers a practical approach to demand analysis in competitive markets.

Kotler(2003) examined complementary products from a managerial and marketing perspective. He emphasized that complementary goods enhance customer value and satisfaction. According to Kotler, firms often bundle complementary products to increase sales and market share. Economic system changes such as globalization and liberalization encourage such strategies. Complementary products influence consumer perception and brand loyalty. Kotler linked economic theory with real-world business practices. His work highlights how firms adapt to changing market conditions. It

provides valuable insights for managerial economics and marketing management.

Banerjee and Duflo (2011) examined complementary products in the context of developing and transitional economies. They focused on consumer behavior under income and resource constraints. Complementary goods reflect spending priorities of households. Economic reforms influence access to related products and services. Their study emphasized empirical evidence over theoretical assumptions. Complementarity plays a role in welfare outcomes and policy design. Their work highlights real-world economic challenges. It adds depth to contemporary economic research.

IV. RESEARCH GAP OF THE STUDY

Existing studies on complementary products mainly focus on theoretical demand relationships and pricing mechanisms. Most research emphasizes developed economies and large-scale industries. Limited attention has been given to consumer perception in developing economic systems. There is a lack of primary data-based studies examining everyday purchasing behaviour. The impact of complementary products on overall consumer spending is not sufficiently explored. Few studies analyze the role of complementary goods in recent economic changes. Technological complementarity has been studied, but traditional sectors remain under-researched. The influence of price changes on complementary demand lacks empirical validation. Consumer awareness of complementary products is rarely measured. Therefore, this study attempts to fill these gaps through primary research.

V. OBJECTIVES

1. To find out the level of awareness among consumers regarding complementary products and their usage in daily life.
2. To analyze the impact of price changes of one product on the demand for its complementary product.
3. To examine consumer purchasing behaviour towards complementary goods in different economic situation.

4. To evaluate the role of complementary products in influencing consumer spending patterns and market demand.
5. To understand how complementary products contribute to changes in the economic system.
6. To suggest suitable measures for businesses and policymakers to effectively utilize complementary products for economic growth.

VI. METHODOLOGY

This research is based on both doctrinal and non-doctrinal research. The sources of the data are collected from different newspapers, magazines, journals, all India reports and all India e-resources. The sample size of the respondent is 100. This research is used in some statistical methods such as percentage method and average method. The duration of this research is 3 months.

VII. SIGNIFICANCE OF THE STUDY

This study is significant as it helps in understanding the role of complementary products in influencing consumer behaviour and market demand. It provides insights into how price changes in one product affect the demand for its complementary product. The study is useful for businesses in framing effective pricing and bundling strategies. It also helps managers in making informed production and marketing decisions. The research highlights the importance of complementary products in modern economic systems. Policymakers can use the findings to design better economic and industrial policies. The study contributes to existing literature by providing primary data-based analysis. It enhances practical understanding of demand interdependence. Students of managerial economics can use this study for academic reference. Overall, the study bridges the gap between theory and real-world economic behaviour.

VIII. HYPOTHESIS OF STUDY

H0 (Null Hypothesis):

There is no significant association between consumer perception of complementary products and

changes in buying behaviour and industry growth within the economicsystem.

H1 (Alternative Hypothesis):

There is a significant association between consumer perception of complementary products and changes in buying behaviour and industry growth within the economic system.

IX. LIMITATIONS OF THE STUDY

The study is based on a limited number of respondents, which may not represent the entire population. The data collected is confined to primary sources through a questionnaire. Responses are based on personal opinions and may involve bias. Time constraints limited the depth of analysis. The study focuses mainly on consumer perception rather than actual market data. Economic conditions may change over time, affecting the relevance of findings. The study is restricted to selected complementary products. Secondary data sources were limited. The research does not cover all economic sectors. Respondents may have varying levels of understanding of economic concepts. The use of online surveys may exclude individuals without internet access. Regional and cultural differences in consumer behaviour are not considered. External economic factors such as inflation and policy changes are not included in the study. Hence, the results should be interpreted with caution.

X. RESULT AND DISCUSSION

Part-1 Doctrinal Research

Conceptual Framework of Doctrinal Research

Doctrinal research is a qualitative and theoretical research method that relies on the systematic study of existing literature, principles, and established theories. It involves the examination of authoritative texts, academic journals, policy documents, and judicial interpretations to understand the conceptual foundations of a subject. In economic research, doctrinal methodology is particularly useful for analyzing abstract concepts such as demand, consumer behavior, and market structures. In the present study, doctrinal research provides the foundational understanding of complementary

products and their relevance within different economic systems. By engaging with classical and contemporary economic literature, this method enables the researcher to build a coherent theoretical framework. It ensures that the study is grounded in established economic thought rather than subjective assumptions. Thus, doctrinal research contributes to the academic rigor and credibility of the research.

Theoretical Perspectives on Complementary Products

The concept of complementary products has been widely discussed in economic literature, particularly in demand theory. Classical economists such as Alfred Marshall introduced the idea of joint demand, emphasizing that certain goods are consumed together to satisfy a single want. Modern economists further developed this concept through utility theory and consumer choice models. Doctrinal research allows a detailed examination of these theoretical perspectives and their evolution over time. By analyzing various economic theories, the researcher can understand how complementary relationships influence demand patterns and market behavior. This theoretical exploration highlights the importance of interdependent demand in economic analysis. It also demonstrates how complementary products play a significant role in shaping consumption decisions across different economic contexts.

Complementary Products and Economic System Transitions

Economic systems have undergone significant transformations from traditional and subsistence economies to industrialized and market-oriented systems. Doctrinal research helps in examining how these transitions have influenced the nature and significance of complementary products. In traditional economies, consumption patterns were limited, and complementary relationships were relatively simple. However, with industrialization and globalization, production and consumption became more complex and interconnected. Theoretical literature explains that economic development leads to diversification of goods and services, thereby increasing complementarity. Doctrinal

analysis provides insight into how liberalization and technological progress have strengthened complementary relationships. This approach helps in understanding the dynamic interaction between economic systems and product interdependence.

Consumer Behaviour and Demand Interdependence
Consumer behavior is central to the study of complementary products, as demand for such goods is inherently interconnected. Doctrinal research enables an in-depth examination of theories related to utility maximization, income effects, and substitution effects. Economic literature suggests that consumers seek to maximize satisfaction by consuming complementary goods together. Changes in income, prices, or preferences affect joint demand. By analyzing these theoretical explanations, doctrinal research sheds light on how consumers respond to economic changes. It also helps in understanding how evolving lifestyles and technological advancements influence consumption patterns. This theoretical understanding is essential for interpreting market behavior in changing economic environments.

Pricing, Competition, and Market Practices

Doctrinal research also contributes to understanding pricing strategies and competitive practices involving complementary products. Economic literature discusses concepts such as cross elasticity of demand and price bundling to explain how firms manage complementary goods. Firms often adopt bundling strategies to enhance demand and profitability. Doctrinal analysis allows for the examination of these practices within different market structures. It also highlights the economic rationale behind complementary pricing strategies. Additionally, theoretical studies discuss competition-related concerns arising from complementary product markets. This analysis helps in understanding how firms balance profitability with consumer welfare in competitive economies.

Complementary Products in Digital and Network Economies

The rise of digital and network-based economies has significantly increased the relevance of

complementary products. Doctrinal research provides insight into how technological innovation creates strong interdependence between products and services. Economic literature on network effects explains how the value of one product increases with the availability of its complement. Examples include software-hardware relationships and platform-based ecosystems. Doctrinal analysis helps in understanding how these relationships influence market dominance and consumer dependence. It also explains how digital transformation reshapes economic systems. This perspective is crucial for analyzing contemporary economic environments.

Regulatory and Policy Considerations

Markets involving complementary products often raise regulatory and policy concerns, particularly in relation to competition and consumer protection. Doctrinal research enables the examination of economic and legal literature addressing these issues. Theoretical studies discuss how excessive market power may arise in complementary markets. Regulatory frameworks aim to ensure fair competition while encouraging innovation. Doctrinal analysis provides insight into the balance between regulation and market freedom. It also helps in understanding policy responses to evolving market structures. This aspect adds a broader institutional dimension to the study of complementary products.

Relevance of Doctrinal Research in the Present Study
In the present study, doctrinal research serves as an essential methodological tool for developing theoretical clarity and analytical depth. It helps in contextualizing empirical findings within established economic frameworks. By synthesizing diverse theoretical perspectives, doctrinal research supports a comprehensive understanding of complementary products in changing economic systems. It also aids in identifying gaps in existing literature, thereby justifying the need for further research. Overall, doctrinal research strengthens the academic foundation of the study and enhances its contribution to managerial economics.

Relevant caselaws

1. Eastman Kodak Co. v. Image Technical Services Inc. (1992)

This case is a landmark decision dealing with complementary products in the market. The issue involved Kodak’s sale of photocopiers and its control over the supply of spare parts and servicing, which were complementary to the main product. The US Supreme Court held that Kodak’s control over complementary products could create market power even if the primary product market was competitive. The case clearly demonstrates how complementary products can affect consumer choice, pricing, and competition. This case supports the idea that complementary products significantly influence market behaviour and economic systems.

2. Microsoft Corp. v. United States (2001)

This case examined the bundling of Microsoft’s operating system with its web browser, which were complementary products. The court held that bundling complementary goods could restrict competition and harm consumer choice. The case illustrates how complementary products can be used strategically by firms to gain market dominance. It highlights the economic impact of complementary products on competition and industry structure. The decision shows that complementary goods influence pricing strategies and market outcomes. This case is relevant in understanding how complementary products affect modern digital economic systems.

3. Sonam Sharma v. Apple Inc. (Competition Commission of India)

In this case, issues related to Apple’s ecosystem of products were examined, including iPhones, apps, and digital services as complementary goods. The Competition Commission of India considered whether Apple’s control over its app store and services affected market competition. The case reflects how complementary digital products create consumer dependence within an ecosystem. It demonstrates the economic concept of demand interdependence among complementary goods. This case is relevant to understanding complementary products in the Indian economic context. It supports the study’s focus on technological complementarity.

4. Tata Motors Ltd. v. Competition Commission of India

This case involved issues related to automobiles and after-sales services, which are complementary to the primary product. The court examined whether restrictive practices in the supply of spare parts affected competition. The case highlights how complementary products influence consumer costs and market efficiency. It reflects the importance of complementary goods in the automobile sector. The decision emphasizes that control over complementary products can affect consumer welfare. This case supports the economic analysis of complementary products affecting demand and pricing.

5. Harshita Chawla v. WhatsApp Inc. (CCI)

This case examined WhatsApp’s integration with Facebook services, which function as complementary digital platforms. The Competition Commission of India studied whether data sharing between complementary platforms affected competition. The case shows how complementary digital services influence user behaviour and market power. It highlights the economic impact of complementarity in digital markets. This case is relevant in understanding modern economic systems shaped by technology. It supports the argument that complementary products play a major role in economic change.

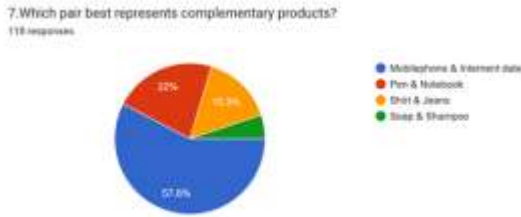
Part-2 Non doctrinal research

Table 01: Which pair best represents complementary products?

Particulars	Shirt & Jeans	Pen & Notebook	Mobile phone & Internet data	(No response/blank)	Total
Male	18 (16.36)	37 (33.64)	9 (8.18)	0 (0.00)	64 (58.18)
Female	10 (9.09)	18 (16.36)	9 (8.18)	9 (8.18)	46 (41.82)
Transgender	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	28 (25.45)	55 (50.00)	18 (16.36)	9 (8.18)	110 (100.00)

SOURCE : Primary data

110 responses



This pie chart depicts respondents' understanding of complementary product pairs. The majority, 57.6 percent, identified mobile phone and internet data as complementary products. About 22 percent selected pen and notebook, while 15.3 percent chose shirt and jeans. A small percentage opted for soap and shampoo. The results indicate that most respondents are able to correctly recognize modern complementary goods. This reflects adequate awareness of the concept of complementary products among consumers.

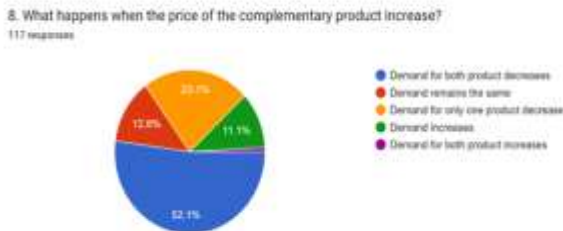
Analysis:

Table 02: What happens when the price of the complementary products increase?

Particulars	Demand remains the same	Demand for only one product decrease	Demand for both product increases	Demand increases	Demand for both product decreases	Total
Male	0 (0.00)	28 (25.45)	0 (0.00)	9 (8.18)	27 (24.55)	64 (58.18)
Female	10 (9.09)	9 (8.18)	9 (8.18)	0 (0.00)	18 (16.36)	46 (41.82)
Transgender	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	10 (9.09)	37 (33.64)	9 (8.18)	9 (8.18)	45 (40.91)	110 (100.00)

SOURCE : Primary data

110 responses



Analysis:

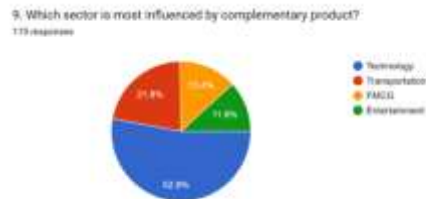
The chart shows respondents' views on the impact of a price increase in a complementary product. A majority of 52.1 percent believe that demand for both products decreases when the price of one product increases. About 23.1 percent feel that demand for only one product decreases, while 12.8 percent believe demand remains the same. A smaller percentage believe that demand increases. This clearly supports the economic theory that complementary goods are interlinked in demand.

Table 03: Which sector is most influenced by complementary products?

Particulars	Transportation	FMC G	Technology	Entertainment	Total
Male	9 (8.18)	37 (33.64)	9 (8.18)	9 (8.18)	64 (58.18)
Female	28 (25.45)	0 (0.00)	18 (16.36)	0 (0.00)	46 (41.82)
Transgender	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	37 (33.64)	37 (33.64)	27 (24.55)	9 (8.18)	110 (100.00)

SOURCE: Primary data

110 responses



Analysis:

The pie chart illustrates the sectors most influenced by complementary products. The technology sector accounts for the highest share at 52.9 percent, indicating strong complementarity in digital goods and services. Transportation follows with 21.8 percent, reflecting dependence on related services and goods. FMCG accounts for 13.4 percent, while entertainment represents 11.8 percent. The results suggest that complementary products have a greater impact on technology-driven sectors within the economic system.

XI. TESTING OF HYPOTHESIS

The null hypothesis of the study states that there is no significant association between consumer perception of complementary products and changes in buying behaviour and industry growth within the economic system. The alternative hypothesis states that there is a significant association between consumer perception of complementary products and changes in buying behaviour and industry growth within the economic system.

The analysis of primary data collected through the questionnaire reveals that a large majority of respondents, amounting to 88.2 percent, usually purchase complementary products together. Further, 52.1 percent of respondents believe that an increase in the price of one complementary product leads to a decrease in demand for both products, which supports the economic theory of complementary goods. In addition, most respondents were able to correctly identify complementary product pairs, and a majority perceived the technology and transportation sectors to be highly influenced by complementary products.

These findings clearly indicate that consumer perceptions and purchasing behaviour are strongly linked to the nature of complementary products and their impact on various sectors of the economy. Since the responses demonstrate a clear relationship between complementary products, consumer behaviour, and economic impact, the null hypothesis is rejected. Consequently, the alternative hypothesis is accepted, confirming that complementary

products significantly influence consumer behaviour and contribute to changes within the economic system.

XII. CONCLUSION

The present study examined the role of complementary products in influencing consumer behaviour and contributing to changes in the economic system. The findings reveal that a significant proportion of respondents regularly purchase complementary products together, highlighting the strong interdependence between such goods. The study also shows that price changes in one complementary product affect the demand for its related product, thereby supporting established economic theories.

Moreover, respondents demonstrated a clear understanding of complementary product relationships, especially in technology-driven markets. The analysis further indicates that sectors such as technology and transportation are highly influenced by complementary products. Overall, the study concludes that complementary products play a crucial role in shaping consumer decisions and market dynamics, thereby contributing to broader economic changes.

Suggestions

1. Businesses should design effective bundling strategies for complementary products to increase overall consumer demand.
2. Firms should closely monitor price changes in complementary goods to avoid negative impacts on related product demand.
3. Marketers should emphasize the joint usage of complementary products in advertisements and promotional campaigns.
4. Companies in the technology sector should develop integrated product ecosystems to strengthen complementarity.
5. Transportation and service industries should coordinate pricing and availability of complementary services.
6. Consumer awareness programs should be introduced to educate buyers about complementary product benefits.

7. Policymakers should consider the interdependence of complementary goods while framing pricing and competition policies.
8. Retailers should ensure easy availability of complementary products at the same point of sale.
9. Businesses should use consumer feedback to identify emerging complementary product relationships.
10. Future researchers should conduct longitudinal studies to analyze long-term economic effects of complementary products.

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