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Research paper

Strategic Orchestration of Omnichannel Marketing in Pharma: A Project-Driven Lean Framework For Operational Excellence

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Abstract

Purpose: This study aims to examine the application of omnichannel selling and customer engagement in achieving operational excellence within the US pharmaceutical industry, with a focus on the adoption of a project-based lean approach.
Approach: A quantitative research design was employed, using a standardized questionnaire completed by 383 professionals from the US pharmaceutical industry. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess the relationships between omnichannel selling, customer engagement, and operational excellence.
Results: The results indicate that customer engagement has a significant positive impact on operational excellence ($\beta = 0.425$, p-value = 0.000). Additionally, the implementation of omnichannel marketing positively influences both customer engagement ($\beta = 0.448$, p-value = 0.000) and operational excellence ($\beta = 0.334$, p-value = 0.000). The study found that the impact of implementing a project-driven lean framework on operational excellence was moderate.
Conclusions: The findings underscore the importance of customer engagement in enhancing operational efficiency and compliance within the pharmaceutical sector. Further research is recommended to explore how integrating digital transformation mechanisms can automate marketing functions and improve operational performance.

Keywords: *Customer Engagement; Omnichannel Marketing; Operational Excellence; Strategic Orchestration; US Pharma Sector.*

1. Introduction

The United States pharmaceutical industry plays a critical role in the healthcare system, maintains the creation of innovation, and provides access to essential drugs [1]. As the landscape moves towards digitization, omnichannel marketing is becoming a more popular approach by pharmaceutical companies in the US to reach health care professionals, patients, and other stakeholders [2]. The study [3] stated that this strategy combines various marketing platforms, including online media, print documents, in-person visits, and telemedicine channels, providing a coherent and personal interaction on every point of contact. Pharmaceutical firms can develop stronger customer connections, increase brand exposure, and improve patient outcomes.
According to a study [4], the US pharmaceutical market is regulated, holding guidelines and regulations to ensure patient safety and ethical marketing conditions. Marketing activities are closely monitored by regulatory bodies like the Food and Drug Administration (FDA) and the Federal Trade Commission (FTC) to ensure compliance with legal and ethical standards [5]. This also incorporates the advertisement requirements of prescription drugs, where marketing is not only scientifically sound but is also ethically compliant. On the other hand, customer engagement is a pivotal element of omnichannel marketing campaigns in the US pharmaceutical sector. As per a study [6], customer engagement is essential for developing trust and fostering long-term relationships, requiring content that effectively communicates with the target audience, and ensuring easy access to crucial information. A study [7] argued that loyal customers are more likely to recommend products, adhere to treatment plans, and they would be more engaged, resulting in improved patient outcomes. A study [8] discovered that customer engagement increases omnichannel marketing, allowing businesses to collect feedback at various points and constantly adjust their plans to fit customers' changing needs.
Although omnichannel marketing has become a highly embraced practice in the US pharmaceutical market, the integration of various marketing channels frequently causes problems in enabling a firm to support its operational excellence and set a standard of compliance. As per a study [9], most companies face operational inefficiencies due to the complexity of balancing traditional and online marketing initiatives and the necessity to meet the needs of a diverse range of stakeholders using multiple touchpoints. According to a study [10], pharmaceutical corporations operate in a hostile environment as it is heavily regulated, and organizations like the FDA and FTC impose strict regulations, affecting the marketing approach. Such laws require marketing actions and procedures to be ethically correct, but socially and legally acceptable. Businesses have found it challenging to trade off innovation in marketing strategies against the need to conform to rigid legal structures [11]. Recent studies emphasize the fact that AI-driven omnichannel strategies are gaining more and more power in

the pharma industry and are not referred to in the study under consideration [20]. Indicatively, it has been stated that pharma marketers today combine AI and HCP behavioral data with omnichannel campaigns- resulting in a brand having a 296% positive TRx rise in seven months through incorporation of EHR and social-media-based targeting [21]. The other guide is on the projection that predictive analytics would reshape HCP-targeting by 2025: beyond the reactive segmentation approach, to actively forecasting HCP needs through active profile development and real-time engagement stimuli.

The study aims to address this gap by exploring strategic orchestration of omnichannel marketing in the US pharmaceutical sector, focusing on improving operational efficiency and emphasizing the mediating role of customer engagement in optimizing market strategies.

The study applies the Resource-Based View (RBV) theory, which states that organizations can achieve competitive advantage by effectively utilizing internal resources. As per a study [12] inside the omnichannel marketing scenario, the theory emphasizes the strategic significance of the interface with customers and the merging of technology as unique capabilities to deliver operational excellence. RBV is also significant with regard to the pharmaceutical industry when applied to omnichannel marketing, i.e., the value of technological infrastructure and customer engagement as valuable and inimitable resources. These resources enable companies to deliver a customized, smooth customer experience in various touchpoints, resulting in operational excellence. Integrating these resources in pharmaceutical firms will increase customer loyalty and satisfaction, but also optimize the operations. The RBV theory argues that success achieved across the years in the omnichannel marketing strategies is directly dependent on a firm's capability to constantly innovate and restructure its internal resources in response to new customer needs and regulatory requirements [13]

The research gap of this study arises in the form of the lack of unification of omnichannel marketing strategies with operational excellence in the highly regulated US pharma sector. While previous work has discussed omnichannel marketing [2] and customer engagement [7], little research is available that explores the impact of such campaigns in supporting operational efficiency in the pharma scenario, particularly in the face of regulatory pressures coming from institutions like the FDA and FTC. In addition to this, the incorporation of lean principles within omnichannel marketing in the pharmaceutical sector remains under-examined. This study fills this gap by critically examining how omnichannel marketing strategies can be harmonized with regulatory compliance and operational effectiveness, with a special focus on the mediating role of customer engagement.

The study holds significance by adding knowledge to the current gap in literature due to the integration of lean principles with omnichannel marketing strategies in the highly regulated US pharmaceutical sector. The study will enhance marketing practices as it sheds light on the efficiency of operations, regulatory requirements, and the role of customer engagement as the mediator. It holds relevance for the pharmaceutical companies that aim to achieve the proper equilibrium between innovation and the strictness of compliance with the law and ethical issues. This research has implications beyond academic contribution; it provides practical solutions to pharmaceutical companies in enhancing their marketing functions, contact with their customers, and results in better compliance with regulations. As marketing has become digitized and customized customer experiences emerge as a dominant trend, this research may assist businesses in managing the many complexities of omnichannel marketing, all the while ensuring operational excellence.

2. Method

The study utilized a quantitative method, as a structured questionnaire was used to collect data among pharmaceutical professionals in the US. Omnichannel Marketing Integration and Project-Driven Lean Framework Implementation are the independent variables in the study, whereas Operational Excellence is the dependent variable, along with the mediating variable, Customer Engagement. The questionnaire was designed using a 5-point Likert scale ranging from Strongly Agree to Disagree to make the questions clear and consistent. This scale enabled the participants to state the level of agreement or disagreement with some statements touching on the integration of the omnichannel marketing strategy, customer engagement activities, and business performance in the pharmaceutical industry.

This study involved professional respondents in the US pharmaceutical industry, such as people working in marketing, regulatory, operations, and customer engagement. Convenience sampling was used to select the sample, so it was easy to find the participants with the relevant experience and knowledge of the omnichannel marketing strategies that could be introduced to the industry. The convenience sampling approach allowed the researcher to compile the information time-efficiently, focusing on people with specific knowledge and increasing the relevancy of the responses [14]. The size of the sample, 383, was estimated considering the power analysis, which showed that 383 sample size is adequate in forming statistically significant relationships between the variables under study. Moreover,

Partial Least Squares Structural Equation Modelling (PLS-SEM) was used in data analysis, which is appropriate in a complex model with latent variables in social science research [15]. The benefits of PLS-SEM include the possibility of exploring the direct and indirect constructs of the relationship between variables, which is especially relevant to the complexity of omnichannel marketing strategy implementation and its effects on the efficiency of operations and compliance with regulations. The Confirmatory Factor Analysis (CFA) was carried out by comparing and testing the reliability and validity of the measurement model. Important indices, including composite reliability and average variance extracted (AVE), were used to ensure the constructs were measured properly. After a successful validation of the measurement model, the structural model was examined to test the correlation existing between the independent and the dependent variables. Path Coefficient Analysis was used to reveal the strength and pattern of such relationships and achieve a better understanding of the roles played by omnichannel marketing integration and customer engagement in operational efficiency and compliance in the US pharmaceutical industry.

Figure 1 below illustrates the conceptual framework of research. Omnichannel marketing integration and project-driven lean framework implementation are independent variables of study, while operational excellence is the dependent variable. Customer engagement's effect as a mediator is further examined.

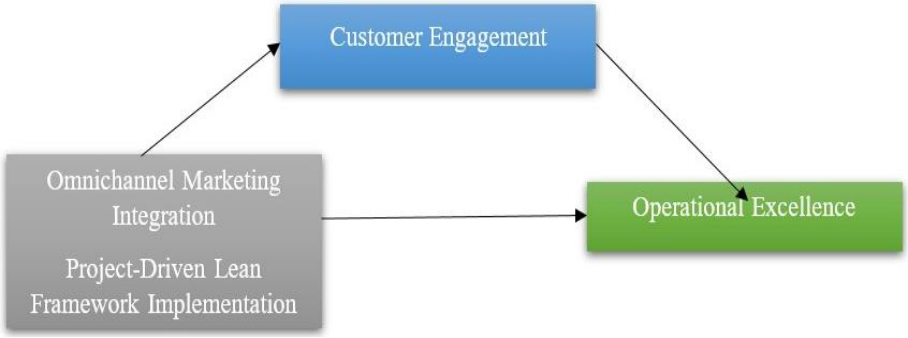

Fig. 1: Conceptual Framework.

3. Results and Findings

3.1. Measurement model using confirmatory factor analysis

Table 1 indicates that Confirmatory Factor Analysis (CFA) was estimated to evaluate the reliability of the measurement model and convergent validity, which is essential in the validation of the constructs being tested. CFA is also used to guarantee that the observed variables go well with the entire latent constructs, thus assuring certainty of the measurement model [16]. Construct internal consistency was measured using Cronbach's alpha and composite reliability. To be considered acceptable, both measures should have a factor of above 0.7 [17]. Factor loading of each indicator was also considered in assessing the extent to which each indicator measures its particular construct. According to a study [16], the factor loading of 0.6 or higher represents an adequate depiction of the constructs. The factor loadings of Omnichannel Marketing Implementation (0.852 to 0.903), Project-Driven Lean Framework Implementation (0.786 to 0.901), Operational Excellence (0.879 to 0.930), and Customer Engagement (0.906 to 0.929) are above this level, which is, in turn, an indication that every indicator has significant relevance to its construct. Moreover, the Average Variance Extracted (AVE) measurement of all constructs exceeds the required 0.7 mark with 0.772 in Omnichannel Marketing Implementation, 0.730 in Project-Driven Lean Framework Implementation, 0.814 in Operational Excellence, and 0.836 in Customer Engagement.

Table 1: Reliability and Convergent Validity testing

Constructs	Indicators	Factor Loadings	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Omnichannel Marketing Implementation	OMI1	0.880	0.852	0.854	0.772
	OMI2	0.903			
	OMI3	0.852			
Project- driven lean framework implementation	PDL1	0.786	0.815	0.839	0.730
	PDL2	0.901			
	PDL3	0.871			
Operational Excellence	OE1	0.896	0.885	0.890	0.814
	OE2	0.930			
	OE3	0.879			
Customer Engagement	CE1	0.907	0.902	0.902	0.836
	CE2	0.929			
	CE3	0.906			

As demonstrated in Table 2, the research employed the Heterotrait-Monotrait (HTMT) ratio to test the discriminant validity of the constructs involved, which is essential to guarantee that each latent variable in the research model forms a different dimension [18]. Based on the established guidelines, an HTMT value equal to or less than 0.85 indicates acceptable discriminating validity, and it proves that the constructs are not strongly correlated and solves any concerns of multicollinearity [16]. Table 3 provides the HTMT ratios that confirm that all the constructs, including Customer Engagement, Omnichannel Marketing Implementation, Operational Excellence, and Project-Driven Lean Framework Implementation, can be found below this threshold. In particular, the Customer Engagement and Omnichannel Marketing Implementation have a connection of 0.607 in the HTMT ratio, which defines a moderate and specific relationship. The ratio of customer engagement and Operational Excellence is 0.731, and the ratio between Omnichannel Marketing Implementation and the Operational Excellence is 0.718, which also confirms the distinctiveness of the constructs. What is more, the correlation between Project-Driven Lean Framework Implementation and the rest of the constructs has not exceeded the level of 0.85, with the maximum of the interconnection being in the case of Project-Driven Lean Framework Implementation and Omnichannel Marketing Implementation (0.615). This result strengthens the theoretical assumption that a relationship exists among constructs, thereby justifying the discriminant validity of the measurement model.

Table 2: Discriminant Validity

	Customer Engagement	Omnichannel Marketing Implementation	Operational Excellence
Customer Engagement	-	-	-
Omnichannel Marketing Implementation	0.607	-	-
Operational Excellence	0.731	0.718	-
Project- driven lean framework implementation	0.464	0.615	0.546

3.2. Path analysis

The results of the structural model testing illustrate the relationships between the independent variables (Omnichannel Marketing Implementation, Project-Driven Lean Framework Implementation) and the dependent variables (Customer Engagement, Operational Excellence), which are represented in Table 3. Bootstrapping procedures were implemented to identify the strength and significance of the path

coefficients using the necessary methodological instructions [19]. In Table 3, Customer Engagement and Operational Excellence have a substantial path coefficient of 0.425 and a p-value of 0.000. This shows that the impact of Customer Engagement on Operational Excellence is statistically significant and positive, implying the necessity of customer engagement in raising operational excellence.
The path coefficient between Omnichannel Marketing Implementation and Customer Engagement is 0.448 and p-value 0.000, which further supports the fact that proper omnichannel marketing positively affects customer engagement. The correlation between the Omni marketing Implementation and Operational Excellence has a path coefficient of 0.334 and a p-value of 0.000, indicating that omnichannel marketing implementation is also positively and significantly associated with the overall operational performance.
Conversely, the path coefficient of Project-Driven Lean Framework Implementation to Customer Engagement is 0.166, with a p-value of 0.011, which is statistically significant but weaker than previous paths. Project-driven lean Framework Implementation and Operational Excellence are associated with a path coefficient of 0.127 and a p-value of 0.009, which shows a significant though moderate impact on operational performance. These results point to the significance of customer engagement and omnichannel marketing in the machinery of operational excellence and indicate the positive, though less pronounced, effect of lean framework implementation.

Table 3: Structural Model

	Coefficient	T statistics	P values
Customer Engagement -> Operational Excellence	0.425	8.829	0.000
Omnichannel Marketing Implementation -> Customer Engagement	0.448	8.006	0.000
Omnichannel Marketing Implementation -> Operational Excellence	0.334	6.691	0.000
Project-driven lean framework implementation -> Customer Engagement	0.166	2.553	0.011
Project-driven lean framework implementation -> Operational Excellence	0.127	2.612	0.009

3.3. Model explanatory power

Table 4 shows the R-squared and adjusted R-squared values of Customer Engagement and Operational Excellence. The Adjusted R-squared value of 0.305 for Customer Engagement indicates that the model explains about 30.5% of the variance in customer engagement. In the case of Operational Excellence, the variance in operational excellence presented by the model is 0.547 or 54.7$. The value of 0.302, or the adjusted R-square of Customer Engagement, and 0.544 of the adjusted R-square of Operational Excellence reflect the adjustment made to the assessed fit of the model by the number of predictors, which further affirms the moderate explanatory power of both variables.

Table 4: Predictive Relevance and Quality Assessment

Variable	R-square	R-square adjusted
Customer Engagement	0.305	0.302
Operational Excellence	0.547	0.544

4. Discussion

The study's findings highlight the critical role of customer engagement and adoption of omnichannel marketing as drivers of operational excellence in the US pharmaceutical sector. It shows a strong positive relationship between customer engagement and operational excellence, supporting the contention that customer engagement is connected with better operational performance. This aligns with existing literature, which argues that customer engagement fosters loyalty, trust, and long-term relationships, all of which lead to organizational effectiveness [6] [8]. Moreover, the path coefficient of the effect of omnichannel marketing implementation on customer engagement is large and significant at a high level, which aligns with a growing body of research studies that highlight omnichannel approaches in creating seamless, personalized customer experiences [3]. This result is supported by a survey carried out by a study [3], which also identified the beneficial impact of omnichannel marketing on both the satisfaction and retention of customers. The results show that pharma companies can increase their operational effectiveness by improving engagement efforts and implementing harmonized marketing strategies that cross Customer Touchpoints. Moreover, Lean principles aim at streamlining the internal procedures, increasing efficiency, and minimizing waste, which leads to an increase in operational capacity. However, external revenues are produced directly by omnichannel marketing due to improved engagements with customers and the growth of the market [8]. This means that operational excellence is more likely to be influenced by omnichannel strategies in comparison to lean frameworks that are internally oriented [11]
The study confirms that customer engagement acts as a mediator that bridges the gap between omnichannel marketing strategies and operational outcomes. Thus, the findings further confirm that there is a requirement for an all-inclusive and concentrated customer engagement strategy to ensure that pharmaceutical firms can maximize their operations in a competitive and regulated environment. However, the study also highlights project-driven lean framework implementation's relatively less extreme influence in propelling operational excellence than customer involvement and omnichannel marketing. The path coefficient between lean framework implementation and operational excellence, although statistically significant, is relatively weaker, suggesting that lean principles in isolation may not be as effective in achieving operational success as customer-centric activities. This result concurs with a study [9], which determined that while process optimization occurs through lean frameworks, it is needed with customer engagement strategies for firms to cultivate responsiveness and agility. The moderate effect of lean framework adoption on customer engagement is also indicative that lean practices can increase operational effectiveness, but are less effective in significantly contributing to customer relations. This aligns with the study [11], which argued that operational models like Lean Six Sigma must be dovetailed with customer-centric approaches to craft an integrated approach to organizational excellence. These discoveries highlight the need to combine lean process optimization with strong customer interaction and omnichannel marketing initiatives to achieve sustainable competitive strength in the US pharmaceutical sector, characterized by stringent regulation and continuously shifting consumer needs. This dual approach erases operational pains and ensures regulatory compliance with the industry, ultimately paving the way for long-term success and improved market positioning.

5. Conclusion

This study recognizes the pivotal position of customer engagement and omnichannel marketing in facilitating operational excellence in the US pharmaceutical sector. The discussion highlights that effective customer engagement strategies and successful integration of omnichannel marketing positively influence operational performance, stressing the need for pharmaceutical companies to focus on building

strong customer relationships and embracing innovative marketing approaches. Although the study demonstrates the importance of these factors, it also reveals that project-based lean introduction, although relevant, has a comparatively lesser impact on operational excellence. Pharmaceutical companies must prioritize omnichannel marketing strategies as a primary focus in combining traditional and online platforms to achieve maximum customer engagement and operational efficiency and deliver a seamless and personalized customer experience across touchpoints. To realize maximum operational excellence, companies must align omnichannel marketing with lean management discipline, focusing on constant improvement and eliminating waste while ensuring adherence to strict pharmaceutical regulatory standards. Despite its valuable contributions, this study has a few limitations. The convenience sampling may not fully capture the variety of perspectives in the larger pharmaceutical industry, and therefore, the generalizability of the findings may be restricted. In addition, the study's cross-sectional design limits the ability to observe changes over a period and renders causal inferences difficult. These flaws can be overcome in future research by adopting a longitudinal design to examine the dynamics of omnichannel marketing and customer engagement over an extended period. In addition, enhancing the sample size and covering multiple regions or market segments within the pharmaceutical industry would provide a broader perspective. Future studies can also investigate the alignment of other strategic frameworks, e.g., digital transformation or Artificial Intelligence (AI)-driven marketing, to study their impact on operational excellence. Investigating the effect of evolving regulations on marketing strategies and customer outreach would offer valuable insights into navigating the increasing regulatory complexity of the pharma sector.

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Appendices

Questionnaire:

1) Please specify your age:

i) 18-25

ii) 25-35
iii) 35-45
iv) 45-55
v) More than 55 years

2) Please specify your Gender:
i) Male
ii) Female
iii) Other
iv) Not feeling comfortable specifying

Based on your knowledge and experience, select any one of the options given below each of the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Omnichannel Marketing Integration					
• I believe that the integration of multiple marketing channels enhances my ability to reach customers effectively.					
• I feel that omnichannel marketing allows for a consistent experience across different platforms.					
• I think that the use of both traditional and digital marketing channels improves customer engagement in my organization.					
Project-Driven Lean Framework Implementation					
• I think the project-driven lean framework helps my team streamline processes and reduce waste.					
• I believe that implementing lean strategies in projects has improved our operational efficiency.					
• I feel that the lean framework implementation supports our company in meeting performance goals and objectives.					
Operational Excellence					
• I believe that operational excellence is crucial for improving overall organizational performance.					
• I feel that my company continuously seeks to improve operational efficiency through streamlined processes.					
• I think that achieving operational excellence in my organization contributes to enhanced customer satisfaction.					
Customer Engagement					
• I believe that actively engaging with customers leads to stronger long-term relationships.					
• I feel that personalised communication with customers increases their satisfaction with our products and services.					
• I think that customer feedback is a valuable source of information for improving our marketing strategies.					