Essays on Stakeholder Engagement

by
Sandhya Banda

A dissertation submitted in partial fulfillment of the requirements for
Fellow Programme in Management (FPM) in the Indian School of Business, Hyderabad

Dissertation Committee

Professor V. Kumar (Co-Chair)
Professor of Marketing & Goodman Academic-Industry Partnership Professor,
Goodman School of Business, Brock University

Professor Rajendra Srivastava (Co-Chair)
Novartis Professor of Marketing Strategy and Innovation
Exec Director: ISB Centre for Business Innovation (CBI)
Exec Director: ISB Executive Fellow Program in Management (EFPM)
Indian School of Business

Professor Anita Pansari
Assistant Professor of Marketing
Eli Broad College of Business, Michigan State University

June, 2024

Acknowledgements

I am deeply grateful to many individuals who have been integral part of my PhD journey. First and foremost, I owe a debt of gratitude to my advisors, Dr. V. Kumar and Prof. Rajendra Srivastava, whose unwavering guidance and mentorship has made this PhD experience both challenging and memorable. Their professional expertise, coupled with kindness and care, has been invaluable. I will always be grateful to Dr. V. Kumar who believed in me and encouraged me to explore new research ideas.

I extend heartfelt thanks to Prof. Anita Pansari, my dissertation committee member, for her guidance both professionally and personally. The insightful recommendations and valuable advice, particularly on the second essay of my dissertation, has been immensely fruitful.

I am grateful to Prof. Raghuram Bommaraju, Prof. Ahmed Timoumi and other marketing faculty at ISB for their feedback and suggestions on my research papers. I express my appreciation to my doctoral friends at ISB who were there for me when needed and helped me sail through this journey. Additionally, I deeply appreciate the essential support provided by the FPM office throughout the years.

To my parents, L. V. Rao and L. Satyavani, I owe everything for their exceptional love, sacrifices they made, and their unwavering encouragement throughout my life. I am also grateful to my younger brother and his family for their support.

Lastly, I am indebted to my husband, Prashant, who has been a rock-solid pillar of support for me, helping me reach this point, and to my loving children, Praneel and Pratheek, for their unconditional love and incredible patience during my PhD journey.

I dedicate my dissertation to my elder brother, (Late. Dr. L. V. S. Rajendra) whose belief in me and teaching me to never give up were the reasons I embarked on this journey.

Table of contents

Dissertation Essays

Essay 1: Insights on antecedents and dimensions of delivery drone adoption as a last-mile delivery option

Essay 2: Engagement Orientation: A conceptual framework of construct and consequences and empirical analysis

Dissertation Overview

My dissertation is structured as two essays, where Essay 1 explores the antecedents and dimensions of delivery drone adoption as a last-mile delivery option. With the rising significance of last-mile delivery in catering to diverse stakeholders, firms are actively seeking to harness the potential of delivery drones.[1] However, little is known about what drives a firm's decisions to adopt delivery drones. This study is structured in three phases. Phase 1 employs a triangulation approach to identify potential antecedents of delivery drone adoption. Phase 2 develops propositions to evaluate the antecedents and contingency factors influencing firms' decision to adopt drones and provides a framework. Subsequently, we validate the framework using data from 101 firms. The results suggest that the firm capabilities, stakeholder concerns, and economic viability influence the adoption of drones for last-mile delivery. Phase 3 examines the dimensions of delivery drone adoption – the timing, breadth, and depth of adoption that vary across adopters and explain this variation among the adopters. The study offers future research opportunities, and guidelines regarding drone adoption for last-mile delivery.

In Essay 2, we emphasize the crucial role of active stakeholder engagement for firms navigating dynamic business environments. We develop engagement orientation as a composite construct with six dimensions (customers, employees, channel partners, investors, and society). We define engagement orientation as *" a strategic process by which a firm creates value from its stakeholders and provides value to its stakeholder."* We develop and examine the engagement orientation in two phases: Phase1, focusses on development of engagement orientation construct by adapting and refining scales for its lower order constructs (six dimensions) from the extant literature. We

[1] https://www.cnbc.com/2022/11/11/a-first-look-at-amazons-new-delivery-drone.html

employ exploratory factor analysis (EFA) and then confirmatory factor analysis (CFA) to assess the construct. We validate the engagement orientation higher order construct using PLS-SEM. In Phase 2, we empirically validate the link between engagement orientation and firm's financial performance and test how firm capabilities (marketing, technological, and operational) moderate this relationship. We posit that the impact of engagement orientation on the financial measure would be positive. Additionally, we hypothesize that firm capabilities strengthen the link between engagement orientation and performance. Our findings confirm that engagement orientation positively impact performance. Moreover, this positive relationship is significantly enhanced when the firm possesses strong marketing, technological, and operational capabilities. This suggests that firms with robust capabilities in these areas can more effectively leverage their stakeholder engagement strategies to achieve superior financial outcomes. These results underscore the importance of a dual focus for managers: not only should they prioritize stakeholder engagement, but they should also develop and enhance their internal capabilities to maximize the benefits of their engagement efforts. By integrating a strong engagement orientation with well-developed firm capabilities, companies can achieve greater financial success and sustain in the marketplace.

Essay on Insights on antecedents and dimensions of delivery drone adoption as a last-mile delivery option

Introduction

The transformation of digital technologies, and their inclusion in organizations' distribution, logistics, and operational strategies have allowed firms to augment their existing capabilities (Kumar 2018), benefit from the reduced implementation costs, and alter the fundamental methods they operate in (Holmström et al. 2019). One of the key areas of focus of digital transformation has been last-mile delivery -- an integral part of order fulfillment and logistics handling by focusing on delivering the ordered products to the end user (Lim et al. 2018). While last-mile delivery has been primarily achieved through delivery trucks, the higher order contributions of delivery trucks towards emissions and overall environmental sustainability (i.e., delivery trucks cause about 50% of nitrogen oxide emissions, and 7% of greenhouse gas emissions in the US (Eskandaripour and Boldsaikhan 2023)), have forced firms to rethink innovation appropriation and sustainability in last-mile delivery-related strategies (Bates et al. 2018). However, despite being critical for the customer management and operational and economic success of a firm, last-mile delivery is an expensive process (Mangiaracina et al. 2019) due to the costs associated with delivery equipment, fuel, software, and labor. Moreover, because of the demanding target service levels and increased dispersal of destinations, the cost that last-mile delivery brings to the firms often pushes them away from its adoption (Vanelslander et al. 2013; Macioszek 2017). Given the concerns associated with the adoption of last-mile delivery, academic studies, and managerial practices demonstrate that innovations and automation with the potential for reducing environmental impact and externalities need to be combined with traditional systems to create a smart logistics system (Ranieri et al. 2018).

To reduce the negatives associated with current instruments in achieving last-mile delivery (i.e., trucks), a few firms are testing "delivery drones" to make their logistics efficient and effective. For example, retailers such as Amazon (Elias 2019), Walmart, and UPS are leaning towards considering drones as a sustainable delivery alternative (Figliozzi 2020), leveraging on its benefits of being eco-friendly, providing faster deliveries at lower operational costs[2]. In addition, delivery drones are increasingly being used in several situations (where delivery trucks might not work), including vaccine delivery, disaster relief operations, and other lifesaving supply deliveries (Guttman 2022; Alkhalifah et al. 2022; Rashidzadeh et al. 2021). Managerial practices hint that drones can be integrated into delivery of standard consumer products (Melkonyan et al. 2020)[3].

While managerial forecasting is at peck about *drones* as the suitable and sustainable last-mile delivery[4], academic research provides limited insights (Aurambout et al., 2019; Khan et al., 2019; Rodrigues et al., 2022) about delivery drones' suitability to disrupt last-mile delivery, and specifically, what might allow firms to adopt delivery drones in their operations and logistics. Beninger and Robson (2020) highlight the need to understand conducive and impeding factors to drone adoption by firms and consumers. A critical issue that a firm would face is making the decision to adopt drones for last-mile delivery service by adding drones to their other existing delivery modes. Secondly, once a firm thinks drones can be a probable option, it is important that they also decide *how soon to adopt*, to *what product categories*, and *how deep into the specific product categories*.

[2] https://www.insiderintelligence.com/insights/drone-delivery-services/ and https://www.cnbc.com/2022/11/11/a-first-look-at-amazons-new-delivery-drone.html
[3] https://www.freightwaves.com/news/walmart-pilots-drones-to-fly-items-to-consumers-doorsteps
[4] https://www.popsci.com/environment/drones-delivery-greenhouse-gas-energy/ and https://www.nature.com/articles/d41586-022-02101-3 and https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/future-air-mobility-blog/drones-take-to-the-sky-potentially-disrupting-last-mile-delivery

‘Drones’ as a technology is new to most firms, and little is known about what might drive firms to adopt drones in their delivery strategies. The concept of delivery drones is in its nascent stage and both the industry, and the academics need guidance about the use of delivery drones. To uncover the aspects that might drive a firm’s decision to adopt drones as the last-mile delivery option, the related contingencies and dimensions, the current paper relies on three phases. Phase 1, through a triangulation approach that includes information from three sources—extant literature, marketplace insights, and managerial interviews, reveals several factors that impact a firm’s decisions of drone adoption for last-mile delivery, including firm-related capabilities, stakeholder-related concerns, economic viability, and government regulations. In addition, Phase 1, along with support from the literature (Sood et al. 2023), identifies three drone adoption behavior dimensions - *timing*, *breadth*, and *depth* of adoption that vary across adopted firms. The insights from the investigation are cross-checked with the theoretical underpinnings of technology adoption. Relying on the insights from Phase 1, the paper develops a research framework.

Phase 2 develops propositions towards the effect of antecedents on drone adoption for last-mile delivery relying on the Technology, Organization, and Environment (T-O-E) framework proposed by Tornatzky and Fleischer (1990). The paper argues that a firm’s intent to adopt drone technology is a strategic decision based on technological, organizational, and environmental-related factors. Further, drawing upon the Innovation Resistance theory (Ram and Sheth 1989), the study posits why consumers resist drone technology. We also argue that employee readiness towards using drone technology plays a crucial role in a firm’s decision to adopt drones for last-mile delivery. The paper tests the conceptual framework by accessing the data collected by a third-party syndicated firm that offers services to the firms that are interested in drone delivery. Results suggest that firm capabilities (technological, marketing, and operational), stakeholder concerns (customer, employee, and environmental), and economic viability (cost-benefit) are the factors that affect a firm's decision of drone adoption. Government regulations (legal requirements, compliance, and safety concerns) are not tested as the data is obtained only from those countries where the regulations permit the use of drones for delivery.

In Phase 3, the study explores the dimensions of drone adoption. Consistent with the findings from Phase 1, the *timing of adoption* is defined as the time taken for a firm from decision-making to implementation of drones for last-mile delivery; *breadth of adoption* is defined as the extent of using drones for a different number of product categories offered by the firm; and *depth of adoption* is the firm's total volume of the business covered by delivery drones. Collectively, the three dimensions represent a firm's drone adoption behavior.

The study contributes to the extant literature on marketing and operations strategies focusing on last-mile delivery in general, and technology intervention (i.e., new age technologies) in last-mile delivery in specific. To the technology adoption literature, we develop the conceptual framework by drawing upon two complementary theories: T-O-E framework and Innovation Resistance Theory. We also contribute to the new-age technology literature, exploring drone technology in the context of last-mile delivery, which is still in its nascent stage. The paper introduces the delivery drone adoption construct and discusses the drivers impacting drone adoption by considering firm and consumer perspectives. We empirically validate the firm-related factors and stakeholder concerns. The paper further contributes to the research domain by exploring adoption behavior dimensions that vary across adopted firms. Managerially, the paper shows the favorable conditions to firms who are willing to adopt drones in their operations and marketing, but yet to integrate because of various unknowns. More specifically, the paper has opened doors for various research on last-mile deliveries, integrating insights from innovation adoption literature, operations management, and broad marketing strategy literature on technology integration. Next, we elaborate Phase 1.

Phase 1: Identification of factors influencing Delivery Drone Adoption

To identify what drives a firm's decision to adopt delivery drones as the solution to last-mile delivery strategies, it is critical to know what the current research and theoretical underpinning have to say and what the challenges are, along with managerial inputs. Hence, in Phase 1, we undertake a three-step process. *First*, we employ a triangulation approach (gathering insights from popular business press, comprehensive literature review, and conducting managerial interviews). We build our primary data from direct interviews; additionally, we curate extensive data from secondary sources that include marketplace evidence. This approach facilitates the internal validity of data and helps cross verifying the findings from the primary source (managerial interviews), and secondary source (marketplace evidence and extant literature). *Second*, we perform a content analysis of the managerial interviews to identify and categorize the underlying factors influencing drone adoption. *Third*, we conduct a face validation of the factors that we identify from interviews and extant literature. The details regarding the triangulation approach are provided in Table 1- select literature review in the context of delivery drones and Appendix (A) Section A (Table A1- key insights from managerial interviews and Table A2 - select marketplace evidence). Phase 1 relies on three sources of information to come up with a comprehensive list of factors that might affect a firm's decision to adopt delivery drones, as we discuss them subsequently.

---Insert Table 1 about here---

Related Literature and Insights from Existing Theoretical Underpinning

While the literature on drones as the last-mile delivery option is sparse, extant research on technology management, operational efficiency, and logistics strategies has certain insights to provide. For example, Hwang et al. (2021) noted that pro-environmental behavior with the use of drone delivery vs. conventional delivery mode for food service influences customers' attitudes to use and willingness to pay for drone service. Similarly, Barlow et al. (2019) indicated that strict regulations for using delivery drones near roadways positively impact delivery drone usage. Vlahovic et al. (2017) discussed the economic viability of drones in the pharmaceutical context and showed that the usage of drones in the logistics business can provide improved profits but is conditional on technology regulations and safety attributes of drones. If we look at the existing literature on what drone-related characteristics are critical, it seems to indicate three categories: *regulations*-related, *drone attributes*-related, and *environmental impact*-related. Table 1 provides a glimpse of existing literature and allows us to see three categories of drone-related characteristics, which might be critical to consider while strategizing delivery drones.

Furthermore, as drone adoption could be an integral part of technology adoption and impacts organizational and environmental strategies, two theoretical frameworks could be relevant.

Technology, Organization and Environment (T-O-E) framework. A firm can gain competitive advantages by adopting new technologies (Kumar 2021). The extant technology acceptance and adoption frameworks (Davis 1989; Parasuraman 2000) have mainly focussed on individual users. At the organization level, (T-O-E) framework proposed by Tornatzky and Fleischer (1990) explains how technological and environmental factors affect a firm's decisions regarding technology adoption. They explain the three contexts as "(a) Technological context describes both the existing technologies in use and new technologies relevant to the firm; (b) Organizational context refers to descriptive measures about the organization, such as scope, size, and the amount of slack resources available internally, (c) Environmental context is the arena in which a firm conducts its business—its industry, competitors, and dealings with the government.” (Tornatzky and Fleischer 1990, p. 152–154).

Regarding drone adoption, the three aspects of the framework can be understood as: *technology context* as assessment of internal and external resources that include existing technological capability by the firm, decision on adopting technology (Kauffman and Walden 2001), the firm’s flexibility, and compatibility (Bradford and Florin 2003); *organization context* as operational capabilities that include the firm’s structure (Awa et al. 2015), and cost parameters (Chwelos et al. 2001; Holotiuk et al. 2018), and *environment context* as marketing capabilities that consider assessing the potential customer segments (Teo et al. 2009; Awa et al. 2015), dissemination of information, and assessing competitive pressure (Hsu et al. 2006). Therefore, for this study, the T-O-E framework provides a potential comprehensive lens, and a good starting point to examine and evaluate the factors that impact drone adoption for last-mile delivery.

Innovation Resistance Theory. The technology acceptance models discuss consumers’ intention to adopt and do not address consumers’ resistance. The Innovation Resistance Theory (IRT) (Ram and Sheth 1989) offers a comprehensive asseesment of consumers’ resistance toward innovations. Success or failure of a technological innovation is determined by consumer resistance towards the technology (Ram and Sheth, 1989). IRT rests upon two barriers that impede consumer acceptance of technology: psychological and functional barriers. Consumer resistance is assessed as an antecedent to technology adoption in multiple contexts, such as food processing (Kaur et al. 2020), mobile wallets (Leong et al. 2020), mobile payments (Kaur et al. 2020), mobile banking, and food delivery through drones (Khalil et al. 2022). In the context of drone usage, consumer concerns tap the functional and psychological barriers. Thus, it is important to account consumer concerns as a driver of delivery drone adoption, and the IRT framework provides a foundation for extending this concept to drone adoption as a last-mile delivery option.

Insights from Managerial Interviews

For primary data collection through managerial interviews, we target two industries — namely, medicines & medical supplies, and retail & food service firms. Under medicines & medical supplies, we consider firms that manufacture (i.e., pharmaceuticals), supply medicines and medical consumables (syringes, gloves, etc.). Second, for retail & food services, we include firms that sell consumer products (retail chains), fast moving consumer goods (FMCG) firms, food delivery firms, and restaurants. A total of 20 managerial interviews spread across five countries allow us to investigate how managers from these two industries view drones for delivery services, and their concerns about integrating drones for last-mile delivery. We identify the managers through convenience sampling, using two sources: contacts from a Chief Marketing Officer (CMO) Roundtable/ CMO Growth Council and executive education programs at universities in the five countries. The target respondents are from diverse background, and different levels of work experience (> 8 years). We conduct interviews with 12 mid-level and 8 senior-level managers from various departments of the firms to have a multifaceted view. We utilize semi-structured interview techniques to conduct our exploratory research. With managers' approved consent, our semi-structured interviews ask them first to define drones from their viewpoint and further ask three open-ended questions:

A. Do you think your firm would use drones for last-mile delivery service offerings? If so, to what extent do you anticipate that your firm will implement delivery drones?
B. What benefits and concerns do you anticipate while deploying drones for last-mile delivery in your firm?

C. How do you envision the impact of delivery drones on the firm's stakeholders?

Each interview lasts for about 20-35 minutes. For reviewing interview transcripts, we rely on open coding to analyze, compare, and conceptualize the data. We adopt content analysis as "a research technique for making replicable and valid inferences from texts or (other meaningful matter) to the contexts of their use" (Krippendorff, 2018, p. 18). We, therefore, perform content analysis for content validity, and conceptualize *Delivery Drones Adoption*--our core construct and research variables. We ensure that the categorized data from the content analysis have comprehensiveness and relevance to digital technology. Because delivery drones fall under the bucket of digital technology, we ensure that our variables list is highly relevant to the new-age digital technologies. The inter-judge reliability is high (Kappa test value = 0.91), in accordance with the acceptable range (Cohen 1960), and substantial agreement of items aligns with the research variables. To establish the face validity, we seek feedback from two marketing professors and present the variables to domain experts from industry. We summarize the learnings from the managerial interviews' illustrative verbatim related to drones in Table A1. Managerial interviews identify several challenges, and themes related to drone adoption and factors driving it.

Do delivery drones substitute the labor capital of a firm? A central challenge for firms is the employee-job fit. Through digitalization, firms strive to increase their returns but miss out on understanding the impact on their labor capital. As drones can automate the last-mile delivery processes in the firm, it would lead to acquiring a new skill set. Employees' knowledge and technical expertise are the key determinants of the success of a technology adoption (Pagell, et al. 2000; McCutcheon and Wood 1989), especially in the case of drones. Throughout the interviews, many managers allude to drones impacting overall job requirements in the firm, mentioning that replacing existing labor with a fresh set would be imperative. A senior manager at a medical supplies company describes the challenge of balancing the labor capital of the firm while implementing delivery drones to have sustained growth as:

"*It is crucial for a firm to either up-skill the current employees or acquire a new set of talent to operate drones. Acquiring a new skillset would hurt the current labour and create uncertainty of job security within the firm. Firms must invest a considerable amount of time and effort to proceed."(Manager- M2)*

Will delivery drone technology implementation need continuous investment? One of the critical blocks to drone adoption could be the huge initial investments from the firm. Integrating technological innovations requires firms to manage resources and build capabilities (Gruber et al. 2008). Ali et al. (2022) state that a firm's technical and marketing capabilities are important factors for adopting drone technology. As technology advances, it would push firms to upgrade and update themselves with the required capabilities. According to one of the interviewees, firms' dilemma of 'make or buy' decision related to drone technology is critical to its adoption, and Ali et al. (2021) show that firm's decision to adopt drones is dependent of the cost parameters related to drones. Implementing drones might be challenging for small and mid-sized firms as investment becomes their biggest hurdle. In addition, a few managers state that as technology advances, the firm may have to pump in a substantial investments and resources to augment its existing capabilities and reap the benefits of drone technology. For example, the marketing head of a retail firm noted:

"*Implementation of drone technology doesn't just ask for an upgrade of the software part of technology but requires new hardware that would be compatible with the software. Which in turn would incur costs for us, and it is one of the biggest issues with drone technology. As technology evolves, we need to either upgrade to survive or die…Also we have to invest in additional resources to build our capabilities to adopt drone technology."(Manager -M10)*

Consumers' mental blocks and drone-related knowledge. It is crucial to acknowledge that the shift to increasing digital offerings by firms, requires customers to have a clear understanding and knowledge regarding the use of delivery drones. However, this shift may create resistance and inertia among the consumers as it depends on their level of interaction with the technology. For example, for AI-related processes, the involvement of consumers with technology is moderately low, but using a delivery drone would require consumers to have end-to-end knowledge of the delivery process, including tracking the delivery process. Secondly, the notion of having drones deliver the product to consumers' homes can create a mental block in the consumers' minds (Khan et al. 2019; Leon et al. 2021). An illustrative quote from a global leader at a customer products firm voices a concern that:

"*Consumers are resistant to change when the need to understand the process is high and which demands more effort from their end. We know that drones have been known for their use in military-related activities, and a shift to using it for product delivery service can show resistance from the customer side. In addition, delivery through drones is not as simple as using a conventional delivery. It would require consumers to understand stepwise delivery process — like tracking the delivery on their mobile phones, knowing the drop location, identifying the right product, etc. This would require consumers to have the technology knowhow."(Manager-M3)*

Regulations are the bottleneck that may slow down delivery drone adoption. Firms are motivated to increase their returns by implementing digital technologies. Data is pivotal to any digital technology, and when firms have greater access to data, it raises a concern about privacy. This is more pronounced in the case of consumer-related data, specially, for drone technology, where customer privacy and security concerns are surfaced from the back end (software related) and the front end (hardware related). Thus, regulations to minimize consumer privacy and security issues are crucial to its adoption. The manager at a pharmaceutical firm explicitly mentions the importance of regulations related to operating delivery drones:

"*A SOP (standard operating procedure) in place can guide firms in deciding upon the adoption of delivery drones. Even today, firms that want to adopt drones for delivery-related activities perceive regulations as a roadblock. One can argue that the air space is public and not private for an individual/firm beyond a certain height. However, consumers' concerns about invasion of privacy play a significant role. Without clear-cut guidelines, a strategic decision related to drone adoption seems meaningless, and firms are waiting to have clear guidelines for using drones."(Manager-M5)*

Thus, it becomes important for managers to evaluate these impeding issues and examine the feasibility of drone adoption for last-mile delivery. This study aims to provide guidelines to the firms regarding drone adoption given the sharp rise in the use of drone services, with an anticipated growth at a 44.7% CAGR from 2022 to 2027[5]. Next, we elaborate on the marketplace evidence pertaining to what, and how firms are strategizing drone adoption as the potential next-generation delivery option.

Insights from Popular Business Articles

As trials on drone technology are in their evidencing phase, drones for last-mile delivery may have a fair chance to make their path through the service market. According to McKinsey & Co. survey[6], 80% of package delivery in the future with the last-mile delivery service will be done through drones. This is not without identifying ways to mitigate the challenges drones present to users. Our interviews with managers offer relevant insights into the compelling issues firms may encounter while adopting and implementing delivery drones service. Additionally, marketplace evidence suggests several categories of factors, mainly regulation-related issues and cost-related benefits. For example, Palmer (2020) noted, “Amazon’s operating and safety procedure for an autonomous drone delivery service that will one day deliver packages to customers around the world. Amazon continues to develop and refine the technology to fully integrate delivery drone into the airspace and work closely with the FAA and other regulators… to realize the vision of 30-minute delivery.” Baker (2017) noted that “U.S. start-up Zipline has teamed up with the Rwanda government to deliver blood supplies by drones.” Cornell et al. (2023) stated, “drones may become

[5] https://www.globenewswire.com/en/news-release/2023/04/19/2650350/28124/en/Drone-Package-Delivery-Global-Market-Report-2023-Major-Players-Include-Amazon-United-Parcel-Service-of-America-Zipline-FedEx-and-DHL-International.html
[6] https://bdkep.de/files/bdkep-dateien/pdf/2016_the_future_of_last_mile.pdf

cost competitive across the board with other delivery options.” See Table A2 for more information on the applications of drones.

Summarizing Phase 1. Together, the triangulation approach seems to suggest four antecedents for delivery drone adoption from three perspectives: the firm adopting the technology to provide service offerings, a customer using the service with the technology, and a regulatory body governing the legal aspects related to the technology. We present the insights in a conceptual framework, as illustrated in **Figure 1.** Delivery Drones Adoption (DDA) is a new construct that we present in this study to quantify the extent to which a firm intends to adopt delivery drones for its processes and last-mile delivery service offerings.

---Insert Figure 1 about here---

Phase 2: How the factors identified in Phase 1 related to Delivery Drone Adoption?

While Phase 1 identifies several antecedents of drone adoption, we are yet to know how the antecedents could be related to drone adoption directionally. In Phase 2, we first argue for antecedents’ effects, then propose several potential relationships, in the form of research propositions. The paper then empirically explores the proposed relationships using the data we access from a third-party syndicated firm.

Relationship between firm capabilities and delivery drone adoption

The T-O-E framework examines the factors that impact technology acceptance at a firm level. Zhu and Kraemer (2005, p. 68) describe the T-O-E framework as a “generic theory of technology diffusion.” Studies also suggest that this framework provides a contextual basis with specific factors varying based on the research context (Oliveira and Martins 2011; Baker 2012). Therefore, in the context of delivery drone adoption, the factors in technological context refer to a firm's technological capabilities, organizational context refers to a firm's operational capabilities, and an environmental context refers to the firm's marketing capabilities.

Technological Capabilities refers to a firm's ability to acquire and develop technological knowledge to respond to market conditions and improve a firm's existing resources (Moorman and Slotegraaf 1999). These make the firm agile to respond to the market's changing needs and leverage competitive advantage. A firm's existing knowledge acts as a basis for acquiring and utilizing knowledge from external sources (Cohen and Levinthal 1990; Zahra and George 2002), and the firm can use these knowledge streams to understand customer needs, translate them into product or service offerings, and improve its technological capabilities (Dutta et al. 1999). Thus, with increased technological capabilities, a firm should be more likely to adopt drone technology for delivery activities.

Marketing Capabilities refers to the level of a firm's marketing readiness to embrace new technology. It indicates a firm's ability to link customer needs with their offerings (Krasnikov and Jayachandran 2008), and it positively impacts firm performance (Day 1994). We argue that increased marketing capabilities enhance customer loyalty (Krasnikov and Jayachandran 2008) and consumer acceptance of new service offerings. Thus, a firm can benefit by reducing acquisition costs and extracting value from customers by offering drones as a last-mile delivery option.

Operational Capabilitie refer to the end-to-end approach of coordinating the tasks along the value chain that involves transforming inputs into output (Cepeda and Vera 2007). It facilitates the firm to leverage the flexibility in the value chain, improve the existing processes, smoothens supply chain, and allows for accurate demand forecasting (Tan et al. 2007). By building these capabilities, firms can reduce costs and improve efficiency related to last-mile delivery. Our interview with a manager at a retail chain suggests that, *"A central component of digital technology is the firm's capabilities. Firms need to leverage their existing capabilities and build new capabilities to adapt to the digital era. Today's customers need convenience over anything, and firm readiness is central. Firms also need to analyse and choose delivery drones based on their product suitability to delivery mode. Additionally, the ecosystem capability and identifying capacity need to make it a seamless service offering is the key." (Manager-M12)*

In addition, when a market experiences an external shock, such as a recession or pandemic induced uncertainties, firms are urged to be agile to adapt and respond to the changing market needs. More agile firms have a competitive advantage (Sambamurthy et al. 2003) and agility can be a function of various existing capabilities. For example, in a pandemic like COVID, which demands low or no contact between people, firms can favor drones in the delivery processes if they have all the capabilities ready to undertake such a massive strategic decision. Firms can leverage this technology to provide safer customer deliveries (Shokouhyar et al. 2021) if they have the capabilities acquired. For example, the vice president at a multi-chain departmental store reflects the importance of a timely response to an external shock to achieve a competitive advantage:

"We see that, a situation like COVID brought a sharp spike in the online deliveries due to public's restrictive movement. It is also important that our delivery people maintain social distancing while delivering. Therefore, the delivery drone can be a useful solution for us. We achieved this because we have a strong technological investment, and our operations team is facilitating entire process." (Manger-M8)

Therefore, we propose that,

Proposition 1(a, b, c): Higher the firm capabilities (technological, marketing, and operational), higher the probability of delivery drone adoption.

Relationship between stakeholder concerns and delivery drone adoption

Customer-related concerns. Despite the potential benefits of delivery drones, it poses multiple consumer concerns. The risks associated with the technology are critical barriers to consumer acceptance (Ram and Sheth, 1989). Prior research on consumers' attitude toward drone delivery shows that perceived risks related to privacy and safety (Khan et al. 2019; Ramadan et al. 2017), security (Rao et al. 2016), performance risk (Yoo et al. 2018), physical risks (Leon et al. 2021), and delivery risk (Sah et al. 2021) are key concerns for drone acceptance.

Convenience and saving time (Ozturk et al. 2016; Stock et al. 2015; Gawor and Hoberg 2019) are two vital considerations consumers weigh for using any digital technology. Furthermore, Osakwe et al. (2022) highlight consumers' behavioral intentions, like desire and lifestyle compatibility, positively influence their acceptance of drone delivery service. Service offerings with higher convenience increase customer satisfaction (Berry et al. 2002). However, to offer convenience, the firm may pass on the cost to consumers (Kim 2020), and associated risks can negatively influence customer acceptance. This echoes the point by Boucher (2016) that "we should not focus on making citizens accept civil drones, but on making civil drones acceptable to citizens". A study by Lyon-Hill et al. (2020) in three metropolitan cities in the US, examines probable long-term benefits (better access, reduced delivery time) of drone adoption, emphasizing on firms focusing on working towards social acceptance. A manager at a retail firm points out how financial and physical risks associated with using delivery drones affect consumer acceptance:

"The key to the adoption of a digital technology is to provide an immediate and reliable solution to consumer problems and needs. We also look for mitigating consumer hassle costs. For example, one can argue that implementing drones can reduce delivery time and even delivery costs, but it is associated with added risks to consumers. If the consumers do not feel safe, they may not come forward to adopt it soon, and it may take longer for the technology to seep into the market and be sustainable." (Manager-M12)

Employee-related concerns. Delivery drone implementation for last-mile delivery results in an increased automation level in the delivery process and, in turn, may positively affect employees' work quality (Manyika 2017) with decreased inefficiencies (Mende et al. 2019). However, given the intricacies of delivery drones, employees' knowledge, and job fit will be essential. Further, during our exploratory study, a few managers repeatedly mention that employees should have a clear understanding of this new technology as they will be first-hand users. This is consistent with the extant technology research (Speier and Venkatesh 2002); firms need to ensure that person-technology fit is established among their employees. For example, a senior product manager signals that employees play a central role in the adoption of delivery drones by a firm:

"While the firm makes the decision to adopt delivery drones, the employees would be directly involved to work or coordinate with the technology. Having an employee-job fit would be crucial as it would ease them into using the new technology. Employees also need to constantly up-skill themselves to adapt with the technological changes. If this is not the case, with the skill gap, firms may suffer in the process." (Manager-M6)

Environment-related concerns. Apart from contributing significantly to the firms' sustainable growth, digital technologies bring along some environmental issues too. They are contributors to the climate change challenges (Unwin 2020), as technology advances, the earlier versions become obsolete and add up to the e-wastes. The rapid increase in the digital carbon footprint is considerably more than what firms appreciate. In the context of delivery drones, it possesses issues, impacting the natural ecosystem, like birds getting hurt by drones (Lyons et al. 2018). As drone technology relies on air space for movement, it possesses few risks for the public. These include adding to noise pollution as they generate buzzing sounds while traveling in the air (Eißfeldt et al. 2020). Apart from the associated environmental risks, it does offer some unique benefits. First, drones act as a delivery option that addresses traffic-related issues. All transportation modes use ground, resulting in delayed service due to traffic congestion. Due to the complexity of the effect of ground transportation mode on traffic-related factors (Kirschstein 2020), delivery drones can have a spot for itself. Second, as it is battery-operated, it helps reduce carbon emissions in contrast to traditional delivery modes. The operational emissions of drones vs. conventional ground vehicles for delivery services show that drones have lesser CO_2 emissions than traditional transport services like trucks (Goodchild and Toy 2018). Firms need to do an in-depth analysis by examining the possible tangible aspects (speed, energy consumption, etc.) and intangible forces (e.g., environment) to understand the use of drones for last-mile delivery service, and its impact on society at large. A manager at an FMCG firm describes how delivery drones can be a risky solution for providing convenience:

"Drones travel in the air, and there are chances that the drones may injure someone or damage someone's property. It is important we weigh out the convenience and the possibility of putting the society at risk! We need to address and mitigate societal concerns in our decision to adopt drones. As firms are inclined towards adoption, the acceptance will be positive when drone technology evolves in a way that it provides security to the product, public and the environment." (Manager-M7)

Taken together, we propose,

Proposition 2 (a, b, c). Lower the stakeholder concerns (customer, employees, and environmental), higher the probability of delivery drone adoption.

Relationship between economic viability and delivery drone adoption

A common point among all the interviews is the need to have an intensive analysis of the cost aspects. Managers revealed that the firms need to analyse returns, risks, and costs associated with the adopting delivery drones. The perceived benefit of innovative technology significantly affects a firm's intention to adopt the technology (Rogers 2003).

Cost-Benefit Analysis. Traditionally in the supply chain process last-mile delivery accounts to the most expensive segment, and concerns are growing with increasing delivery costs.[7] Inclusion of

[7] https://www.statista.com/statistics/816884/last-mile-delivery-logistics-providers-challenges/

technology offers a probable solution to the problem (*Forbes insights, 2018*), but the shift of the processes and service offerings through new technology like delivery drones would require the firms to have a clear cost-benefit understanding. Drones for delivery services have shown a reduction in cost and delivery time (Koetsier 2021). Borghetti et al. (2022) evaluate viability and financial feasibility of drones but ambiguity around drones requires firms to have a cost comparison of initial investment to the variable costs associated with the drone technology (Welch 2015) and compare its benefits to other delivery options (Kirschstein 2020). An economic analysis by ARK Invest (Keeney 2016) discusses the cost analysis of delivery drones by considering the costs associated with fuel, battery, and facility upgrade. For example, when contrasting conventional delivery options with drone delivery, a senior manager of a retail firm comments that:

"As the technology is not perfect yet, it can be viewed as an investment and not as savings for the firm adopting it and the customer using it. Existing (traditional) delivery options like trucks, vans, and delivery persons provide savings for firms, but it is unclear whether they will implement drones. It would require firms to observe costs and to what extent the costs can be passed over to customers. Therefore, firms using delivery drones for products are still unclear, but can work with a hybrid model (Conventional + Drone)."(Manager-M11)

Consequently, we propose that:

Proposition 3. Better the economic viability based on cost-benefit analysis, higher the probability of delivery drone adoption.

Relationship between government-related issues and delivery drone adoption

Digital technologies directly work with the data and information pertaining to processes, products, and customers. Drone technology possesses a higher perceived risk from consumers' perspective, and therefore, it requires more transparent and standardized regulatory considerations imposed on the firms to deploy them (Baloch and Gzara 2020). Other digital technologies, like blockchain, AI, and ML, act as a back-end support system for the firm, and firms use data shared by consumers to provide personalized experience. Delivery drones go one step deeper in accessing customers' personal information (Rao et al. 2016), which includes having access to data even without consumers' consent, like drones hovering over other's property. Thus, clear government regulations on drone usage are important to safely integrate drones into firms' processes (Estrada 2018). A senior manager at a medical supplies firm describes how regulatory measures when mandated for delivery drones would expedite their acceptance:

"In fact, with regulatory measures in place to manage private drones, this could be a massive opportunity for logistics, supply chain, and customer-focused companies. I also believe that standard regulatory measures can guide firms in deciding whether to adopt delivery drones. Regulations regarding delivery drones are not concrete yet, as they become concrete, the implementation pace would change. I believe that standard regulatory measures can guide firms in deciding whether to adopt drones for delivery activities." (Manager-M2). Thus, we state the following proposition,

Proposition 4. The more conducive the government regulations are, higher the probability of delivery drone adoption.

Next, we discuss the contingency factors that might influence the proposed relationships between antecedents and the delivery drone adoption.

Contingency factor affecting Delivery Drones Adoption

*Business-to-Consumer (B2C) vs. Business-to-Business (B2B) firms***.** Previously, we discussed that new technology adoption requires firms to be agile and adaptive. Prior research (Ali et al. 2021) indicates that firm capabilities (technological, marketing, and operational) are important factors that help a firm adopt a new technology. The use of drones in B2B context is mostly related to operational activities like site surveillance, dropping items at the construction sites and within the factory premises (Tatum and Liu 2017); hence the pressure to build technological and operational capabilities is high. Furthermore, the number of customers in a B2B context is limited. Thus, for B2B firms, the adoption of drones is a derived demand rather than a direct demand. However, for a B2C firm, the pool of customers to be served is substantial and requires a firm to assess the needs of consumers and build marketing capabilities to offer drones as last-mile delivery option. Therefore, we propose that,

Proposition 1(d, f). The positive effect of (d) technological and (f) operational capabilities on the probability of delivery drone adoption is enhanced in the B2B (vs.B2C) markets.
Proposition 1 (e). The positive effect of marketing capabilities on the probability of delivery drone adoption is mitigated in the B2B (vs.B2C) markets.

As stated earlier, the acceptance of drone technology by consumers and employees is equally important (Boucher 2016*)*. A report by Levitate Capital[8] states that bringing automation into processes can reduce technical and operational inefficiencies. In a B2B scenario, employees' work related to drone usage is specific to firm facilities and confined to certain geographical spread, where employees' major concern would be understanding the technology itself. However, in a B2C context, due to geographical dispersion of customers, employees' interaction with customers is high and requires them to have a better understanding of drone usage for last-mile delivery. The number of customers to whom a B2B would offer the drone is lower than a B2C firm. This creates pressure on the B2C firm to address customer concerns. Thus, we propose that,

Proposition 2 (d, e). The negative effect of (d) customer concerns, and (e) employee concerns, on the probability of delivery drone adoption is mitigated in the B2B (vs.B2C) markets.

Apart from offering benefits like reduction in carbon emissions, it does possess a concerning issue related to noise pollution. In a B2B context, drones are used for operational activities, which result in less noise pollution in comparison to B2C firms that use drones for delivering products to customers as they cover larger air space. Thus, we propose that,

Proposition 2 (f). The negative effect of environmental concerns on the probability of delivery drone adoption is mitigated in the B2B (vs.B2C) markets.

[8] https://levitatecap.com/levitate/wp-content/uploads/2020/12/White-Paper-v4.pdf

In a B2B context, the use of delivery drones is restrictive to the working site of the firm (like building or land surveillance) or places that are usually far from the public (like movement of goods between distribution centres), thus making the location of dropping easier, and reducing hindrance to the public. For example, the SEAT factory,[9] uses delivery drones to speed up the logistical process with reduced delivery times. Even though the load size carried by the delivery drone is smaller than the convention delivery options (i.e., trucks), the shipping cost is lower on a unit shipment basis for drones. Given the higher frequency of shipping for the B2B firms, the influence of economic viability based on accumulated volume of business is enhanced for B2B firms. In a B2C context, the package size is smaller, and the associated costs of shipping to individual customers can be higher. Thus, we propose that,

Proposition 3a. The positive effect of economic viability based on cost-benefit analysis on the probability of delivery drone adoption is enhanced in the B2B (vs. B2C) markets.

The above propositions represent the antecedents and contingency factor that affect delivery drone adoption decisions of a firm. Next, we describe the data, measures, and analysis of models by deliberating operationalization of specific variables.

Research Methodology

Data Collection and Measures

For building our data, we rely on accessing the propriety data collected by a third-party syndicated firm located in Europe, which provides (paid) service to firms interested in exploring the use of drones. This survey data combined with firm characteristics is available to all service firms interested in service drones and who pay for the syndicated service. To have an adequate sample size, we access this data (survey data) related to firms from five countries where drones

[9] https://trans.info/en/in-the-seat-factory-agvs-are-already-in-use-now-drones-have-appeared-logistics-4-0-in-practice-160020

are being used in two industries (medicines & medical supplies and retail & food service) in this study. We consider data from the countries that have approved drone usage for delivery services, and thus, we exclude government regulations as a research variable from our estimation model. The five countries and the corresponding number of data points for our study are: the United States (35 firms), United Kingdom (21 firms), Canada (15 firms), Australia (18 firms), and Germany (12 firms). We identify the firms that have adopted drones as of 2022 for last-mile delivery vs. not, from this data. The number of drone adopters at the time of survey are 52 firms; of which, we identify 39 complete responses on all the items in the survey. Similarly, out of 97 non-adopters that were surveyed at that time, we identify 62 complete responses[10]. Thus, the resultant dataset contains a total of 101 firms with complete information. We received the survey items from a third party source. While these items were not developed by us, upon reviewing them, we identified connections or relevance to the literature in our research domain. The constructs or variables measured by these items align with theoretical frameworks or concepts discussed in the literature, providing a basis for their inclusion in our study. Therefore, while the items themselves may have originated from a third party, their relevance to the existing literature strengthens their applicability to our research context.

The survey data covered an array of topics related to drone technology. The survey data had a combination of information: i) firm-related and ii) employees- and customers-related. Firms provide the responses to the survey items based on their own reality and share the information they collect from their employees and customers. Insights from managerial interviews and review of extant literature, we assess the antecedents to drone adoption, and we draw the relevant items from

[10] The means are not significantly different for incomplete responses.

the survey measure (i.e., pool of items collected by the third-party syndicated firm) to map each of the constructs in the study by ensuring the items have similar scale support from the extant literature. The items of the survey anchor on a five-point Likert scale where 1 - strongly disagree and 5 - strongly agree. We identify a total of 26 items and perform factor analysis. Definitions of the variables and corresponding measurement items are provided in Table 2.

---Insert Table 2 about here---

Factor Analysis and Reliability test. We run a factor analysis on the multi-item indicators by employing Principal Components Analysis technique with varimax rotation (Gorsuch 2013). We extract seven eigenvalues with values greater than 1. The measure of sample adequacy, Kaiser-Meyer-Olkin (KMO), is 0.87 confirming the sample sufficiency for factor analysis. The factor loadings for all items are greater than 0.5, indicating a well-described factor structure.

We conduct a series of validations and do scale purification using Cronbach's alpha; the values for all items are above 0.6, which is above the suggested cut-off level (Nunnally and Berstein, 1994), supporting scale reliability. Composite reliability (CR) and Average Variance Extracted (AVE) are commonly used for assessing the internal consistency of the items and are calculated by measuring the stability of the scales. All the proposed constructs have composite reliability values greater than 0.7 (Nunnally, 1978), and AVE values greater than 0.6 (Bagozzi and Yi, 1988). This confirms the appropriateness of the constructs in the measurement model for testing the conceptual framework and the associated prepositions. The seven factors that we identify from the analysis are: technological capabilities, marketing capabilities, operational capabilities, customer concerns, employee concerns, environmental concerns, and cost-benefit analysis. Table 3 summarizes the factor loadings and corresponding Cronbach's alpha, R^2, CR, and AVE for each research variable.

---Insert Table 3 about here---

Data Analysis. We develop the independent variables for the measurement model based the data we access from third party syndicated firm. We present the descriptive statistics of each construct in Table 4. We conduct the collinearity diagnostics, and the highest variance inflation factor value is 5.7, which is within the upper limit of value 10 (Hair et al., 1998). Thus, indicating that there are no serious multicollinearity issues.

---Insert Table 4 about here---

Model Specification and Estimation. The dependent variable, Delivery Drone Adoption, is a binary variable where firms that adopt delivery drones take the value 1, and 0 otherwise. As the independent variables in the study are a combination of categorical and continuous variables, the multivariate normality assumption will not hold for discriminant validity. Thus, we run logistic regression model to test the propositions based on the estimated coefficients.

$$\ln(p/1-p) = \beta_0 + \beta_1 (TC_{1i}) + \beta_2 (MC_{1i}) + \beta_3 (OC_{1i}) + \beta_4 (TC_{1i} * MC_{1i} * OC_{1i}) + \beta_5 (CC_{1i}) + \beta_6 (EMC_{1i}) + \beta_7 (ENC_{1i}) + \beta_8 (CBA_{1i}) + \beta_9 (TC_{1i} * B2B_{1i}) + \beta_{10} (MC_{1i} * B2B_{1i}) + \beta_{11} (OC_{1i} * B2B_{1i}) + \beta_{12} (CC_{1i} * B2B_{1i}) + \beta_{13} (EMC_{1i} * B2B_{1i}) + \beta_{14} (ENC_{1i} * B2B_{1i}) + \beta_{15} (CBA_{1i} * B2B_{1i}) + \mu_i \qquad (1)$$

Where $p = Pr(DDA=1)$ is probability of adopting delivery drones, and it depends on the observed characteristics, which are TC (Technological Capabilities), MC (Marketing Capabilities), OC (Operational Efficiency), CC (Customer Concerns), EMC (Employee Concerns), ENC (Environmental Concerns), CBA (Cost-Benefit Analysis), and B2B has moderating effect (if the firm is a B2B firm, then the value is 1, 0 otherwise). μ_i represent the error term.

The three-way interaction term between the firm capabilities (technological, marketing, and operational) in Equation 1 signifies the synergy effect. The bivariate interaction terms (technological capabilities*marketing capabilities, technological capabilities*operational capabilities, and marketing capabilities*operational capabilities) are not significant. We estimate the logistic regression coefficients for the model specified in Equation 1 and present the results in Table 5.

---Insert Table 5 about here---

Assessing Model Fit Tests: The goodness of fit is assessed by using two methods: We conduct a likelihood ratio (LR) test that is statistically significant ($p < 0.001$), indicating a compelling relationship between dependent variable and independent variables. We also employ the Hosmer-Lemeshow (1980) test; *p* value of 0.42 suggests no difference between the predicted values and actual observed values.

A key empirical issue in analyzing firms' adoption of delivery drones is that the adoption is dictated by the time frame of the study. Thus, the sample in our study suffers from potential selection bias introduced by right censoring as we consider firms that belong to the event of interest prior to the time of data collection only. This results in Type I censoring as the design of the study ends at a fixed point; thus, firms that have not adopted delivery drones are censored. To eliminate this artificial censoring, we implement the inverse probability censoring weightage (IPCW) estimator (Robins et al. 1995; Robins and Finkelstein 2000) to account for right censoring and adjustment of time-varying confounders. This method corrects for censored units by giving extra weight to the units that are not censored to account for the loss of information due to censored observations. It is a well-established method for addressing censoring by weighing the impact of each uncensored observation by the inverse probability of the remaining uncensored. The estimates of IPCW-adjusted probabilities account for censoring (Tian et al. 2014). The substantial difference in the estimates indicates the presence of censoring, and IPCW accurately reflects the underlying population. The regression coefficients for IPCW are estimated based on maximum likelihood estimation by fitting the Cox Hazard model for time. We follow Wooldridge (2007) for estimating the IPCW estimates. First, we estimate the probability of censoring by building a logistic regression.

$$\text{logit}[P(C_i=1/Z_i)] = \exp[\alpha_0 + \alpha_1 (TC_i) + \alpha_2 (MC_i) + \alpha_3 (OC_i) + \alpha_4 (CC_i) + \alpha_5 (EMC_i) + \alpha_6 (ENC_i) + \alpha_7 (CBA_i) + \alpha_8 (TC_i{*}MC_i{*}OC_i) + \alpha_9 (TC_i{*} B2B_i) + \alpha_{10} (MC_i{*} B2B_i) + \alpha_{11} (OC_i * B2B_i) + \alpha_{12} (CC_i{*} B2B_i) + \alpha_{13} (EMC_i * B2B_i) + \alpha_{14} (ENC_i * B2B_i) + \alpha_{15} (CBA_i * B2B_i)]/1+ \exp[\alpha_1 (TC_i) + \alpha_2 (MC_i) + \alpha_3 (OC_i) + \alpha_4 (CC_i) + \alpha_5 (EMC_i) + \alpha_6 (ENC_i) + \alpha_7 (CBA_i) + \alpha_8 (TC_i{*}MC_i{*}OC_i) + \alpha_9 (TC_i{*} B2B_i) + \alpha_{10} (MC_i{*} B2B) + \alpha_{11} (OC_i * B2B) + \alpha_{12} (CC_i{*} B2B_i) + \alpha_{13} (EMC_i * B2B_i) + \alpha_{14} (ENC_i * B2B_i) + \alpha_{15} (CBA_i * B2B_i)] \quad (2)$$

Where C_i is the censoring indicator variable (C_i =1 when firms adopt drones and C_i = 0 if firms did not adopt yet, Z_i represents the covariates of the model. The outcome variable is assumed to follow a generalized linear model,

$$\mu_i = E(Y_i/X_t)= g^{-1} (\beta\alpha_0 + \beta\alpha i\, X_{it}) \quad (3)$$

where g is the link function for the outcome variable Y_i (DDA). Next, we get the IPCW logistic regression estimates **(**Table 6**)** by solving the following equation:

$$\sum(C_i / \text{logit}[P(C_i=1/Z_i)]) (\partial \mu_{it} / \partial \alpha\beta) V^{-1} (Y_i - \mu_i) \quad (4)$$

where V is variance of Y_i. The detailed steps of IPCW are provided in Appendix Section B.

Analysis of Results. Comparing the unweighted estimates from the logistic regression and adjusted weights by IPCW, the results suggest that the firm capabilities (technological, marketing, and operational capabilities) and economic viability (cost-benefit analysis) are positively associated, and stakeholder concerns variables (customer, employee, environmental concerns) are negatively associated with delivery drone adoption (Table 6). Our results show that firm's decision to adopt delivery drones in highly influenced by marketing capabilities (MC) of the firm. Ali et al. (2022) indicates that matching firms' capabilities to consumer requirements can guide firms to exploit drone technology and reap its benefits. *Second*, the interaction term (TC*MC*OC) is statistically significant, and this indicates that the firms with higher overall capabilities, a combination of technological, marketing, and operational, have a positive effect on the adoption of drones due to the synergy effect. *Third*, customer concerns (CC) turn out to be an important inhibitor to adopting drones for last-mile delivery. In line with the previous research (Clothier et al. 2015) and the report by Lyon-Hill et al. (2020) that emphasize the need for firms to prioritize on social acceptance of drone for delivery service, by addressing the potential customer related issues. *Fourth*, the moderating effect of B2C vs. B2B regarding firm capabilities show support for the technological and marketing capabilities but is not significant for operational capabilities, indicating that the effect of building operational capabilities on drone adoption is the same for both B2C and B2B firms. The moderating effect of B2C vs B2B supports the argument for stakeholder concerns (customer and employee), whereas it is not significant for environmental concerns. The latter result indicates that environmental concerns equally impact drone adoption for B2C and B2B firms. We found support for the argument of the moderating effect of B2B vs. B2C on the relationship between economic viability and probability of drone adoption, indicating that cost-related aspects and geographical locations of delivery are critical parameters.

Based on the IPCW coefficients, we further compute marginal effects, and the results show a positive association of firm capabilities and economic viability, and a negative association of stakeholder concerns with delivery drone adoption (Table 7).

---Insert Table 6 and Table 7 about here---

Robustness Check

Further to the data from the third-party syndicated firm, out of seven proposed constructs, we gather secondary data for computing objective measures on three proposed constructs - technological capabilities, marketing capabilities, and operational capabilities. We adopt Stochastic Frontier Analysis (SFA)-- a widely used approach to calculate firm capabilities (Feng et al., 2015). We use another set of measurements for capability dimensions, as a robustness check to show that our approach does not suffer from any survey bias. We gather data on the firm's financials from their annual reports for a period of five years (2018-2022). Details of operationalization of technological capabilities, marketing capabilities and operational capabilities are presented in Appendix Section C. Results show consistent estimates.

To better understand the use of delivery drones, we further develop insights and explore the dimensions of delivery drone adoption in Phase 3.

Phase 3: Dimensions of Delivery Drone Adoption

From the managerial interviews, it is apparent that the firms focused their efforts on using drones along three dimensions (timing, breadth, and depth of adoption). We rely on content analysis to categorize responses and analyze both explicit and implicit statements from the managerial interviews into different dimensions (Kassarjian 1977). First, we identify the keywords and compute the frequency of words belonging to each dimension. We group the words belonging to each dimension and calculate the fraction of words and divide them by the total words used to describe each dimension. We compare the codes from the first step of content analysis to the automation and technology literature. We further validate the dimensions table by presenting it to four managers. A detailed process of content analysis is presented in Appendix Section D. Table 8 presents examples of words and phrases, and illustrative quotes from the managerial interviews that map onto each dimension.

---Insert Table 8 about here---

Thus, we identify three overarching dimensions associated with the multidimensional Delivery Drones Adoption behavior.

Timing of adoption

"*How much time did it take for the firm from decision-making to implementing drones for last-mile delivery?"* Our interviews with managers suggest that one of the dimensions of drone adoption behavior is the timing of adoption. It discusses how soon the firm intends to implement the technology from the time of decision-making to actual implementation. Maghazei et al. (2022) discuss how the timing of technology adoption, like delivery drones, plays a critical role in firm technology processes. A consultant at an FMCG firm explains how firms can gain competitive advantage based on how soon a firm adopts delivery drones for their offerings.

"By nature, technology is dynamic, and it evolves every day. A firm needs to analyze which technology is suitable for its domain and adopt it at the earliest to reap the benefits. On the flip side, technology must percolate into the market, and this would take time when technology is still developing. For example, delivery drones may take a little longer as the technology is not yet perfect, and many gaps must be filled. Strong players in the market may adopt the technology sooner by leveraging their capabilities and may have the edge over others and take the opportunity to capture the market. But other firms have to go with the wait-and-watch approach as there is not much clarity, and it is not easy to anticipate how the technology will shape." (Manager-M15)

Breadth of adoption

"The extent of using delivery drones for a different number of product categories offered by the firm." The breadth of adoption implies for which product categories and service offerings a firm intends to implement delivery drones. Chircu and Mahajan (2009) define mobile technology service breadth as service variety available for users. Similarly, in this study, we argue that a firm may decide not to implement at all, implement for a specific product category or all product categories/service offerings. For example, a senior partner at an apparel retail firm describes that the breadth of adoption indicates a firm's intention to implement delivery drones across multiple product categories and service offerings.

"A firm's decision on implementing delivery drones for service offerings would depend on multiple factors: product type, service type, customer segment, and geographical presence of the firm. It would be critical to identify the product category that is readily insured. It is also critical to consider customers' geographic location (individual homes or high-rise apartments), geofencing, no-flying zones, etc" (Manager-M18).

Depth (Volume sales) of adoption

"*The firm's total volume of the business covered by delivery drones.*" Depth of adoption discusses how deep in a product category the firm intends to implement drones, which translates to the volume of business. The prior technology literature discusses the depth of adoption as a measure of level of penetration of technology (Chircu and Mahajan 2009) and a metric of choice of technology diffusion (Kraemer et al. 2005). In our context, we argue that a firm's depth of adoption indicates customers' readiness for delivery drones and the fiscal viability of the firm. In an interview with a product manager at a multinational fast-food corporation, it is seen that,

> *"While deciding to adopt delivery drones, a firm needs to understand how viable it would be for the firm to adopt drones to various service offerings. The technology is still not mature, and it would demand firms to adopt the hybrid model (traditional delivery mode + Drone delivery). Several elements may influence the decision, like product weight, size, and packaging of the product. For example, if a grocery retailer has to deliver vegetables weighing about 1-5 lbs, it would be viable to use delivery drones, but it may not be a viable option if the weight of the vegetables is 8-10 lbs. Convenience is the most important criterion for customers to adopt drones. While consumers may prefer heavyweight packages to be shipped through drones, firms might prefer lightweight packages but are somewhat expensive to be shipped through drones."(Manager-M13)*

Data Analysis and Results

To examine the dimensions of drone adoption behavior, we use data from the firms that have adopted drones as a last-mile delivery. However, such data might experience a selection bias. Thus, we run the Heckman procedure to account for the selection bias. In the first stage, we estimate inverse mills ratio (IMR) using a Probit regression. We include the calculated IMR in the second stage and employ a Seemingly Unrelated Regression (SUR) approach to jointly estimate the dimensions of adoption among the three dependent variables (timing, breadth, and depth). We also use unique variables in each of the three equations for model identification purposes. This allows simultaneous evaluation of the three equations of observed variables (Greene 2003) and provides an opportunity to have unbiased regressions coefficients. We explain the variation in the three dimensions (timing, breadth, and depth) across firms using a set of relevant variables drawn from the triangulation approach. To estimate the dimensions (timing, breadth, and depth), we gather data on the firm financials (from the annual reports) that have adopted drones as a last-mile delivery. We operationalize the dimensions of drone adoption behavior as follows:

$$\textbf{Ln (Time\_Adoption}_i\textbf{)} = \gamma_0^{TA} + \gamma_1^{TA} \ln(Firm\_Size_i) + \gamma_2^{TA} \ln(Firm\_Age_i) + \gamma_3^{TA} Firm\_Industry_i + \sum Country_j + \mu_i^{TA} \lambda_i + u_i^{TA} \quad (5),$$

Where $Time\_Adoption_i$ is a continuous variable and is the time taken by a firm from the decision to implementing drone technology. $Firm\_Size_i$ is the number of employees in the firm, $Firm\_Age_i$ is the number of years the firm is in business, and $Firm\_Industry_i$ is the industry to which the firm functions. We include λ_i , the inverse mills ratio as an additional covariate. We include country dummies to control country-level heterogeneity.

$$\textbf{Ln (Breadth\_Adoption}_i\textbf{)} = \gamma_0^{BA} + \gamma_1^{BA} Product\_type_i + \gamma_2^{BA} Product\_size_i + \gamma_3^{BA} Firm\_Ownership_i + \gamma_4^{BA} \ln(Firm\_Revenue_{it-1}) + \gamma_5^{BA} Firm\_Industry_i + \sum Country_j + \mu_i^{BA} \lambda_i + u_i^{BA} \quad (6),$$

Where $Breadth\_Adoption_i$ is expressed as the ratio (percentage) of a number of product categories served by drones to the total number of product categories the firm serves. $Product\_type_i$ is the binary variable with 1 for non-perishable product, and 0 otherwise, $Product\_size_i$ is the product weight that a firm can deliver through drone (equals to 1 if weight < 2.5kgs, 0 otherwise), $Firm\_Ownership_i$ is the type of firm (dummy equals to 1 if the firm is public, 0 otherwise), $Firm\_Revenue_{it-1}$ is the previous year revenue of the firm, and $Firm\_Industry_i$ is the industry in which the firm operates. We include λ_i, the inverse mills ratio as an additional covariate. We include country dummies to control country-level heterogeneity.

$$\textbf{Ln (Depth\_Adoption}_i\textbf{)} = \gamma_0^{DA} + \gamma_1^{DA} \ln(P\_Density_j) + \gamma_2^{DA} \ln(H\_Income_j) + \gamma_3^{DA} Firm\_Ownership_i + \gamma_4^{DA} \ln(Firm\_Revenue_{it-1}) + \gamma_5^{DA} Firm\_Industry_i + \sum Country_j + \mu_i^{BA} \lambda_i + u_i^{DA} \quad (7),$$

Where $Depth\_Adoption_{2i}$ is expressed as the ratio (percentage) of sales through drones to total sales in year *t*, which translates to the total volume of the business. $P\_Density_j$ is the population density of country *j* and H_Income_j is the household income of the country, $Firm\_Ownership_i$ is the type of firm (binary equals to 1 if the firm is public, and 0 otherwise), $Firm\_Revenue_{it-1}$ is the previous year revenue of the firm, and $Firm\_Industry_i$ is the industry in which the firm operates. We include λ_i, the inverse mills ratio as an additional covariate. We include country dummies to control country-level heterogeneity.

Empirical support is identified (Table 9), and the findings extend our understanding of the three dimensions of drone adoption behavior. All the regression coefficients are statistically significant at $p<.1$ except for Firm_Ownership, indicating delivery drone adoption does not vary among private or public firms. Firm_Size is the predictor variable with a negative coefficient indicate that larger firms with access to resources, capabilities and expertise may adopt delivery drone quicker than smaller firms. Firm_Age predictor variable with a positive coefficient suggest that legacy firms are burdened with structural inertia and show resistance to new technology adoption. In the next section, we discuss the implications of the study and present future research opportunities.

---Insert Table 9 about here---

Discussion and Implications

The study aims to identify the antecedents to delivery drone adoption by potential firms and provide guidelines for implementing drones as the last-mile delivery option. Our proposed framework integrates two theoretical perspectives by drawing upon the T-O-E framework and Innovation Resistance Theory. The empirical results show that firm-related capabilities (technological, marketing, and operational) are statistically significant antecedents to a firm's decision to adopt drones for last-mile delivery. This is also consistent with the T-O-E framework (Tornatzky and Fleischer, 1990). This means that having expertise that facilitates the adoption of drone technology can help managers and policymakers make informed decisions.

In the context of the stakeholder concerns, all three - consumer, employee, and environment being statistically significant antecedents (P2a, P2b, and P2c), support P2. The negative association of stakeholder concerns to drone adoption indicates that the firms need to be aware of and anticipate probable concerns from the stakeholders. Managers should work towards educating consumers and employees and building trust (Zhu et al. 2020) towards using drones as a last-mile delivery service option. Our analysis shows a higher magnitude of consumer concern than employee concern; this is consistent with Innovation Resistance theory (Ram and Sheth 1989), where various barriers/ risks strongly impact consumer probability to accept drones as last-mile delivery option (Hwang et al. 2021).

Considering the economic viability, the cost-benefit analysis is a statistically significant factor for delivery drone adoption, confirming P3. Therefore, managers need to do a cost-benefit analysis by including returns and risks associated with implementing drone as a last-mile delivery option.

Theoretical Implications

While a few studies discuss consumer concerns and viability of delivery drones, a deep analysis to understand the drivers of drone adoption is critical. To our knowledge, this is the first study that considers a two-way perspective, combining firm and customer side factors about delivery drones. *First*, we contribute to the sparse literature and less learned digital technology, i.e., delivery drones in the marketing, operations, and logistics areas, through a comprehensive exploration by highlighting the drivers and impeding factors of adoption of drones as a last-mile delivery option. To develop the framework, we conduct a triangulation analysis based on results from the interviews, marketplace evidence, and draw upon the T-O-E framework and Innovation Resistance Theory. *Second*, we empirically validate the propositions and present the results indicating that the firm-related capabilities and economic viability have a positive association whereas stakeholder concerns have a negative association with a firm's decision for drone adoption. We draw upon theoretical perspectives and empirically demonstrate that a firm's decision to adopt delivery drone is influenced by endogenous factors (within firm capabilities) and exogenous factors (customer and environment concerns). *Third*, the study contributes to the drone technology literature by constructing the dimensions (timing, breadth, and depth) of drone adoption behavior. We empirically explain the adoption variation among adopters as a function of firm-related, market-related, and socioeconomic variables. Phase 3 highlights the relative importance of the dimensions in adoption behavior, and this variance can further lead to a new theory development around technology management in last-mile delivery strategies. We also answer Beninger and Robson (2020) call for further exploring of the drivers contributing to the adoption of delivery drones.

Practical Implications

We propose that delivery drone adoption is influenced by firm-related and consumer-related factors; we empirically see this to be the case. Since our findings show that technological, operational, and marketing capabilities influence drone adoption, we suggest firms consider all three capabilities together rather than seeing them as siloed capabilities. This can benefit the most by equally focussing on building all three capabilities (Ali et al. 2022). Secondly, the negative effect of stakeholder concerns directs the need to anticipate impeding factors and concerns. Delivery drone is one such new-age technologies that brings both positive and negative outcomes to the society at large. Therefore, firms must weigh the risk and benefits of this technology. The dynamic nature of the new-age technology like delivery drones and ever-changing consumer behavior push firms to act to such changes simultaneously. A manager of a retail firm expressed that,

" The new age technologies or also known as emerging technologies, are very dynamic by nature and this creates an ambiguity among firm's strategic decisions… Firms can offer enhanced customer experience through drone delivery service but unless issues related to privacy and security are not addressed it will be very difficult for a consumer to embrace this service. A detailed analysis of intrinsic and extrinsic factors can help firm's make informed decisions" (Manager-M12)

Future Research Opportunities

Our findings provide several implications for both scholars and practitioners. However, the study suffers from limitations, First, we consider only two industries (medicines & medical supplies and retail & food service). It would be interesting to see how drone adoption varies across multiple industries. Second, we consider only the countries where drone delivery is approved. Further research is needed to see how government regulations can alter the firm's decisions. Third, we urge researchers to explore drone technology further by conducting confirmatory analysis in different contexts. Finally, survey data and very proprietary nature of the data creates obstacles to test few statistical challenges. However, as the stream progress, and popularity and implications increase, future research should be able to cover deeper aspects related to drone adoptions through methodological advancements. We present future research opportunities in drone technology in the context of delivery with a broader view (see Table 10).

---Insert Table 10 about here---

Conclusion

The study investigates the antecedents of drone adoption as a last-mile delivery service option. This study identifies four important antecedents (firm capabilities, stakeholder concerns, economic viability, and government regulations) to drone adoption. The empirical results confirm our conceptual framework and propositions.

As drone technology is still in the nascent stage, it is critical to see how last-mile delivery through drones will be perceived, and how its potential to change the business landscape, with respect to customers, the environment, and society would be received. It is vital to assess the viability of delivery drones, i.e., why they can fail? Here, we bring in the Uber case. Uber entered with a bang and had pulled venture capitalists to invest in its business model with a profitable future in view. It offered an alternative to traditional taxis with lower costs to enter new markets (Maier 2021). But, as labor problems amplified, it increased the prices too, which negatively impacted Uber rides' demand and reduced profitability. Would delivery drones face a similar fate, or can they reap real benefits for firms and consumers? More profound exploration is warranted to unravel this mystery. We acknowledge that the dynamic advancement of drone technology might lead to changes in the implementation of drones in the delivery process, consumers' preferences, and firms' necessity to use such technologies.

References

Agatz, N., Bouman, P., & Schmidt, M., (2018). Optimization approaches for the traveling salesman problem with drone. *Transportation Science*, *52*(4), 965-981.

Ali, S. S., Kaur, R., & Abbas, H. (2022). Feasibility of Drones as the Next Step in Innovative Solution for Emerging Society. *Artificial Intelligence in Industry 4.0 and 5G Technology*, 179-208.

Ali, S. S., Kaur, R., Gupta, H., Ahmad, Z., & Elnaggar, G. (2021). Determinants of an organization's readiness for drone technologies adoption. *IEEE Transactions on Engineering Management*.

Aurambout, J.-P., Gkoumas, K., Ciuffo, B. (2019). Last-mile delivery by drones: An estimation of viable market potential and access to citizens across European cities. *European Transport Research Review* 11, 1-21.

Alkhalifah, A., Alorini, F., & Alturki, R. (2022). Enhancement of E-commerce Service by Designing Last-mile Delivery Platform. *Computer Systems Science & Engineering*, *42*(1).

Awa, H. O., Baridam, D. M., & Nwibere, B. M. (2015). Demographic determinants of electronic commerce (EC) adoption by SMEs: A twist by location factors. *Journal of Enterprise Information Management*.

Awa, H. O., Ojiabo, O. U., & Emecheta, B. C. (2015). Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. *Journal of Science & Technology Policy Management*, *6*(1), 76-94.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, *16*, 74-94.

Baker, J. (2012). The technology–organization–environment framework. *Information Systems Theory: Explaining and Predicting Our Digital Society, Vol. 1*, 231-245.

Baker, A (2017). The American drones saving lives in Rwanda. https://time.com/rwanda-drones-zipline/

Baloch, G., and Gzara, F. (2020). Strategic network design for parcel delivery with drones under competition. *Transportation Science*, *54*(1), 204-228.

Bates, O., Friday, A., Allen, J., Cherrett, T., McLeod, F., Bektas, T., ... & Davies, N. (2018, April). Transforming last-mile logistics: Opportunities for more sustainable deliveries. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1-14.

Beninger, S., and Robson, K. (2020). The disruptive potential of drones. *Marketing Letters*, *31*(4), 315-319.

Borghetti, F., Caballini, C., Carboni, A., Grossato, G., Maja, R., & Barabino, B. (2022). The use of drones for last-mile delivery: A numerical case study in Milan, Italy. *Sustainability*, *14*(3), 1766.

Barlow, Z., Jashami, H., Sova, A., Hurwitz, D.S., Olsen, M.J. (2019). Policy processes and recommendations for Unmanned Aerial System operations near roadways based on visual attention of drivers. *Transportation Research Part C: Emerging Technologies* 108, 207-222.

Berry, L. L., Seiders, K., & Grewal, D. (2002). Understanding service convenience. *Journal of Marketing*, 66(3), 1-17.

Bradford, M., Florin, J. (2003). Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems. *International Journal of Accounting Information Systems* 4, 205-225.

Boucher, P. (2016). 'You wouldn't have your granny using them': drawing boundaries between acceptable and unacceptable applications of civil drones. *Science and Engineering Ethics*, *22*, 1391-1418.

Cepeda, Gabriel, and Dusya Vera. (2007). Dynamic Capabilities and Operational Capabilities: A Knowledge Management Perspective. *Journal of Business Research,* 60 (5), 426–37.

Chang, Y. S., and Lee, H. J. (2018). Optimal delivery routing with wider drone-delivery areas along a shorter truck-route. *Expert Systems with Applications*, *104*, 307-317.

Chircu, A. M., & Mahajan, V. (2009). Perspective: Revisiting the digital divide: An analysis of mobile technology depth and service breadth in the BRIC countries. *Journal of Product Innovation Management*, 26(4), 455-466.

Chwelos, P., Benbasat, I., & Dexter, A. S. (2001). Empirical test of an EDI adoption model. *Information Systems Research*, *12*(3), 304-321.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*(1), 37-46.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 128-152.

Clothier, R. A., Greer, D. A., Greer, D. G., & Mehta, A. M. (2015). Risk perception and the public acceptance of drones. *Risk Analysis*, *35*(6), 1167-1183.

Coombs, J. E., & Bierly III, P. E. (2006). Measuring technological capability and performance. *R&D Management*, *36*(4), 421-438.

Cornell. A, Kloss. B, Presser. DJ, and Riedel. R, (2023). Drones take to the sky, potentially disrupting last-mile delivery. https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/future-air-mobility-blog/drones-take-to-the-sky-potentially-disrupting-last-mile-delivery

Day, George S. (1994). The Capabilities of Market-Driven Organizations. *Journal of Marketing*, 58 (4), 37–52.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 319-340.

Dutta, S., Narasimhan, O. and Rajiv, S. (1999). Success in high-technology markets: Is marketing capability critical?. *Marketing Science*, 18(4), 547-568.

Elias. J. (October 18, 2019). Alphabet's Wing launches first commercial drone delivery. https://www.cnbc.com/2019/10/18/alphabets-wing-launches-first-commercial-drone-delivery.html

Eißfeldt, H., Vogelpohl, V., Stolz, M., Papenfuß, A., Biella, M., Belz, J., & Kügler, D. (2020). The acceptance of civil drones in Germany. *CEAS Aeronautical Journal*, 11(3), 665-676.

Eskandaripour, H., Boldsaikhan, E. (2023). Last-Mile Drone Delivery: Past, Present, and Future. Drones 7, 77.

Estrada .Z. (2018). Alphabet, other companies want strict drone rules to apply to everyone. https://www.theverge.com/2018/4/9/17216288/alphabet-amazon-faa-drone-rules

Figliozzi, M. A. (2020). Carbon emissions reductions in last-mile and grocery deliveries utilizing air and ground autonomous vehicles. *Transportation Research Part D: Transport and Environment*, 85, 102443.

Forbes Insights. (2018). Logistics, Supply Chain and Transportation 2023: Change at breakneck speed.

Gawor, T. and Hoberg, K. (2019). Customers' valuation of time and convenience in e-fulfillment. *International Journal of Physical Distribution and Logistics Management*, Vol. 49 No. 1, 75-98.

Giones, F., Gurses, K., & Brem, A. (2019). The interplay of technology entrepreneurs and regulation in a new industry: the case of the drone industry. In *Handbook of Research on Techno-Entrepreneurship, Third Edition*. Edward Elgar Publishing.

Goodchild, A., & Toy, J. (2018). Delivery by drone: An evaluation of unmanned aerial vehicle technology in reducing CO2 emissions in the delivery service industry. *Transportation Research Part D: Transport and Environment*, *61*, 58-67.

Gorsuch, R. L. (2013). Factor analysis. Psychology press.

Greene, W. H. (2003). *Econometric Analysis*. Pearson Education India.

Gruber, M., MacMillan, I. C., & Thompson, J. D. (2008). Look before you leap: Market opportunity identification in emerging technology firms. *Management Science*, *54*(9), 1652-1665.

Guttman. Chase, (2022).Why Drone Delivery Is Destined to Make a Difference. https://www.nutanix.com/theforecastbynutanix/technology/why-drone-delivery-is-destined-to-make-a-difference

Ha, Q. M., Deville, Y., Pham, Q. D., and Hà, M. H. (2018). On the min-cost traveling salesman problem with drone. *Transportation Research Part C: Emerging Technologies*, *86*, 597-621.

Haidari, L. A., Brown, S. T., Ferguson, M., Bancroft, E., Spiker, M., Wilcox, A., ...and Lee, B.Y. (2016). The economic and operational value of using drones to transport vaccines. *Vaccine*, *34*(34), 4062-4067.

Hair, J., Anderson, R, Tatham, R., & Black. (1998). Multivariate Data Analysis (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Holotiuk, F., Pisani, F., & Moormann, J. (2018). Unveiling the key challenges to achieve the breakthrough of Blockchain: Insights from the payments industry.

Holmström, J., Holweg, M., Lawson, B., Pil, F.K. Wagner, S.M. (2019). The digitalization of operations and supply chain management: Theoretical and methodological implications. *Journal of Operations Management* 65, 728-734

Hosmer, D. W., & Lemesbow, S. (1980). Goodness of fit tests for the multiple logistic regression model. *Communications in Statistics-Theory and Methods*, 9(10), 1043-1069.

Hsu, P. F., Kraemer, K. L., & Dunkle, D. (2006). Determinants of e-business use in US firms. *International Journal of Electronic Commerce*, 10(4), 9-45.

Hwang, J., Cho, S. B., and Kim, W. (2019). Consequences of psychological benefits of using eco-friendly services in the context of drone food delivery services. *Journal of Travel & Tourism Marketing*, *36*(7), 835-846.

Hwang, J., Kim, J.J., Lee, K.-W. (2021). Investigating consumer innovativeness in the context of drone food delivery services: Its impact on attitude and behavioral intentions. *Technological Forecasting and Social Change* 163, 120433

Hwang, J., Lee, J. S., Kim, J. J., and Sial, M. S. (2021). Application of internal environmental locus of control to the context of eco-friendly drone food delivery services. *Journal of Sustainable Tourism*, 29(7), 1098-1116.

Jeong, H. Y., Song, B. D., and Lee, S. (2019). Truck-drone hybrid delivery routing: Payload-energy dependency and No-Fly zones. *International Journal of Production Economics*, *214*, 220-233.

Kassarjian, H. H. (1977). Content analysis in consumer research. *Journal of Consumer Research*, 4(1), 8-18.

Kaur, P., Dhir, A., Ray, A., Bala, P. K., & Khalil, A. (2020). Innovation resistance theory perspective on the use of food delivery applications. *Journal of Enterprise Information Management*, 34(6), 1746-1768.

Kaur, P., Dhir, A., Singh, N., Sahu, G., & Almotairi, M. (2020). An innovation resistance theory perspective on mobile payment solutions. *Journal of Retailing and Consumer Services*, *55*, 102059.

Kauffman, R.J., Walden, E.A., (2001). Economics and electronic commerce: Survey and directions for research. *International Journal of Electronic Commerce* 5, 5-116

Keeney, T. (2016). Drone delivery: How can Amazon charge $1 for drone delivery? https://ark-invest .com/research/drone-delivery-amazon.

Khalil, A., Shankar, A., Bodhi, R., Behl, A., & Ferraris, A. (2022). Why Do People Resist Drone Food Delivery Services? An Innovation Resistance Theory Perspective. *IEEE Transactions on Engineering Management.*

Khan, R., Tausif, S., and Javed Malik, A. (2019). Consumer acceptance of delivery drones in urban areas. *International Journal of Consumer Studies*, 43(1), 87-101.

Kim, S. H. (2020). Choice model based analysis of consumer preference for drone delivery service. *Journal of Air Transport Management*, 84, 101785.

Kirschstein, T. (2020). Comparison of energy demands of drone-based and ground-based parcel delivery services. *Transportation Research Part D: Transport and Environment,* 78, 102209.

Koetsier. J (2021). Drone Delivery Is Live Today And It's 90% Cheaper Than Car-Based Services. https://www.forbes.com/sites/johnkoetsier/2021/08/18/drone-delivery-is-live-today-and-its-90-cheaper-than-car-based-services/?sh=23164df04d02

Kraemer, K. L., Ganley, D., & Dewan, S. (2005). Across the digital divide: A cross-country multi-technology analysis of the determinants of IT penetration. *Journal of the Association for Information Systems*, 6(12), 10.

Krasnikov, A., & Jayachandran, S. (2008). The relative impact of marketing, research-and-development, and operations capabilities on firm performance. *Journal of Marketing,* 72(4), 1-11.

Krippendorff, K. (2018). *Content Analysis: An Introduction to Its Methodology* . Sage publications.

Kumar, V., (2018). Transformative marketing: The next 20 years. *Journal of Marketing* 82, 1-12

Kumar, V., (2021). Intelligent Marketing: Employing New-Age Technologies. Sage Publications Pvt. Limited

Kulviwat, S., Bruner II, G. C., Kumar, A., Nasco, S. A., & Clark, T. (2007). Toward a unified theory of consumer acceptance technology. *Psychology & Marketing*, *24*(12), 1059-1084.

Lee, M., & Cunningham, L. F. (2001). A cost/benefit approach to understanding service loyalty. *Journal of Services Marketing*, *15*(2), 113-130.

Leon, S., Chen, C., & Ratcliffe, A. (2021). Consumers' perceptions of last-mile drone delivery. *International Journal of Logistics Research and Applications*, 25(1), 1–20.

Leong, L. Y., Hew, T. S., Ooi, K. B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural network approach. *International Journal of Information Management*, 51, 102047.

Lim, S.F.W., Jin, X., Srai, J.S. (2018). Consumer-driven e-commerce: A literature review, design framework, and research agenda on last-mile logistics models. *International Journal of Physical Distribution & Logistics Management* 48, 308-332

Lyon-Hill, S., Tilashalski, M., Ellis, K., & Travis, E. (2020). Measuring the effects of drone delivery in the United States.

Lyons, M., Brandis, K., Callaghan, C., McCann, J., Mills, C., Ryall, S., and Kingsford, R. (2018). Bird interactions with drones, from individuals to large colonies. *Australian Field Ornithology*, 35,51-56.

Maghazei, O., Lewis, M. A., & Netland, T. H. (2022). Emerging technologies and the use case: A multi-year study of drone adoption. *Journal of Operations Management,* 68(6-7), 560-591.

Manyika. James, (2017). Technology, Jobs and the future of work. McKinsey & Company. https://www.mckinsey.com/featured-insights/employment-and-growth/technology-jobs-and-the-future-of-work#

Macioszek, E. (2017). First and last-mile delivery – problems and issues. *Scientific and Technical Conference Transport Systems Theory and Practice,* Springer, Cham and Katowice, 147-154.

Maier G. (2021). Will Uber still exist by the end of the decade? https://blogs.lse.ac.uk/businessreview/2021/10/29/will-uber-still-exist-by-the-end-of-the-decade/

Mangiaracina, R., Perego, A., Seghezzi, A., & Tumino, A. (2019). Innovative solutions to increase last-mile delivery efficiency in B2C e-commerce: a literature review. *International Journal of Physical Distribution & Logistics Management*, 49(9), 901- 920.

McCutcheon, D. M., & Wood, A. R. (1989). Effects of technical experience on robot implementations. *International Journal of Operations & Production Management*, 9(7), 5-16.

Melkonyan, A., Gruchmann, T., Lohmar, F., Kamath, V., Spinler, S. (2020). Sustainability assessment of last-mile logistics and distribution strategies: The case of local food networks. *International Journal of Production Economics* 228, 107746

Mende, M., Scott, M. L., van Doorn, J., Grewal, D., & Shanks, I. (2019). Service robots rising: How humanoid robots influence service experiences and elicit compensatory consumer responses. *Journal of Marketing Research*, *56*(4), 535-556.

Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology*, *30*(1), 80-94.

Morgan, N. A., Vorhies, D. W., & Mason, C. H. (2009). Market orientation, marketing capabilities, and firm performance. *Strategic Management Journal*, *30*(8), 909-920.

Moorman, Christine, and Rebecca J. Slotegraaf. (1999). The Contingency Value of Complementary Capabilities in Product Development, *Journal of Marketing Research*, 36 (2), 239–57.

Murray, C. C., and Chu, A. G. (2015). The flying sidekick traveling salesman problem: Optimization of drone-assisted parcel delivery. *Transportation Research Part C:Emerging Technologies*, *54*, 86-109.

Nunnally, J. C. (1978). An overview of psychological measurement. Clinical diagnosis of mental disorders: A handbook, 97-146.

Nunnally, J. C., & Berstein, I. H. (1994). Psychometric Theory. 3. Edit. McCraw-Hill. Inc. New York.

Oliveira, T., & Martins, M. F. (2011). Literature review of information technology adoption models at firm level. *Electronic Journal of Information Systems Evaluation*, 14(1), 110.

Osakwe, C. N., Hudik, M., Říha, D., Stros, M., & Ramayah, T. (2022). Critical factors characterizing consumers' intentions to use drones for last-mile delivery: Does delivery risk matter?. *Journal of Retailing and Consumer Services*, *65*, 102865.

Ozturk, A. B., Bilgihan, A., Nusair, K., & Okumus, F. (2016). What keeps the mobile hotel booking users loyal? Investigating the roles of self-efficacy, compatibility, perceived ease of use, and perceived convenience. I*nternational Journal of Information Management*, 36(6), 1350-1359.

Pagell, M., Handfield, R. B., & Barber, A. E. (2000). Effects of operational employee skills on advanced manufacturing technology performance. *Production and Operations Management*, 9(3), 222-238.

Palmer, A. (2020). Amazon wins FAA approval for Prime Air drone delivery fleet. https://www.cnbc.com/2020/08/31/amazon-prime-now-drone-delivery-fleet-gets-faa-approval.html

Parasuraman, A. (2000). Technology Readiness Index (TRI) a multiple-item scale to measure readiness to embrace new technologies. *Journal of Service Research*, 2(4), 307-320.

Park, J., Kim, S., and Suh, K. (2018). A comparative analysis of the environmental benefits of drone-based delivery services in urban and rural areas. *Sustainability*, *10*(3), 888.

Ramadan, Z. B., Farah, M. F., & Mrad, M. (2017). An adapted TPB approach to consumers' acceptance of service-delivery drones. *Technology Analysis & Strategic Management*, *29*(7), 817-828.

Ram, S., Sheth, J.N. (1989). Consumer resistance to innovations: the marketing problem and its solutions. *Journal of Consumer Marketing* 6, 5-14

Ranieri, L., Digiesi, S., Silvestri, B., Roccotelli, M. (2018). A review of last-mile logistics innovations in an externalities cost reduction vision. *Sustainability* 10, 782

Rao, B., Gopi, A. G., & Maione, R. (2016). The societal impact of commercial drones. *Technology in Society*, 45, 83-90.

Rashidzadeh, E., Hadji Molana, S.M., Soltani, R., Hafezalkotob, A. (2021). Assessing the sustainability of using drone technology for last-mile delivery in a blood supply chain. *Journal of Modelling in Management* 16, 1376-1402.

Robins, J. M., & Finkelstein, D. M. (2000). Correcting for noncompliance and dependent censoring in an AIDS clinical trial with inverse probability of censoring weighted (IPCW) log-rank tests. *Biometrics*, 56(3), 779-788.

Robins, J. M., Rotnitzky, A., & Zhao, L. P. (1995). Analysis of semiparametric regression models for repeated outcomes in the presence of missing data. *Journal of the American Statistical Association*, 90(429), 106-121.

Rodrigues, T.A., Patrikar, J., Oliveira, N.L., Matthews, H.S., Scherer, S., Samaras, C. (2022). Drone flight data reveal energy and greenhouse gas emissions savings for very small package delivery. Patterns 3, 100569.

Rogers, E. M. (2003). Diffusion of innovations. Free Press, New York, 551.

Sah, B., Gupta, R., & Bani-Hani, D. (2021). Analysis of barriers to implement drone logistics. *International Journal of Logistics Research and Applications*, *24*(6), 531-550.

Sambamurthy, V., Bharadwaj, A., and Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, 237-263.

Shokouhyar, S., Shokoohyar, S., Sobhani, A., & Gorizi, A. J. (2021). Shared mobility in post-COVID era: New challenges and opportunities. *Sustainable Cities and Society*, 67, 102714.

Speier, C., and Venkatesh, V. (2002). The hidden minefields in the adoption of sales force automation technologies. *Journal of Marketing*, 66(3), 98-111.

Sood, A., Kumar, V., Gupta, S. (2023). Modeling the antecedents of multi-generational services adoption behavior of clients across countries: The role of mindset metrics. *Journal of International Business Studies*, 1-26.

Stock, R. M., Oliveira, P., & Von Hippel, E. (2015). Impacts of hedonic and utilitarian user motives on the innovativeness of user-developed solutions. *Journal of Product Innovation Management*, *32*(3), 389-403.

Stolaroff, J. K., Samaras, C., O'Neill, E. R., Lubers, A., Mitchell, A. S., and Ceperley, D. (2018). Energy use and life cycle greenhouse gas emissions of drones for commercial package delivery. *Nature Communications*, *9*(1), 1-13.

Tan, K. C., Kannan, V. R., & Narasimhan, R. (2007). The impact of operations capability on firm performance. *International Journal of Production Research*, *45*(21), 5135-5156.

Tatum, M. C., & Liu, J. (2017). Unmanned aircraft system applications in construction. *Procedia Engineering*, *196*, 167-175.

Teo, T. S., Lin, S., & Lai, K. H. (2009). Adopters and non-adopters of e-procurement in Singapore: An empirical study. *Omega*, *37*(5), 972-987.

Tian, L., Zhao, L., & Wei, L. J. (2014). Predicting the restricted mean event time with the subject's baseline covariates in survival analysis. *Biostatistics*, *15*(2), 222-233.

Tornatzky, L. G., & Fleischer, M. (1990). Processes of Technological Innovation. Lexington books.

Unwin.Tim. (2020). Digital Technologies Are Part of the Climate Change Problem. ICTworks. https://www.ictworks.org/digital-technologies-climate-change-problem/#.YwiASnZByUm

Ulmer, M. W., and Thomas, B. W. (2018). Same-day delivery with heterogeneous fleets of drones and vehicles. *Networks*, *72*(4), 475-505.

Vanelslander, T., Deketele, L., Van Hove, D. (2013). Commonly used e-commerce supply chains for fast moving consumer goods: comparison and suggestions for improvement. *International Journal of Logistics Research and Applications* 16, 243-256

Vlahovic, N., Knezevic, B., & Batalic, P. (2017). Implementing delivery drones in logistics business process: Case of pharmaceutical industry. *International Journal of Mechanical and Industrial Engineering*, *10*(12), 4026-4031.

Vorhies, Douglas W., and Neil A. Morgan. (2005). Benchmarking marketing capabilities for sustainable competitive advantage. *Journal of Marketing* 69, no. 1: 80-94.

Welch, Adrienne, (2015). A cost-benefit analysis of Amazon Prime Air.

West, J. P., Klofstad, C. A., Uscinski, J. E., and Connolly, J. M. (2019). Citizen support for domestic drone use and regulation. *American Politics Research*, *47*(1), 119-151.

Wooldridge, J. M. (2007). Inverse probability weighted estimation for general missing data problems. *Journal of Econometrics*, 141(2), 1281-1301.

Yoo, W., Yu, E., & Jung, J. (2018). Drone delivery: Factors affecting the public’s attitude and intention to adopt. *Telematics and Informatics*, 35(6), 1687–1700.

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, *27*(2), 185-203.

Zhu, X., Pasch, T. J., & Bergstrom, A. (2020). Understanding the structure of risk belief systems concerning drone delivery: A network analysis. *Technology in Society*, *62*, 101262.

Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: cross-country evidence from the retail industry. *Information Systems Research*, *16*(1), 61-84.

FIGURE 1: Conceptual Framework of Delivery Drone Adoption – Antecedents and Dimensions

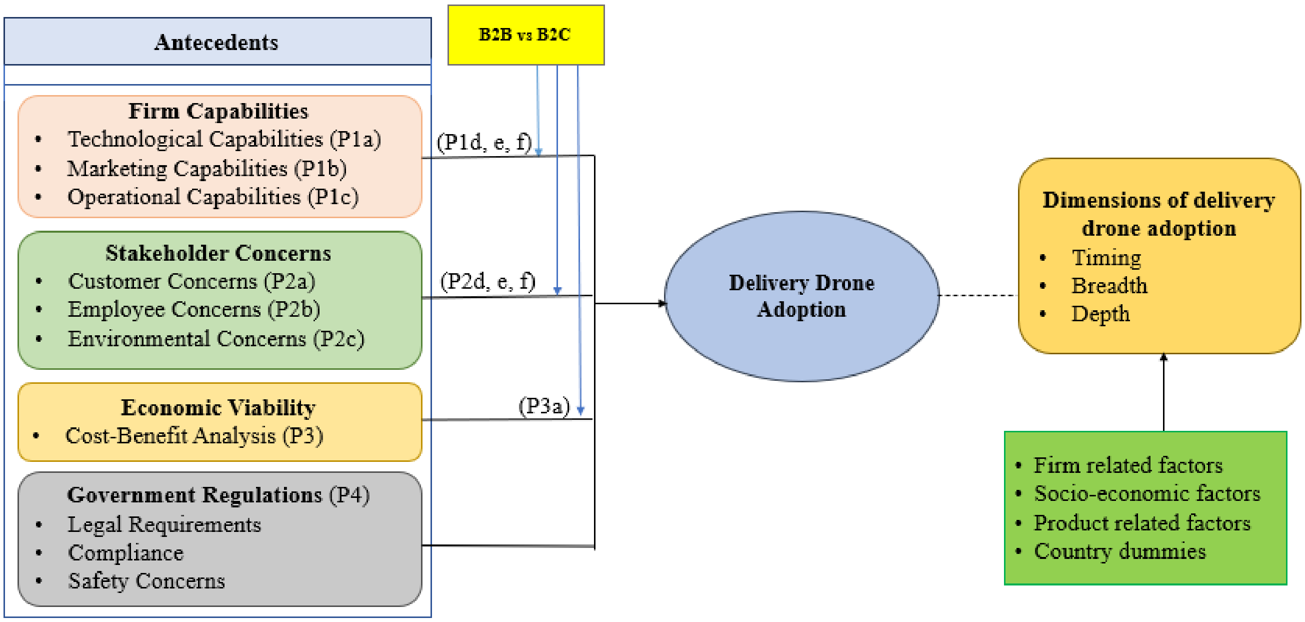


TABLE 1. Select Literature on Drones in the Context of Delivery.

Research Articles	**Drone Related Characteristics**			**Customer Concerns**	**Firm Benefits**	**Study Focus and Key Findings**
	Regulations	**Drone Attributes**	**Environmental Impact**			
Hwang et al., (2021)			✓			Pro-environmental behaviour with the use of drone delivery vs conventional delivery mode for food service, influences customers' intention to use and pay for such service.
Jeong et al., (2019)		✓				Package weight impacts the delivery effectiveness of drones in comparison to truck delivery.
Barlow et al., (2019)	✓					Strict regulations near roadways positively impacts delivery drone usage.
Hwang et al., (2019)				✓		Positive impact of drone on environment influences consumers' intention to use.
West et al., (2019)	✓			✓		Public acceptance of drone technology would largely be impacted by regulations.
Giones et al., (2019)	✓	✓				Delivery drone technology requires a co-evolution of technology, business, and regulations.
Goodchild and Toy, (2018)			✓			Drones reduce CO2 emissions and has positive impact on environment.
Park et al., (2018)			✓			Use of drones for parcel delivery in rural areas is beneficial along with environmental benefits.
Agatz et al., (2018)		✓				Use of hybrid mode (use of drone and truck) is beneficial and cost saving over single mode (use of only truck).
Chang, and Lee (2018)		✓				Drones show efficient package delivery mode in urban areas and hard to reach places like mountains.
Ha et al., (2018)		✓			✓	Use of drone delivery minimizes operational costs like transportation cost and waiting penalties.
Stolaroff et al., (2018)			✓	✓		Drone delivery can positively impact environment with less

						greenhouse emissions and less energy usage.
Ulmer and Thomas, (2018)				✓	✓	Delivery drones can provide better service for customers and benefits to firms with reduced delivery resource requirements.
Haidari et al., (2016)		✓				Drones are efficient for delivery of medical products considering costs associated attributes like speed and distance covered.
Murray, and Chu (2015)		✓		✓		Use of drones reduce delivery time and maximize the service quality.
Welch, 2015					✓	Package delivery by drones requires less capital investment than conventional delivery mode.

TABLE 2. Definition and Measurement of Variables used in the Conceptual Framework.

Construct	Definition	Item	Measurement Items	Similar Scale for Literature support
Technological Capability	The level of the technological capabilities acquired by the firm to adopt delivery drone technology.	TC1	Our firm allocates a specific budget for R & D for drone technology	Coombs, and Bierly, (2006)
		TC2	We quickly adapt to new technological changes and advancements in existing technologies	
		TC3	In our firm, the number of patents for drone technology grows yearly	
		TC4	Our firm is open to trying drone technology	
Marketing Capabilities	The level of the marketing capabilities readiness by the firm to adopt delivery drone technology.	MC1	Pricing of drone delivery services is comparable with the competitors	Morgan et al., (2009); Vorhies and Morgan, (2005)
		MC2	Our firm ensures that products/ services development efforts are responsive to consumer needs	
		MC3	We effectively segment and target the market we want to serve through drones	
		MC4	We provide required training to our support staff for using drone technology	
Op era tio	The level of operational	OC1	We have the ability to manage change well, while adopting drone technology	

	capabilities possessed by the firm to adopt delivery drone technology.	OC2	We have a value chain configuration in place for using drones	Cepeda and Vera, (2007)
		OC3	We know our channel partners (suppliers/distributors) well	
		OC4	We focus on knowledge embeddedness into new products/services	
Customer Concerns	Customer preparedness and likelihood of the use of delivery drone service with weighing risks and returns.	CC1	Drone delivery service is very useful and offers advantages over other delivery options	Kulviwat et al. (2007)
		CC2	I feel delivery through drones reduces time in comparison to delivery trucks and other delivery channels	
		CC3	It is complicated and difficult to use drone technology	
		CC4	It is worrying to see drone flying over my property	
Employee Concerns	The degree to which an employee believes that delivery drones can help his/her professional development.	EMC1	Drone service requires me to learn a lot before using this technology	Speier and Venkatesh (2002)
		EMC2	Drone technology usage is compatible to my current work	
		EMC3	I am fearful that the drone will fall over my head while operating	
		EMC4	Drone technology improves my work efficiency	
Environmental Concerns	The extent to which delivery drones will reduce carbon footprint and emission of CO_2 and positively impact environment.	ENC1	Drones affect the environment positively by reducing carbon emissions	Milfont and Duckitt (2010)
		ENC2	Drones does more environmental harm than doing good	
		ENC3	Humans are abusing the environment by advancing technology	
		ENC4	Drone technology creates false belief for solving issues	
Cost Benefit Analysis	Cost difference between delivery using drone technology and conventional delivery mode.	CBA1	The service cost of current delivery mode is much higher than the drone delivery mode	Lee and Cunningham (2001)
		CBA2	It takes a lot of time to get services from the current delivery mode (conventional delivery options)	

TABLE 3. Factor Analysis

Construct	Items	Standardized Factor Loadings	Cronbach's alpha	R^2	AVE	CR
Technological Capabilities	TC1	0.91	0.91	0.32	0.74	0.87
	TC2	0.89		0.45		
	TC3	0.84		0.33		
	TC4	0.78		0.66		
Marketing Capabilities	MC1	0.72	0.89	0.41	0.68	0.90
	MC2	0.83		0.57		
	MC3	0.88		0.53		
	MC4	0.79		0.43		
Operational Capabilities	OC1	0.88	0.90	0.68	0.73	0.88
	OC2	0.70		0.71		
	OC3	0.69		0.49		
	OC4	0.81		0.45		
Customer Concerns	CC1	0.83	0.83	0.61	0.67	0.89
	CC2	0.74		0.58		
	CC3	0.80		0.54		
	CC4	0.77		0.45		
Employee Concerns	EMC1	0.81	0.87	0.72	0.74	0.90
	EMC2	0.90		0.68		
	EMC3	0.79		0.51		
	EMC4	0.81		0.65		
Environmental Concerns	ENC1	0.86	0.85	0.73	0.79	0.93
	ENC2	0.72		0.44		
	ENC3	0.80		0.56		
	ENC4	0.76		0.48		
Cost-Benefit Analysis	CBA1	0.87	0.88	0.59	0.78	0.90
	CBA2	0.73		0.65		

Note: For each proposed construct we map items from the survey based on the support from extant literature

TABLE 4. Descriptive statistics

Variables	No. Obs.	Mean*	Std. Dev.*
Dependent Variable			
Delivery Drone Adoption (DDA)	101	0.45	0.49
Independent Variable			
Technological capabilities (TC)	101	3.68	1.162
Marketing capabilities (MC)	101	4.45	0.823
Operational capabilities (OC)	101	3.73	0.846
Customer concerns (CC)	101	3.92	0.828
Employee concerns (EMC)	101	3.56	0.78

Environmental concerns (ENC)	101	4.20	0.70
Cost-Benefit analysis (CBA)	101	4.26	0.68
Control Variables			
Country Dummies		Yes	
Industry Dummies		Yes	

**The mean and Std. Dev values are across two industries and five countries*

TABLE 5. Proposed Model Estimates

Independent Variable	**Estimates**	**P value**
Technological capabilities	0.136**	0.021
Marketing capabilities	0.228**	0.03
Operational capabilities	0.172**	0.023
Technological capabilities * Marketing capabilities * Operational capabilities	0.092*	0.06
Customer concerns	-0.311***	0.00
Employee concerns	-0.205**	0.011
Environmental concerns	-0.087**	0.010
Cost-benefit analysis	0.216**	0.016
Technological capabilities * B2B	0.0642*	0.051
Marketing capabilities * B2B	-0.045*	0.07
Operational capabilities * B2B	0.087	0.356
Customer concerns * B2B	0.078**	0.026
Employee concerns * B2B	0.098**	0.014
Environmental concerns * B2B	0.054	0.29
Cost-benefit analysis * B2B	0.245*	0.052
Sample Size	101 firms	

Significance: **p* <.1, ***p* < .05, ****p* < .01, we also include country and industry dummies. Note that we use bootstrapping to estimate the significance of the parameter estimates.

TABLE 6. IPCW logistic regression adjusted and unweighted estimates for delivery drone adoption

Independent Variables	**IPCW adjusted estimates**	**Unweighted estimates (Logit Model)**
Technological capabilities (TC)	0. 217**	0.136**
Marketing capabilities (MC)	0.286**	0.228**
Operational capabilities (OC)	0.211**	0.172**
Technological capabilities * Marketing capabilities * Operational capabilities (TC*MC*OC)	0.114**	0.092*
Customer concerns (CC)	-0.352**	-0.311***
Employee concerns (EMC)	-0.277**	-0.205**
Environmental concerns (ENC)	-0.169**	-0.087**

Cost-benefit analysis (CBA)	0.357***	0.216**
Technological capabilities * B2B	0.130*	0.0642*
Marketing capabilities * B2B	-0.064*	-0.045*
Operational capabilities * B2B	0.091	0.087
Customer concerns * B2B	0.099**	0.078**
Employee concerns * B2B	0.102**	0.098**
Environmental concerns * B2B	0.136	0.054
Cost-benefit analysis * B2B	0.317*	0.245*

Significance: *p <0.1, **p < .05, ***p < .01, we also include country and industry dummies.

TABLE 7. Marginal effects of IPCW

Independent Variable	Estimate	Std. Error
Technological capabilities	0.078*	0.481
Marketing capabilities	0.009**	0.006
Operational capabilities	0.087**	0.001
Customer concerns	-0.062**	0.22
Employee concerns	-0.031**	0.14
Environmental concerns	-0.044	0.031
Cost-benefit analysis	0.122*	0.006

TABLE 8. Dimensions of Delivery Drones Adoption

Dimensions of Delivery Drones Adoption	1. *Breadth*		2. *Depth* (*Volume)*		3. *Timing*	
	For what percent of total product categories and/or service offerings a firm decides to adopt drones, i.e., for some product categories/service offerings or for all product categories/service offerings		How deep in each product category and/or service offering does a firm intends to implement drones?		How long does it take for a firm from decision making to implementation of drones?	
Keywords and Phrases from interviews	product line, product range, phased investment, geographics, transition	partwise, delivery channel, fragment, labor replacement, scope, product type,	clustered units, reach, price-point, package size,	segment -wise, extend, weight of package, cost of delivery,	right away, gradual, expansion, marketing activities, technology stabilization level	simultaneous, technology upgrade, technology development, building capability, incremental

		new skill requirement, customer location	product category	service enhancement, product dimensions		
Illustrative Quotes from Managerial interviews	"May be phase-wise implementation of delivery drones will help us recognise the adoption challenges and address customer concerns." "As technology advances, implementation of drone for multiple activities would require continuous investment." "Geographical location of customers may drive the need for the delivery drone like delivery to remote areas."		"Drone is restrictive with product attributes like weight, size and shape, served hot/cold, timeliness, etc." "High priced products cannot be delivered using drones with the current technology as product safety is a big concern". "Weight of the package also plays a major role in deciding the delivery mode."		"We can add drones to present delivery options as they show benefits to both firm and customers." "It is important for us to allow technology to stabilize." "Gradual implementation of drones for delivery related activities" "I see drone implementation as a critical part of our strategic decisions."	

TABLE 9. Parameter Estimates for dimensions of Delivery Drone Adoption (Timing, Breadth, and Depth)

Independent Variables	Time_Adoption	Breadth_Adoption	Depth_Adoption
Firm Size	-0.082*		
Firm Age	0.002**		
Firm Industry	0.12**		
Product Type		0.476**	
Product Size		0.651*	
Firm Ownership		0.032	0.044
Firm Revenue		0.011**	0.021**
P_Density			0.004*
H_Income			0.015**
Inverse Mills ratio	-0.892*	-1.332*	-1.216*
R^2	0.454	0.326	0.379
Country dummies		Yes	

*$p < 0.1$, **$p < .05$, ***$p < 0.01$

TABLE 10. Future Research Opportunities

Emphasis	Future Research Directions
Delivery Drone Adoption-related	▪ Are there any differences in adopting drone technology in the package delivery process between traditional firms and technology-savvy firms?
Firm-related	▪ Will using drones for last-mile delivery differ for diverse product segments in the firms? ▪ Does the adoption of drone vary between firms with differing capabilities (technological, marketing, operational)? ▪ How will the adoption of drones benefit firms belonging to different industries? ▪ What governance issues do the firm need to consider while implementing drones? ▪ What will be the differential impact of drone technology on SMEs vs. large firms? ▪ Based on the applicability of drone technology to various purposes, what kind of innovations both in process and product are needed to heighten technology readiness and adoption by consumers to push firms to adopt delivery drones?
Stakeholder-related	▪ To what level do consumers need to educate themselves about using drones for delivery service? ▪ How does consumer acceptance of drones change over time? ▪ How do consumers show the difference in the delivery options based on the product choice? ▪ What kind of skill sets would employees need to have to result in a smooth process transition to using drone technology for last-mile delivery? ▪ What kind of technical training programs do firms need to provide to their employees to improve process efficiency?
Economic Viability	▪ What are the implications of drones for a firm's supply chain activities? ▪ Does conventional delivery mode differ from drone delivery mode? If yes, will it impact the delivery efficiency and overall delivery process? ▪ Under what conditions should the firm use a hybrid model (traditional mode + deliver drone) or completely move to drone delivery? ▪ How does delivery drone adoption differ between developed markets vs. emerging markets? ▪ How are other stakeholders, like society and the environment, impacted by using drone technology for delivery activities?
Government-related	▪ Do regulations impede drone adoption? ▪ How do regulations differ between countries, and how does it impact drone adoption? ▪ How do multinational firms manage drone adoption decisions across different units?

Appendix

Section A: Triangulation Approach

TABLE A1: Key Insights from Managerial Interviews

Industry	Select key Issues and Challenges	Select Benefits	Select Supporting Verbatims	Key Insights from interviews
Food Service	• Food may drop out from drones. • Liquid based food may spill over. • Additional training needed for staff members with the delivery drone technology usage.	• Reduced Manpower expense. • Provides convenience. • Creates Customer Excitement. • Innovative experience. • Quick delivery. • Supply and Demand side balance.	*"Delivery using drones may result in faster delivery, and at the same time, we would need lesser staff members to function at the same output level.* *"One question that a firm needs to answer: Can drones create a difference in the customer's mind? The customer would be more concerned about the food and not about the delivery mode. Is the food quality good, and is it on time, all that matters for them?"* *"Today, as customers are also technology savvy, they are inclined to experience new innovative options in their lives. Using drones for food delivery can create excitement among the customers and help us provide a better customer experience. But for providing this service, our people should also be equipped with the required skillset".* *"Drones in the food service industry is something very strange … I feel that when we use drones for food delivery the*	✓ Customers' acceptance of new technology depends on the associated benefits that the technology offers, which would affect the shift from human delivery to drone delivery. Food retailers may struggle to address the associated risks. ✓ Food service providers recognize the difficulty in predicting expectations of customers and future demand. ✓ The food industry depends on personal interaction between customers and staff members. Through gaining insights on customer preferences.

			major hurdle that we anticipate is "will drone be convenient and effective in carrying food without spilling or dropping over customers' head or places."	
Retail	• Customer safety and privacy related issues. • Heterogenous customer base. • Government Regulations. • Customers' expectations. • Delivery mode management. • Additional Infrastructure and resource investment. • Customer acquisition & retention. • Labor Management issues.	• Faster delivery. • Leveraging technology benefits. • Reduce operational costs.	*"As a new technology, drones still need to be understood by the companies that intend to implement it and on the other end also need to see how customers will respond to it. I see this having both pros and cons. It can help speed up the delivery but at the same can create concerns to customers. Unlike other technologies, it would be customers who would be the prime decision-makers for drone's survival in the market."* *"Our management is in the notion that current delivery channel is sufficient to provide good customer experience and focussing on filling the delivery related gap is important rather than adopting new technology when it is not sure with such strong regulations and developing technology if it will give us a competitive edge in the market."* *"New skillset requirement for using drone technology may affect the overall labor market."*	✓ Retailers lack clarity on the use of technology and employees with the technical skillset to operate drones in delivery activities and other business operations. ✓ Although Retailers realize they need to understand the new technology benefits for providing enhanced customer experience but have limited ability to invest capital in new technology. ✓ Local retailers / small and medium retailers do not recognize the value in using delivery drone technology as they do not find any value add for themselves and their customers.

			"Not all our customers would be inclined to use drones; we need to identify the customer segment to which we can cater this service." *"We are a family business, and our stores are operated by family members. Our customers are usually in the neighbourhood, and they make regular visits for shopping. Bringing in drones for delivery maybe not be very useful for us."*	
Medical Supplies	• Pricing decisions. • Demand Analysis and Prediction. • Employee training and development. • Third-Party Management.	• Quick Delivery. • Accessibility of medicine supplies. • In-time life-saving medicine delivery provision. • Providing support to reduce the Mortality rate.	*"Seeing the benefits that drones can provide to delivering life-saving medicines to people who find it difficult to get access in time, I believe that drones can prove as a boon in such scenarios. Certainly, drone technology needs refinement like its ability to travel long distances."* *"As far as medical supplies are concerned, I can say drones will be very useful with tangible benefits that both company and customers reap. But for general product deliveries, I am not sure as it would be more of an intangible benefit that a customer would gain, like better service experience. With this, I believe that drones may differentially impact product categories and would depend on*	✓ Firms perceive drones as a useful tool for medicine deliveries. ✓ Drone technology is perceived as expensive and challenging in business operations. Medical Suppliers need third-party interventions for using drones for delivery and have little access to technical skillsets.

			what type of product is delivered." *"Delivery drones may be faster but what is the price associated with the need for emergency medical supplies is crucial. For delivering general medicines would customers find the difference between various delivery modes?"* *"Decision on bringing drone technology into the delivery process would need us to see how to work with the third-party providers for offering such service to our customers."*	

TABLE A2: Application of Drones – Select Marketplace Evidence[a]

No.	Drone Applicability	Firm Name	Drone Usage	Associated Benefits for the firm	Evidence
1	Delivery of car parts	SEAT (car manufacturer)	B2B	• Improved operational efficiency. • Process Innovation. • Decreased CO_2 emissions. • Environmentally friendly.	"The SEAT factory in Martorell is the first Spanish plant to receive components via drone delivery. The addition of drones will improve flexibility on the production lines by connecting just over two-kilometre distance that separates both facilities for just-in-time fast deliveries" (Autocar Pro News Desk, 2019)
2	Inventory Counts	British Airways	B2B	• Smooth Effective operations. • Cost effectiveness.	"British Airways' parent company IAG, started using autonomous drones in a move towards full automation of inventory count in its air cargo facilities." (Menear, 2020)
3	Blood Delivery (Rwanda)	Zipline	B2C	• Faster delivery of vital medical supplies.	"U.S. start-up Zipline has teamed up with the Rwanda government to deliver blood supplies by drones." (Baker, 2017)

				• Providing essential medicines in time.	“Zipline has also deployed 30 drones for delivery of blood, vaccines and medication in Ghana” (de Leon 2019)
4	Product Delivery	Alibaba	B2C	• Better customer experience. • Competitive edge. • Personalized reach and customized service.	“China’s biggest internet retailer says it has begun testing drone-based deliveries to hundreds of customers” (Kelion, 2015) “Chinese e-commerce giant Alibaba has used drones to deliver packages over water for the first time.” (The Economic Times, November 2017)
5	Parcel Delivery	Alphabet	B2C	• Last mile delivery. • Customer loyalty. • Customized services.	“Alphabet’s drone unit WING has officially launched its first commercial drone delivery flight post receiving approval from Federal Aviation Administration (FAA). It partners with Walgreens and FedEx to air deliver products directly to consumers.” (Elias, October 2019)
6	Package Delivery	UPS	B2C	• Parcel delivery efficiency. • Customer satisfaction. • Better customer experience.	“UPS has successfully tested a residential drone delivery using unique approach where the drone is integrated into the existing day-to-day operations of the package delivery company. The drone flies back to the vehicle after delivering the package.” (Tech Staff, (2017).
7	Food Delivery	YO Sushi	B2C	• Quicker food delivery. • Creating excitement among customers. • Customer Relationship.	“iTray, the four-propeller flying waiter is outfitted with a flat top to carry plates and is controlled by a nearby waiter with an iPad. Two cameras on the machine help guide it to the proper starving patrons. As soon as the food is retrieved, the trays fly back to the kitchen.” (Carbone 2013)
8	Parcel Delivery	Amazon prime air	B2C	• Alternate sales channel. • Customer engagement and loyalty. • Marketing tactics.	“Amazon’s operating and safety procedure for an autonomous drone delivery service that will one day deliver packages to customers around the world. Amazon continues to develop and refine technology to fully integrate delivery drone into the airspace and work closely with the FAA and other regulators… to realize the vision of 30- minute delivery” (Palmer 2020)

9	Product Delivery	Flytrex	B2C	• Ease of processing the deliveries. • Logistics Management. • Innovative customer experience. • Personalized services.	“Flytrex, an Israeli drone delivery company is working with Walmart and other partners, to bring purchases to customers immediately. The start-up’s autonomous drones, which they make themselves, can carry six-pound deliveries up to three and half miles.” (Silver, 2020)

*Drones are also used for recreational purpose as personal product. [a] References in the table are presented at the end.

Section B: Details for Inverse probability Censoring Weightage (IPCW) methodology

Inverse probability censoring weightage estimator considers weights of uncensored units equal to inverse of the probability of being uncensored (Mansournia, 2016). This is a well-established estimator for survival analysis. Each unit of analysis, in our case each firm *i* was weighted by the inverse of the probability of each firm adopting the drone as a last mile delivery option. Thus, the adopters of drones received a weight equal to

$W_{i,\ non\text{-}adopter} = 1/e(Z_i)$

And non adopters of drones receive a weight equal to

$W_{i,\ non\text{-}adopter} = 1/\ (1\text{-}e(Z_i))$

The IPCW estimators of the mean and variance for Z_i can be found by a weighted maximum likelihood where the likelihood is weighted by ωi.

Steps for IPCW implementation:

Step 1. Model censoring probability: We calculate probability weights for all the firms under study and then fit a logistic regression to predict, using (Z) as covariates from that are key predictors of study. We calculate predicted probabilities (P (C=1/Z)) where C is the censoring indicator.

Step 2. Using 1/P as weights we fit weighted logistic regression: We calculate the IPCW weights for each observation, by taking inverse of the predicted censoring probability. That is among the firms that have adopted drones, we fit a logit regression with DDA as the outcome variable, and with Z as the covariates.

Step 3. We calculate stabilized of probability weights (S): The stabilized weights are calculated by product-limit estimator (Kaplan- Meier estimator) by including all covariates. We calculate predicted probabilities of censoring (S). Next, we calculate stabilized weights = SWeights = S/P.

Step 4. We fit weighted logistic regression using stabilized weights, SW = S/P, instead of 1/P. By using sandwich estimator, we correct the standard errors.

Section C: Robustness Check

For robustness check, additonal to the data from the third-party syndicated firm, out of seven variables, we gather secondary data for computing objective measures on three variables - technological capabilities, marketing capabilities, and operational capabilities. We adopt Stochastic Frontier Analysis (SFA)-- a widely used approach to calculate firm capabilities (Feng et al., 2015). The value of efficiency ranges between zero and one. We gather data on the firm financials from their annual reports for a period of five years (2018-2022). For the model estimation, we consider log terms to account for the nonlinear effects in the relationship in the equations for modelling capabilities. Note that we do so to have another set of measurements for capability dimensions and to show that our approach has any common method bias issue. The cross-sectional correlations (with firms as observations) between the survey-based measures and objective measures (is the average of the time period on which the estimation is done) for technological capabilities, marketing capabilities and operational capabilities are 0.74, 0.79, and 0. 81, respectively. We operationalize the variables as follows:

Technological Capabilities: We follow the extant literature (Feng, Morgan, and Rego, 2017), we estimate a firm's technological capabilities by considering the logarithm of patent count ($Patent\_count_{it}$ is the number of patents). The technological capabilities of a firm at a given time will be influenced by the following as inputs: $R\&D\_Exp_{it}$ is R&D expenses, $Patent\_Output_{it}$ is the available stock of patents for firm *i* for the year *t*. We add industry, and country dummies and ε_{it} is idiosyncratic error.

$$\ln(Patent\_count_{it}) = \beta_0^{TC} + \beta_1^{TC} \ln(R\&D\_Exp_{it}) + \beta_2^{TC} \ln(Patent\_Output_{it}) + \sum Industry_i + \sum Country_i + \varepsilon_{it}^{TC} \text{---------------}(1)$$

Marketing Capabilities: We use Dutta et al., (1999) to estimate the firms' marketing capabilities by considering log of $Sales_{it}$, which is the total sales as the dependent variable, with the following as inputs: SGA_{it} is Selling and General Administrative expenses, $Receivables_{it}$ is total account receivables for firm *i* at *t*. We add industry and country dummies and ε_{it} is idiosyncratic error.

$$Ln\ (Sales_{it}) = \beta_0^{MC} + \beta_1^{MC} \ln(SGA_{it}) + \beta_2^{MC} \ln(Receivables_{it}) + \beta_3^{MC} \ln(Sales_{it-1}) + \sum Industry_i + \sum Country_i + + \varepsilon_{it}^{MC} \text{---------------}(2)$$

Operational Capabilities: For estimating the operational capabilities, we minimize the operational expense by considering log of operational expenses (OP_Exp_{it}) with the following inputs: C_Assest_{it} is current assets, $PP\_Equipment_{it}$ is plant, property, and equipment costs, and $NEMP_{it}$ is employees count for firm *i* for the year *t*. We add industry and country dummies and ε_{it} is idiosyncratic error.

$$\ln(OP\_Exp_{it}) = \beta_0^{OC} + \beta_1^{OC} \ln(C\_Assest_{it}) + \beta_2^{OC} \ln(PP\_Equipment_{it}) + \beta_3^{OC} \ln(NEMP_{it}) + \sum Industry_i + \sum Country_i + \varepsilon_{it}^{OC} \text{---------------}(3)$$

Section D: Content Analysis

We provide the full description of our procedure on content analysis.

Step 1: We formulate a coding manual for the direct interviews. We create a dictionary of words and phrases using managerial interviews and related definitions from prior literature on technology and automation (Chircu and Mahajan, 2009; Kraemer et al., 2005).

Step 2: We compute the number of words belonging to each dimension from the interviews, which are qualitatively documented by the researcher who made the contact with the managers. We calculate the fraction of words, which is ratio of the number of occurrences of the word belonging to either of the three dimensions to the total number words used to describe the dimension. For instance, if we assume that 100 total words are used in a comment to describe the delivery drone adoption behavior, and we find that the frequency of words belonging to timing of adoption is 40, then frequency proportion of timing of adoption is .4. Similarly, if the frequency of words belonging to breadth of adoption is 35 then the frequency proportion of breadth of adoption is .35, and if the frequency of words belonging to depth of adoption is 25 then the frequency proportion of depth of adoption is .25. Then, we categorize the dimensions of delivery drone adoption as timing, breadth, and depth of adoption. However, there can be comments that fall under two dimensions. For example, a comment recorded as "*First we need to understand, what set of products can be delivered through drones. I mean, as drones are limited in capacity, we need to check the product type, product size, product shape. For example: a food item can be sloid or liquid, can be small or big, can be hot or cold. At the same time the distance the drone must travel to deliver the product*" There are words and phrases related to breadth of adoption (i.e., "type" and "solid or liquid") and words and phrases related to depth of adoption (i.e., "size" and "small or big"). For our analysis, we remove all the stop words (e.g., "is", "that", "the", "to"), and check the words that relate to the dimensions; we code the words under both breadth and depth dimension.

To verify the results, we randomly select 30 comments from the exploratory data and ask four managers to categorize them into delivery drone adoption dimensions. The Kappa reliability value is 0.78, indicating a satisfactory level of agreement and an acceptable inter-rater reliability. Table 8 reflect the keywords and phrases from managerial interviews, illustrative quotes mapping to each of the dimension of delivery drone adoption.

References for appendix

Baker, A. (2017). The American drones saving lives in Rwanda. https://time.com/rwanda-drones-zipline/

Carbone, N (2013). Drone Delivers 'Flying' Susi Burgers at London Restaurant. https://newsfeed.time.com/2013/06/11/drone-delivers-flying-sushi-burgers-at-london-restaurant/

Chircu, A. M., & Mahajan, V. (2009). Perspective: Revisiting the digital divide: An analysis of mobile technology depth and service breadth in the BRIC countries. *Journal of Product Innovation Management*, 26(4), 455-466.

De Leon, R (2019). Zipline takes flight in Ghana, making it the world's largest drone-delivery network. https://www.cnbc.com/2019/04/24/with-ghana-expansion-ziplines-medical-drones-now-reach-22m-people.html

Dutta, S., Narasimhan, O. and Rajiv, S. (1999). Success in high-technology markets: Is marketing capability critical?, *Marketing Science*, 18(4), 547-568.

Economic Times (2017), "Alibaba's drones deliver packages to islands," https://economictimes.indiatimes.com/news/international/business/alibabas-drones-deliver-packages-to-islands/articleshow/61545583.cms?from=mdr

Elias, J (2019). Alphabet's Wing launches first commercial drone delivery. https://www.cnbc.com/2019/10/18/alphabets-wing-launches-first-commercial-drone-delivery.html

Feng, H., Morgan, N. A., & Rego, L. L. (2017). Firm capabilities and growth: the moderating role of market conditions. *Journal of the Academy of Marketing Science*, 45, 76-92.

Feng, H., Morgan, N. A., & Rego, L. L. (2015). Marketing department power and firm performance. *Journal of Marketing*, 79(5), 1-20.

Kelion, L (2015). Alibaba begins drone delivery trails in China. https://www.bbc.com/news/technology-31129804

Kraemer, K. L., Ganley, D., & Dewan, S. (2005). Across the digital divide: A cross-country multi-technology analysis of the determinants of IT penetration. *Journal of the Association for Information Systems*, 6(12), 10.

Mansournia, M. A., & Altman, D. G. (2016). Inverse probability weighting. *BMJ*, *352*. Menear, H (2020). British Airways using Drone to Automate inventory counts. https://technologymagazine.com/ai/british-airways-using-drones-automate-inventory-counts

Palmer, A (2020). Amazon wins FAA approval for Prime Air drone delivery fleet. https://www.cnbc.com/2020/08/31/amazon-prime-now-drone-delivery-fleet-gets-faa-approval.html

Autocar Pro News Desk, (2019). Seat begins parts delivery through drones. https://www.autocarpro.in/news-international/seat-begins-parts-delivery-through-drones-43501

Silver, D (2020). Drone Startup Flytrex Deliveries a Future of Instant Gratification. https://www.forbes.com/sites/davidsilver/2021/02/23/drone-startup-flytrex-delivers-a-future-of-instant-gratification/?sh=1febb6ae21e9

Tech Staff, (2017). UPS successfully tests residential delivery by drone on top of package vehicle. https://www.firstpost.com/tech/news-analysis/ups-successfully-tests-residential- delivery-by-drone-on-top-of-package-vehicle-3698125.html

Essay on Engagement Orientation: A conceptual framework of construct and consequences and empirical analysis

Introduction

In today's interconnected and dynamic business environment, firms face the challenge of adapting their strategic orientation to effectively navigate evolving market trends and prioritize multi-stakeholder engagement. A firm's strategic orientation encompasses the characteristics that enable it to achieve superior performance and fulfill strategic goals (Slater, Olson, & Hult, 2006; Katsikeas et al., 2006). “These reflect the strategic directions implemented by a firm to create proper behaviors for the continuous superior performance of the business” (Gatignon and Xuereb 1997, p.78). Over the years both marketing practice and academia have evolved in response to the needs of the marketplace, which have led to various orientations in marketing. Traditional marketing orientations, such as market orientation by Kohli and Jaworski (1990), emphasized the importance of disseminating the knowledge related to customers’ needs within the organization to create enhanced customer value. While these orientations have contributed to organizational success, increased competition and shifting market goals over the last two decades have diminished the impact of market orientation on performance (Kumar et al., 2011).

The evolving business landscape has ushered in a new era of stakeholder engagement, where firms are no longer solely focused on shareholders but must interact and actively engage with a disparate and broader group of stakeholders.[11] As stated by Sulkowski et al., 2018, p.237 “shaking stakeholders entails engagement and aligning with networks of stakeholders, and

[11] https://hbr.org/2023/05/how-to-create-a-stakeholder-strategy

catalyzing and supporting new relationships and communication within and among stakeholder networks. Firms can and do engage with stakeholders and networks of stakeholders that are both internal, such as employees, and external, such as suppliers and consumers and society."

This shift emerges from the growing recognition that businesses are not isolated entities but rather integral parts of a complex social and environmental ecosystem. Also reflected in the Business Roundtable's 2019 statement, redefining corporate purpose "to deliver economic benefits to all stakeholders, not just shareholders" (Business Roundtable, 2019)[12]. In response to this evolving landscape, there is a need of a timely strategic orientation that adapts to evolving market trends and prioritizing multiple stakeholder engagement (Kumar and Pansari, 2016). This study also attempts to respond to the recent call by Aksoy et al., 2022 for stakeholder engagement research within marketing. Thus, we propose a new orientation: Engagement Orientation which emphasizes effective engagement with all relevant stakeholders, including customers, employees, suppliers, investors, and the broader community. It recognizes that engaging with stakeholders is not just a compliance exercise but a strategic decision for achieving long-term sustainable success. By adopting engagement orientation, firms can effectively navigate the expanding stakeholder landscape, building collaboration, and sustainable growth and resulting in benefits to the firms. Engagement orientation is a more comprehensive way of practicing business by aligning value across multiple stakeholders in today's interconnected business world.

There have been various orientations discussed in the marketing and strategy literature over the past five decades. A brief summary of the relevant literature is provided in Table A1 in appendix. These orientations range from production orientation fifty years ago to interaction

[12] https://opportunity.businessroundtable.org/wp-content/uploads/2020/08/BRT-Statement-on-the-Purpose-of-a-Corporation-August-2020-1.pdf.

orientation in the recent past. Firms in the beginning of the 20th century followed a **production orientation** that broadly focused on mass distribution, production efficiencies, and cost minimization as strategies to perform in the marketplace. A seller's market with one-way marketing communications from firm to customers. However, this approach led to myopic thinking, ignoring customers' changing needs (Levitt 1960) and advancements in technology. This approach transitioned into a ***selling orientation***, wherein firms recognized the need for aggressive sales and advertising methods to create demand for products among the customers. The focus in this era was personal selling and advertising and indicated the beginning of a buyers' market. Additionally, firms focused their efforts on the selling function, but not recognizing customers' needs and wants. From the selling orientation, marketers moved to a ***marketing orientation*** (Kotler 1972) where the focus primarily was on satisfying the market needs and providing shareholder benefit. The focus on customer orientation and its different facets lasted for a very long time and is still evident in the strategies of many firms. However, in the 1990s there was a shift from providing benefits to firms to delivering superior customer service with a focus on how firms gain knowledge and disseminate the same within the firm. This need paved the way for the emergence of ***market orientation*** "market rather than customer intelligence, emphasizes on a specific form of inter-functional coordination with respect to market intelligence, and focuses on activities related to intelligence processing rather than the effects of these activities" (Kohli et al., 1993, p.468; Narver and Slater 1990).

In 2000s, the focus shifted to interaction between the firm and the customer, and this led to emergence of the ***interaction orientation***, which reflects how firms can achieve profitable customer relationships by actively interacting and leveraging insights gained through continuous interactions (Ramani and Kumar 2008). Market orientation has been the most discussed orientation till now, although it had mixed support, it posits that firms with stronger market orientation will exhibit superior financial and market performance (Day 1994; Hult and Ketchen 2001, Grewal and Tansuhaj, 2001, Grewal et al, 2013).

An overview of all the orientations indicates that various aspects such as production, selling, customer focus, inter departmental connectedness and interactions with different stakeholders have had prominence, but none of these orientations discuss all the stakeholders. It is essential to examine the impact of all stakeholders on the firm's strategies. This study aims to address this gap by developing Engagement Orientation as a multidimensional construct encompassing six dimensions (customers, employees, suppliers, distributors, community and investors). Thus, the objective of this study is threefold: First, it aims to develop engagement orientation. We contribute to stakeholder theory literature by constructing engagement orientation as a higher order formative construct which is pronounced in recent years (Hair et al., 2017 and 2018). Second, intends to examine the link between engagement orientation and firm's financial performance. We advance quantitative research in stakeholder engagement stream. Third, to analyse the role of firm capabilities (marketing, technological, and operational) in moderating the link between engagement orientation and firm's financial performance. We provide evidence by utilizing stakeholder theory and resource-based view (RBV) to understand how level of engagement orientation is linked to overall firm performance. As suggested by Freeman et al., 2021 p. 1761 "Stakeholder-RBV strives to make all firms sustainable; this can be achieved by building sustainable stakeholder relationships"

We develop and examine the engagement orientation in two phases: Phase1, focusses on development of engagement orientation construct by adapting and refining scales for its lower order constructs (six dimensions) from existing literature. In this phase first we outline the data collection procedure and examine data using exploratory factor analysis (EFA) and then proceed with confirmatory factor analysis (CFA). Next, validate the engagement orientation higher order formative construct using PLS-SEM. Phase 2, empirically validates the relationship of engagement orientation and firm's financial performance. Additionally, we assess the moderating effects of firm capabilities on this relationship. We posit that the impact of engagement orientation on the financial measure would be positive. We also hypothesize that the link between engagement orientation and performance is moderated by the firm capabilities.

In the next section we discuss the theoretical background and develop the hypotheses. In the subsequent section we discuss Phase1 which focusses on developing the engagement orientation construct. Next, we discuss Phase 2 where we test the hypotheses and present the empirical results. Finally, we conclude with implications and limitations of the study.

Theoretical background and Hypotheses Development

We draw upon two theories that may explain the effect of firm' orientation towards engaging stakeholders and its impact on firm performance: stakeholder theory and resource-based view theory. Prior studies have successfully employed these theories to explore how effective stakeholder management relate to economic performance (Ben Brik et al. 2011; Torugsa et al. 2012; Lourenço et al. 2012).

Stakeholder theory: Stakeholder theory posits that disparate stakeholders have distinct needs, interest, expectations and values (Freeman, 1984; Greenley and Foxall 1997). Extant literature indicates that building mutually beneficial relationship between its stakeholders helps firm build trust and create competitive advantage (Bourne and Walker, 2005; Kull et al., 2016). The stakeholder engagement literature stream has realized a shift from firm centric approach (with emphasis on focal firm) to stakeholder centric approach (with emphasis on stakeholder value), with a focus on interacting and continuous engaging stakeholder relationship (Bosse and Sutton 2019). Stakeholder theory also emphasizes the fit between stakeholder expectations and corporate value and firm responses towards social issues (Harrison et al., 2010; Fernandez-Feijoo et al., 2014). As stated by (Bosse and Sutton, 2019, p.200) "Firms that treat stakeholders fairly (unfairly) generate increased (decreased) performance as stakeholders reward (punish) the firm for its behaviour." Most of the stakeholder engagement research is qualitative (Freeman et al., 2017), quantitative research validating firm-stakeholder relationship is needed (Jones et al., 2018). Few scholars have empirically studied the effect of stakeholder engagement on firm performance. Ayuso et al., 2014 show the board level involvement increases stakeholder engagement. Gupta et al., 2020, discuss how different stakeholder engagement strategies impact firm performance, considering the degree of support from employees and shareholders.

Resource-based view: RBV theory proposes that the firm's sustainable competitive advantage is primarily driven by its resources (Barney, 1991; Rumelt, 1984). Firm resources are " strength or weakness of a given firm" (Wernerfelt, 1984, p. 172), like capabilities (e.g., brand, innovation, operational) that help develop competencies (Day, 1994; Hunt and Morgan, 1995). Considering firms as bundles of resources that are internally developed and strategically acquired capabilities (Pereira and Bamel, 2021, Chahal et al., 2020), can translate into strengths to create a competitive advantage (Dierickx and Cool, 1989b; Barney 1991). Dierickx and Cool, 1989b point that internally built and strategically acquired resources work together synergistically rather than competing for achieving sustainable competitive advantage. This synergy intensifies firm's capability to create value for all its stakeholders (Eisenhardt and Martin, 2000; Teece et al., 1997).

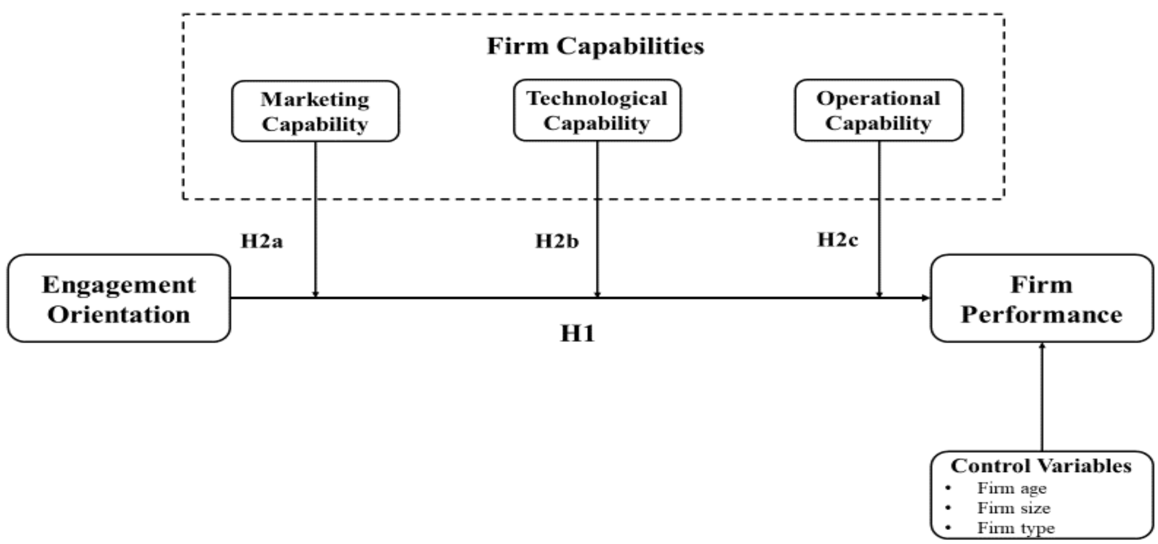
Thus, RBV can be seen as “the firm's network of stakeholder relationships (resource) and the firm's responsiveness to the multiple stakeholders (strategic action)—that enable the firm to achieve its objectives (competitive advantage and superior performance).” (Kull et al., 2016, p.3)

Defining Engagement Orientation

The development of Engagement Orientation (EO) stems from a comprehensive approach that includes analysing popular business articles, reviewing relevant literature, and conducting qualitative studies with managers. This multifaceted approach ensures that the concept of engagement orientation is grounded in both theoretical underpinnings and practical insights from industry experts. We define *Engagement Orientation (EO) as a strategic approach that emphasizes the process by which a firm creates value from and delivers value to its stakeholders.* Stakeholders by Freeman's (1984) is "any group or individual who can affect or is affected by the achievement of the organization's objectives" (p. 46). This definition helped us to understand that stakeholder of a firm encompasses customers, suppliers, distributors, employees, investors, the community, the natural environment, and others. For this study we follow basic stakeholder map (Freeman et al., 2018) to consider primary stakeholders (customers, employees, suppliers, local communities and financers). Research has consistently demonstrated the significant competitive advantage that arises from building and maintaining relationships among stakeholders based on cooperation and mutual trust (Jones, 1995). Maignan and Ferrell (2004) and Surroca et al., (2010) state that stakeholder identification with a firm and a positive reputation among stakeholders are indicators of strong relationships. These relationships influence stakeholder perceptions of the firm (Calton and Lad, 1995; Hillenbrand et al., 2013) and directly impact financial performance. Studies show that incorporating stakeholder cooperation can improve a company's net present value by

40-60% (Henisz et al., 2014). Additionally, firms with strong stakeholder relationships tend to recover more quickly from financial setbacks (Choi and Wang, 2009). This compelling evidence underscores the importance of building positive stakeholder relationships. Therefore, this paper focuses on developing a conceptual framework that explores the construct of Engagement Orientation and its consequences for building successful stakeholder relationships. To further illuminate the concept of Engagement Orientation, we explore its impact on various firm efficiencies, including technological, marketing, and operational capabilities/efficiencies, ultimately influencing firm performance. Figure1, illustrates the theoretical model.

Figure 1: Research model -Engagement Orientation



Engagement Orientation and firm performance

Engagement Orientation (EO) emphasizes the significance of developing and maintaining strong relationships with multiple stakeholders, including customers, employees, suppliers, investors, and the community. These relationships provide firms with valuable information, resources, and support, leading to improved decision-making, enhanced innovation, and increased market opportunities (Goodstein and Wicks, 2007). Effective EO requires the firm to manage stakeholder expectations effectively. When expectations are managed well, stakeholders are inclined to find greater contentment with both with the engagement process and the outcomes (Greenley and Foxall, 1997; Chung-Leung et al., 2005). Harrison et al. (2010), illustrates how firms can achieve economic benefits through effective stakeholder management, and highlight the influence of stakeholders on firm strategies (Fernandez-Feijoo et al. 2014; Perez-Batres et al. 2012). This satisfaction can lead to increased trust, loyalty, and cooperation among stakeholders, contributing to improved firm performance (Harrison &Wicks, 2013; Pansari and Kumar 2016). Thus, we hypothesize that,

H1: *Engagement Oriented firms will have a direct positive effect on financial performance.*

Moderating effect of firm capabilities

The dynamic capabilities perspective emphasizes the importance of firm capabilities to integrate resources in building competitive edge (Teece et al., 1997; Morgan et al., 2009). These capabilities, defined as "complex bundles of skills and accumulated knowledge that enables firms to coordinate activities and make use of their assets," enhance the productivity of other resources, effectively amplifying their impact (Day 1994, p. 38). In this context, we posit that firm capabilities act as moderators, influencing the outcomes derived from firm’s resources. That is, the effectiveness of firm’s engagement is contingent upon the level of capabilities in place. We focus on three capabilities that have consistently emerged as primary sources of firm’s advantage: marketing, technological, and operational (Dutta et al., 1999; Krasnikov and Jayachandran 2008; Watson et al., 2018). We posit that the presence of robust capabilities amplifies the positive effects of the relationship between firm's engagement with its stakeholder and firm outcomes. For instance, a firm with strong marketing capabilities can leverage its engagement activities to gain deeper insights on customer preferences, tailor marketing messages, and strengthen customer relationships. Similarly, firms with advanced technological capabilities can effectively integrate new technologies into their engagement efforts, creating innovative experiences for customers and stakeholders.

Marketing capability encapsulates a firm's capacity to effectively execute market understanding and customer relationship building activities, encompassing the ability to assess and anticipate customer needs and seamlessly connect with customers (Krasnikov & Jayachandran, 2008). It is to identify, understand, and respond to customer needs and market trends effectively. Strong marketing capabilities enable firms to develop and deliver products and services that resonate with customers, building brand loyalty and driving sales growth. Overall, increasing marketing capabilities can significantly enhance firm performance by enhancing market understanding and building customer relationships (Day, 1994).

Technological capabilities represent the firm's proficiency in acquiring, developing, and applying technological advancements to enhance its operations, products, and services (Moorman and Slotegraaf 1999). Advanced technological capabilities empower firms to innovate, create competitive differentiation, and adapt to evolving technological landscapes (Dutta et al., 1999).

Operational capabilities embody the firm's efficiency and effectiveness in managing its internal processes and resources (Cepeda and Vera 2007). Strong operational capabilities streamline production processes, optimize resource utilization, and minimize costs (Tan et al., 2007), contributing to overall productivity and cost competitiveness.

Thus, we hypothesize:

H2: *Engagement-oriented firms will have a direct positive effect on firm financial performance, and this relationship is moderated by the level of firm capabilities a) Marketing, b) Technological and c) Operational.*

Phase 1: Development of the Engagement Orientation Construct

In this section we focus on three key aspects: defining the scope of the construct, generating relevant survey items and refining these items through purification process, and data analysis. For constructing the measurement instrument, we extract items representing various latent variables from existing literature. Furthermore, we adopt a systematic approach to organize and categorize the selected items. This ensures that our measurement instrument is comprehensive, valid and reliable. Next, we discuss the operationalization and methodology of Engagement Orientation construct.

Operationalization

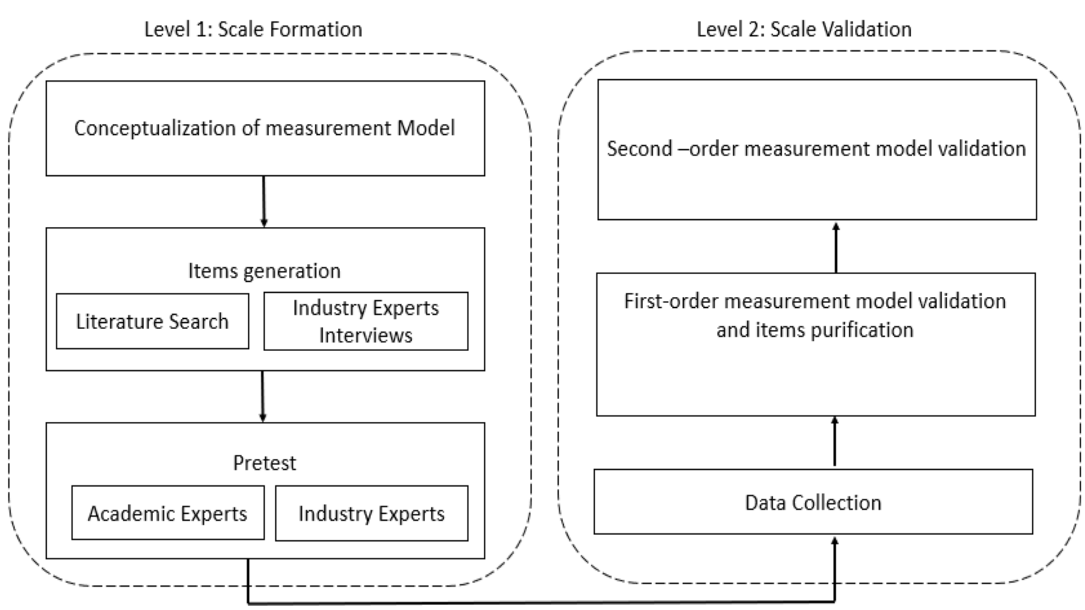


Figure 2: Process for Development of Engagement Orientation construct

Level 1: Scale Formation

1.a Conceptualization of measurement model.

Engagement Orientation (EO) is conceptualized as a higher-order formative construct that is formed by six lower-order constructs, which are customer engagement, employee engagement, investor engagement, supplier engagement, distributor engagement, and community engagement. In line with Diamantopoulos et al., (2008) and Petter et al., (2007) we employ the framework of a formative higher-order measurement model. Diamantopoulos et al., (2008) classify the Reflective-Formative model as a Type II measurement model, which enables us to incorporate abstraction at two levels, allowing for an understanding of the underlying characteristics of the second-order construct, which is Engagement Orientation. For a higher-order formative measurement model "if the measures represent defining characteristics that collectively explain the meaning of the construct, a formative indicator measurement model should be specified." Mackenzie et al., 2005, p. 713). The lower-order constructs are measured as reflective constructs as changes in the latent variables are manifested in the observable indicators. (Jarvis et al., 2003)

1.b Item Generation

We followed Churchill (1979) scale development approach to operationalize the lower-order constructs as reflective indicators. For the research instrument, we generated numerous measurement items by adapting and refining the items from relevant marketing and stakeholder engagement literature for each lower-order construct, thereby forming a comprehensive pool of items. Subsequently, we refined this initial pool, resulting in a preliminary list of 47 items. We ensured the validity of content of the items by focusing on the clarity of the statements (Peter, 1981).

1.c Pretest

We conducted qualitative pretest as a three-step process to ensure the accurate representation of the engagement orientation through six lower order constructs. To assess the face validity of the measurement items we sought feedback from two marketing professors specializing in stakeholder engagement. Both professors endorsed our conceptualization of the six dimensions of engagement orientation, providing suggestions for minor revisions to improve clarity of items. Subsequently, we carried out semi-structured interviews with 6 TMT (Top Management Team) level executives (Vice President, Senior Consultant, Chief Information Officer, Chief Marketing Officer, and Managing Director) and 8 senior managers from various departments (Operations, Delivery, Marketing, Information systems, and Sales) from multiple sectors to validate whether measurement items covered the actual essence of our main construct engagement orientation. To have a deeper understanding and have an industry perspective we did in-depth interviews with TMT level executives. We procured IRB approval for conducting the qualitative data collection. The in-depth interviews were a combination of Zoom and face-to-face interviews. Through a comparative analysis from the TMT executives and senior managers, we refined the items accordingly. Finally, we carried out a pilot study of the revised measurement items with a small cohort of 36 executive MBA students at school to further refine and validate the instrument. Following this comprehensive qualitative pretest process, we finalized an initial item pool consisting of 35 items. The measurement items are shown in Table A3 in the appendix. Three additional questions regarding firm name, employee designation, and employee name were included at the end of the survey to gather supplementary information. This rigorous instrument development and validation process ensured the reliability, validity, and comprehensiveness of the survey, providing a robust measure of senior managers and executives' perceptions of their firms' engagement orientation.

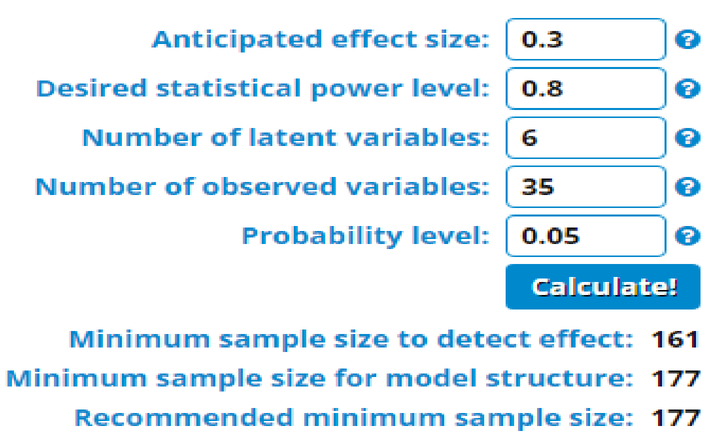
Level 2: Scale Validation

To effectively assess the senior managers and executives' perceptions of their firms' orientation to engage multiple stakeholders, a comprehensive survey instrument was developed. We ran an online (web-based) survey through Qualtrics software tool for data collection. Following this, we conducted a series of validation tests to determine whether engagement orientation is represented as a higher-order formative construct with six reflective lower-order constructs. We employed a two-step approach: first, initial item refinement through EFA, next ran CFA and validated the model through PLS-SEM.

2.a Data Collection

We identified the respondents for the study through convenience sampling by considering the knowledge they would possess regarding the engagement with multiple stakeholders. Choosing senior-executives as key respondents is widely used in business research (Kumar et al., 1993; Schilke, 2014). They are believed to possess valuable insights and informed viewpoints regarding the functioning and effectiveness of firm activities and outcomes (Venkatraman and Grant, 1986; Alt et al., 2015) and make it appropriate to consider them as key informants. The respondent’s pool was identified through various current and alumni of executive education programs at our school. The initial sampling frame for this study was an approx. of 2800 (precisely 2792). IRB approval from the school was obtained and survey was conducted through Qualtrics software tool. The questions (measurement items) in the survey had five-point Likert scale (1- strongly disagree and 5- strongly agree). We adopted Dillman's (2011) method for data collection, following the principles governing question formulation, sequence arrangement, email composition, and online survey execution. Invitation email was sent to the respondents, delineating the study's objectives, inviting active participation, and providing a direct link to the online survey platform. The respondent's confidentiality was assured through formal consent regarding any identifiable data (Appendix A2). To mitigate potential social desirability biases, explicit instructions prompted respondents to indicate the firm's actual situations and guaranteed complete anonymity. Subsequently, we also scrutinized the data to rule out the other possible response biases such as leniency, and acquiescence biases by checking uniform responses. We allowed multiple responses from firms. A total of six reminder emails were sent at an interval of 8 days each. We used A-priori sample size calculator to identify the sample size for the study. For a medium effect size the recommended sample size was 177 (Figure 3).

Figure 3: Sample size analysis



At the end of the survey period a total of 781 responses were recorded, including incomplete responses. We discarded 321 incomplete responses which were cases where respondents exited survey before the completion or designation of respondent was not mentioned, thus a total of 460 completed responses. On average survey was completed in 9 minutes. To ensure the quality of data 28 responses were discarded as they were completed within 3 minutes. For further analysis we had a total of 432 valid responses. The 3-minute cut-off was based on the pilot study as responses of less than 3 minutes showed uniform responses. Multiple responses from firms were allowed and out of the total of 432, we had 9 responses from 1 firm, 4 responses from each of 3 firms, 3 responses from each of 4 firms, 2 responses from each of 4 firms and 1 response from each 391 firms. Of the 403 firms, 268 were from B2B firms and 135 were from B2C firms and 192 were from the service sector and 211 from the manufacturing sector. We assessed the non-response bias by comparing early (responses after first invite) and late (responses after sixth reminder) responses for all the measurements items in the study and the results showed no statistical significance at 0.05 level. For multiple responses from firms the interrater correlation of scale items among respondents of same firm was between 0.8 to 0.9, indicating minor difference between responses. As firm is the unit of analysis in the study, we considered a composite measure by using unweighted average of the responses (Kumar et al., 1993). Therefore, 432 completed responses were utilized for further analysis. The study had a 15.4% response rate. This is an acceptable response rate given the position of key informants in the study and nature of data required. (e.g.: Alt et al., 2015; Plaza et al., 2010).

The six dimensions of EO are as follows: The customer engagement (CE) comprised of items, categorized into direct engagement (product-related information) and indirect engagement (feedback-related information). The direct engagement items assess the firm's efforts to offer customers with comprehensive product information and address their concerns immediately. (Menon et al., 1997). The indirect engagement item evaluates the firm's response to customer feedback and its willingness to incorporate customer suggestions into product development. The employee engagement (EE) items measure the extent to which the firm develops a sense of involvement, belonging, and ownership among its employees (Hartline and Ferrell 1996). These items evaluate the firm's practices in empowering employees, recognizing their contributions, and encouraging open communication. The supplier engagement (SUE) items measure the firm's commitment to building strong and collaborative relationships with its suppliers. These items assess the firm's efforts to engage suppliers in the product development process, provide timely feedback, and share information openly (Lusch and Brown, 1996). The distribution engagement (DE) items measure the firm active participation in supply chain activities (Anderson and Narus 1984). These items evaluate the firm's practices in coordinating with suppliers and distributors, optimizing logistics, and ensuring product availability. The society/ community engagement (SOE) items measure firm’s inclination to provide sustainable product/ services considering the future generations (Turker 2009). The investor engagement (IE) items assess the alignment of the firm's processes and practices with its vision and mission. These items evaluate the firm's transparency in communicating with investors, its adherence to ethical practices, and its commitment to long-term value creation (Marston, 2004).

Analysis and Results

The data analysis involved two statistical software packages: R 3.6.2 and SATA 16. We employed R for conducting EFA and CFA on the measured items/indicators. The objective was to ensure that each item achieved a factor loading of at least 0.50, a prerequisite before proceeding to the structural model. CFA was conducted for assessing validity and reliability of the measurement model. Further, we employ Partial Least Squares Structural Equation Modeling (PLS-SEM) to demonstrate the conceptual model.

2.b Exploratory Factor Analysis

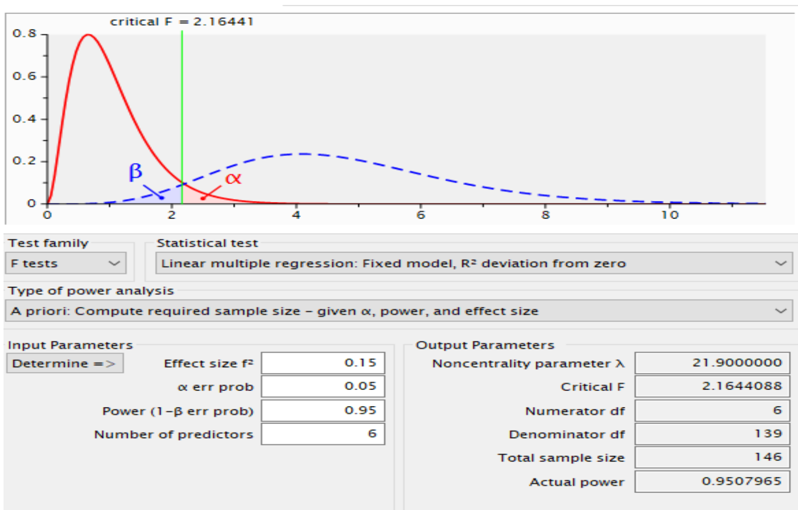
We performed EFA to purify the measurement items and randomly selected 205 responses out of total 432 sample. We ran principal component analysis for extraction with varimax rotation. A series of EFA tests was employed to identify the factor structure. To determine the number of factors we considered three criteria: Scree plot, Kaiser criteria, and Parallel Analysis. With the initial six-factor structure the sum of square loadings was 64%, indicating an adequate level of explanatory power. The scale purification was conducted as a two-step process: The initial 35 items pool was reduced to 25 items by removing the items with low factor loadings (lower than 0.50) and cross loadings more than 0.30. Next, we performed CFA with the model fit indices (CFI: 0.911, TLI: 0.900 and high χ^2 (345 df=198, $p<0.001$). Though the fit indices were above 0.90 we wanted to check if we could improve the model and we dropped four items (Hair et al., 2009). WE re-run the CFA with 21 items/indicators and results suggested a better fit measure (CFI: 0.934 TLI: 0.924 and χ^2= 295.399, df= 174, $p<0.001$) (please refer to Table A3 in appendix). The dropping of items was based on the low factor loadings and we also assessed the item's importance to its respective latent construct (Clark and Watson, 2016). Table 1 shows the factor loadings and sample adequacy was based on the KMO (Kaiser-Meyer-Olkin) value, which was 0.83, within acceptable range. Thus, we conducted the PLS-SEM on the final 21 items for this study.

Table 1: Factor Loadings

Item/Indicator	CE	EE	SOE	SUE	DE	IE
CE1	0.52					
CE2	0.66					
CE3	0.53					
EE1		0.58				
EE2		0.58				
EE3		0.67				
EE4		0.53				
SOE1			0.66			
SOE2			0.76			
SOE3			0.80			
SOE4			0.82			
SUE1				0.52		
SUE2				0.69		
SUE3				0.59		
DE1					0.66	
DE2					0.55	
DE3					0.73	
IE1						0.7
IE2						0.7
IE3						0.8
IE4						0.66
Kaiser-Meyer-Olkin					0.83	
Bartlett's Test of Sphericity						
		Approx. Chi-Square			8584.17	
		df			595	
		Sig.			0.00	

The validation of the model was conducted utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM), as it to accommodate both reflective and formative constructs despite the non-normal distribution assumption (Gefen & Straub, 2005) and its robustness in analyzing survey data. Adequate sample size is important for PLS-SEM. We employ G*power software to establish the requisite sample size for conducting PLS_SEM (Hair et al., 2014, 2017). The sample size for PLS model with six lower-order constructs, with a medium effect size and a power of 0.95 was 146. (Figure 4). We used 227 responses from the original 432 which we used for conducting CFA analysis for running PLS-SEM analysis. The sample size exceeded this requirement. We perform subsequent analysis using **plspm** package in R, incorporating bootstrapping to evaluate the significance of factor loadings. First, we assess the measurement model by analyzing reliability and validity, then analyzed the structural model to estimate inter-construct paths, determine their significance, and evaluate the overall model fit.

Figure 4: G*power sample size



Hierarchical Component Model

The Hierarchical Component Model represent a multidimensional construct model with abstraction associated with other latent variables which are the lower order constructs (Becker et al., 2012) with providing PLS model a more parsimonious model (Hair et al., 2018). The higher-order constructs are characterized as overarching concepts that can be either reflective or formative represented by their lower-order constructs (Becker et al., 2012). Given that each dimension or lower order construct of engagement orientation represents a distinct concept without inherent conceptual unity or shared causality. Thus, engagement orientation is considered a reflective-formative type II higher-order construct with six lower-order constructs. Figure 5 illustrates the hierarchical component model with engagement orientation as higher-order construct and six lower order constructs (CE, EE, SOE, SUE, DE and IE). Table 2 shows the lower order construct with their corresponding manifest variables. We estimate the higher-order construct using repetitive indicator approach using PLS-SEM (Hair et al., 2019). Engagement orientation is constructed by the latent variables that illustrate all the manifest variables items of the lower-order constructs.

Figure 5: Hierarchical component model of Engagement Orientation

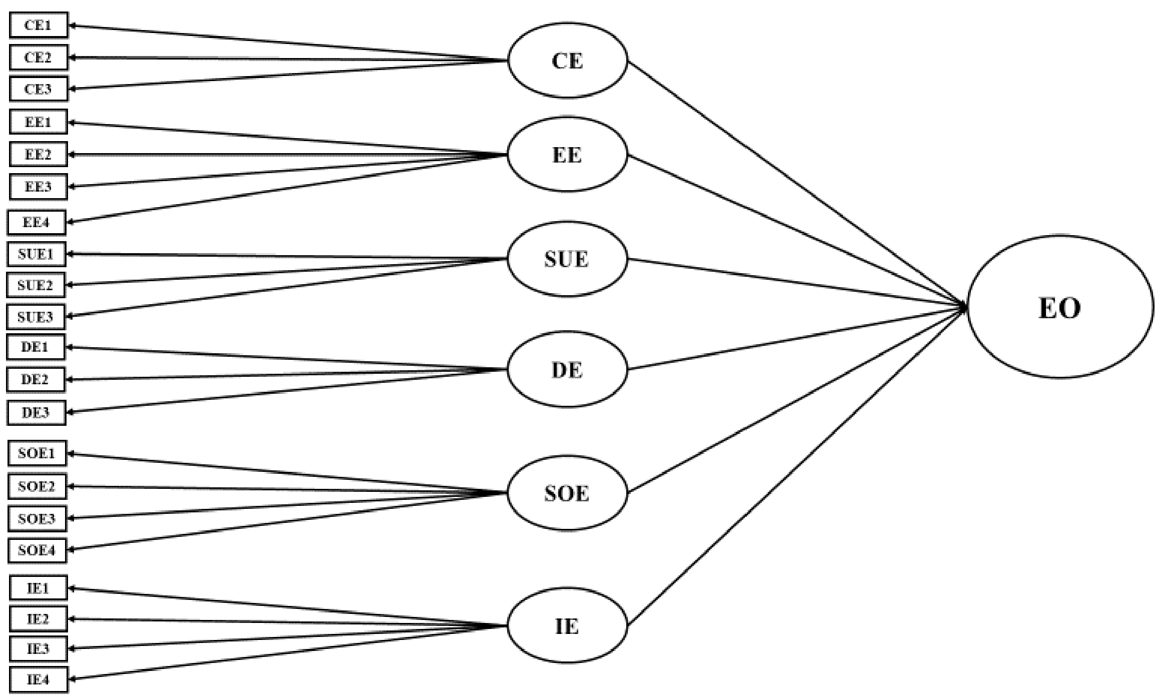


Table 2: Lower-Order Constructs

Lower -Order Constructs	**Manifest Variables/ Indicators**	**Number of Manifest Variables**
Customer Engagement (CE)	CE1, CE2, CE3	3
Employee Engagement (EE)	EE1, EE2, EE3, EE4	4
Supplier Engagement (SUE)	SUE1, SUE2, SUE3	3
Distributor Engagement (DE)	DE1, DE2, DE3	3
Investor Engagement (IE)	IE1, IE2, IE3, IE4	4
Society Engagement (SOE)	SOE1, SOE2, SOE3, SOE4	4
		Total =21

Collinearity: We assess possible collinearity issue in two ways: inspecting the bivariate correlations between the items. The correlations between 21 items of six lower-order constructs were less than 0.4, below threshold value 0.70 (Hair et al., 2014), indicating no strong relationship between items and no collinearity issue. Second, we inspect the VIF values of each item. VIF value above five can be an issue, as *"80% of its variance is accounted for by the remaining formative indicators associated with the same construct"* (Hair et al., 2017, p.144). Table 4 shows that the VIF for all items were below five, thus confirming collinearity is not present in the model.

For assessing the common method bias we used two- methods: i) Harmon's single factor test and the result showed the first factor contributed to 30.04% variance, and no single factor emerged. ii) Correlation Matrix: The correlations between the lower-order constructs exhibited values from 0.17 to 0.55. No constructs had correlations above 0.90 (Bagozzi et al., 1991). Thus, indicating that common method bias is not an issue. Table 3 depicts the correlation matrix of lower order constructs.

Table 3: Correlation Matrix of lower-order constructs

	CE	EE	SOE	SUE	DE	IE
CE	**1.000**					
EE	0.557	**1.000**				
SOE	0.401	0.446	**1.000**			
SUE	0.481	0.497	0.451	**1.000**		
DE	0.172	0.390	0.390	0.520	**1.000**	
IE	0.266	0.391	0.272	0.435	0.240	**1.000**

Assessment of Reflective Measurement model

In reflective measurement model the arrows are directed from the latent construct to the manifest variable/ indicator (Hair et al., 2013). The lower order constructs in this study i.e., customer engagement, employee engagement, supplier engagement, distributor engagement, society engagement and investor engagement represent the reflective measurement model. As per the validation guidelines outlined by (Gefen et al., 2000 and Straub et al., 2004), the reflective measurement model should have rigorous evaluation. This evaluation entails assessing convergent validity, and discriminant validity. The measures collectively contribute to determining the fitness and appropriateness of the measurement model.

Convergent Validity

It signifies all indicators of the corresponding construct have high correlation (Kline, 2015) and this was evaluated through three criteria: indicator reliability, average variance extracted (AVE) and composite reliability (CR). The indicator reliability is assessed through the item's outer loadings. The outer loadings above 0.70 show good indicator reliability (Hair et al., 2020). Also, Cronbach's alpha values are above 0.69. Table 4 represents the outer loadings which are above 0.72, validating construct reliability. Second, the values AVE are above 0.5 which are acceptable (Fornell and Larcker, 1981) and Table 4 indicate each value AVE higher than 0.5. Third, the internal reliability of latent constructs is represented by composite reliability. Hair et al., (2007, 2013) suggest values above 0.7 show internal consistency and each construct evaluates distinct concepts. Results in Table 4 indicate values for CR for each construct is above 0.7.

Table 4: Evaluation of Measurement Model

Construct	Indicator	Outer Loadings	VIF	Communality	α	Dillon-Goldstein's rho	CR	AVE
Customer Engagement	CE1	0.791	2.6715	0.625	0.698	0.8327	0.785	0.622
	CE2	0.789	2.6491	0.622				
	CE3	0.786	2.6164	0.618				
Employee Engagement	EE1	0.786	2.6164	0.681	0.765	0.8501	0.895	0.586
	EE2	0.751	2.2935	0.564				
	EE3	0.799	2.7654	0.639				
	EE4	0.723	2.0952	0.522				
	SOE1	0.832	3.0491	0.692	0.877	0.9155	0.894	0.730

Society Engagement	SOE2	0.812	2.9355	0.760				
	SOE3	0.808	2.8807	0.771				
	SOE4	0.835	3.3027	0.698				
Supplier Engagement	SUE1	0.792	2.6828	0.570	0.737	0.8513	0.859	0.657
	SUE2	0.851	2.6258	0.724				
	SUE3	0.823	3.0991	0.677				
Distributor Engagement	DE1	0.790	2.6602	0.792	0.819	0.8923	0.864	0.733
	DE2	0.836	3.3211	0.699				
	DE3	0.842	3.4360	0.709				
Investor Engagement	IE1	0.743	2.2323	0.553	0.807	0.8747	0.816	0.637
	IE2	0.836	3.0211	0.699				
	IE3	0.735	2.1749	0.540				
	IE4	0.819	3.0373	0.755				

Discriminant Validity

It assesses the extent to which each construct is distinct from other constructs in the model. Following the validation measures suggested by Hair et al., 2017, we examine discriminant validity using three approaches: Fornell and Larker criterion, cross-loadings and HTMT ratio. Fornell-Larcker is computed by taking the value of square root of AVE for each latent variable and ensuring that the value is greater than its correlation with other latent variables (Hair et al., 2017). Table 5 shows that discriminant validity is established. Second, we check for cross-loadings item wise, where the loadings of items for each construct is greater than the loadings on other constructs and Table 6 supports this. Third, we assess the Heterotrait-Monotrait (HTMT) ratio of the correlations, which is computed taking the average the item correlations across constructs to mean of the average correlations for the items of the construct of interest with a threshold of 0.90 (Henseler et al., 2015). Table 7 reveals that all HTMT ratios are within the acceptable threshold.

Table 5: Fornell-Larcker Criterion

	CE	EE	SOE	SUE	DE	IE
CE	**0.78856**					
EE	0.557	**0.76541**				
SOE	0.415	0.446	**0.85463**			
SUE	0.481	0.497	0.451	**0.81037**		

DE	0.172	0.390	0.390	0.520	**0.85624**	
IE	0.266	0.391	0.272	0.435	0.240	**0.797844**

Table 6: Cross Loadings

	CE	EE	SOE	SUE	DE	IE
CE1	**0.791**	0.386	0.265	0.332	0.174	0.118
CE2	**0.789**	0.412	0.323	0.395	0.228	0.195
CE3	**0.786**	0.506	0.382	0.402	0.233	0.295
EE1	0.451	**0.786**	0.520	0.325	0.353	0.321
EE2	0.396	**0.751**	0.459	0.389	0.304	0.270
EE3	0.435	**0.799**	0.608	0.441	0.332	0.398
EE4	0.426	**0.723**	0.357	0.363	0.184	0.176
SOE1	0.374	0.583	**0.832**	0.387	0.331	0.379
SOE2	0.397	0.590	**0.872**	0.374	0.306	0.361
SOE3	0.351	0.516	**0.878**	0.431	0.362	0.501
SOE4	0.294	0.518	**0.835**	0.345	0.332	0.367
SUE1	0.367	0.343	0.310	**0.755**	0.398	0.435
SUE2	0.386	0.401	0.366	**0.851**	0.417	0.464
SUE3	0.414	0.458	0.415	**0.823**	0.448	0.405
DE1	0.323	0.404	0.415	0.489	**0.890**	0.438
DE2	0.182	0.314	0.277	0.424	**0.836**	0.316
DE3	0.172	0.269	0.292	0.416	**0.842**	0.363
IE1	0.299	0.285	0.368	0.471	0.299	**0.743**
IE2	0.232	0.321	0.333	0.375	0.367	**0.836**
IE3	0.153	0.272	0.274	0.380	0.296	**0.735**
IE4	0.165	0.360	0.505	0.474	0.429	**0.869**

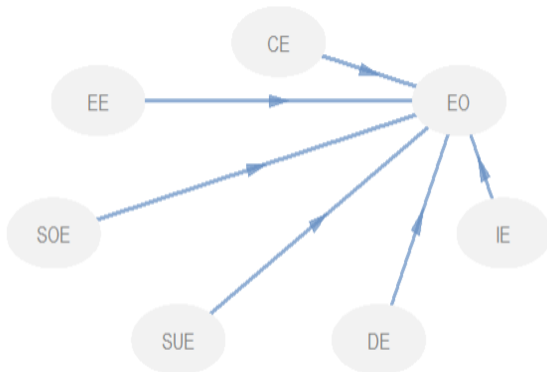
Table 7: HTMT ratio

	CE	EE	SOE	SUE	DE	IE
CE						
EE	0.621					
SOE	0.490	0.578				
SUE	0.512	0.477	0.588			
DE	0.344	0.278	0.450	0.612		
IE	0.289	0.330	0.418	0.604	0.453	

Assessment of higher-order construct – Reflective-formative Model

The engagement orientation construct is a higher-order formative construct comprised of six lower or first order dimensions.(CE, EE, SUE, DE, SOE, IE) (Figure 6). As defined by Vinzi et al., 2010, pg:665, "*higher level of abstraction with the arrow in the opposite direction going from the first order constructs to the higher second order one*."

Figure 6: Higher-order formative construct



We follow Hair et al., 2017 to assess engagement orientation higher-order formative construct by two approaches: indicator weights significance and multicollinearity analysis.

Indicator Weights: Assessing statistical significance of the indicator weights for the formative construct indicate how effectively indicators collectively represent the construct and confirms the validity and robustness of the construct. As suggested by Hair et al. (2017a) we consider the bootstrapped value to assess the significance. Table 8 reveals that all six reflective constructs show statistical significance towards formative construct.

Table 8: Indicator Weights

	Mean Boot Value	**St. Error**	**CI (perc.0.25)**	**CI (perc.975)**
CE → EO	0.133	0.0129	0.1075	0.1584
EE → EO	0.255	0.0152	0.2254	0.2866

SOE → EO	0.313	0.0159	0.2824	0.3437
SUE → EO	0.215	0.0133	0.1892	0.2398
DE → EO	0.196	0.0138	0.1693	0.2223
IE → EO	0.262	0.019	0.2267	0.2992

Multicollinearity Analysis: The Variance Inflation Factor (VIF) value indicate the presence of collinearity of the formative construct and suggested value of VIF are lower than three (Becker et al., 2015). Table 9 shows the VIF for the constructs to EO formative construct lie within the suggested value.

Table 9: VIF values

Construct	**VIF**
Customer Engagement (CE)	1.991
Employee Engagement (EE)	1.322
Society Engagement (SOE)	1.428
Supplier Engagement (SUE)	1.260
Distributor Engagement (DE)	1.245
Investor Engagement (IE)	1.310

Apart from analysing the path coefficients, the structural model is assessed based on three metrics: i) Coefficient of determination R^2: R^2 signifies the proportion of variability in the dependent latent variable (endogenous) explained by its predictor latent variables. According to Hair et al., (2020), R-squared values below 0.25 are low, 0.50 as moderate and greater than 0.75 as high. The R^2 is 0.997 which indicates a very good value. ii) Redundancy index: This metric is the extent to which the variance observed in an endogenous construct is explained by its corresponding independent latent variables and gives predictive relevance. Redundancy value with 0.02 is weak, 0.15 is moderate and value above 0.35 is strong degree of predictive relevance. (Tenenhaus et al., 2005, Hair et al., 2013). The redundancy index value was 0.36 indicating a reasonable value. iii) Goodness-of -fit (Gof) index: This index provides an overall assessment of the model's predictive performance, considering both the measurement and structural models. A

GoF value above 0.7 is good. The GoF index is 71.4% (0.7141). which falls under good acceptable range.

Phase 2: Assessing the Engagement Orientation framework -Empirical investigation

Research setting

Further establishing Engagement Orientation (EO) as a second order formative construct, we proceed with empirical analysis. In this phase, we aim to explore the link between engagement orientation score (EOscore) and firm performance. We employ robust statistical techniques based on the nature of our data. The variables used for the regression analysis are stated in Table A4 (Appendix).

Measures

EOscore is the independent variable for our study. It is measured as the average score obtained from the six dimensions of engagement-orientation which include customer engagement, employee engagement, suppler engagement, distributor engagement, society engagement and investor engagement. EOscore ranges from 6 to 30 (where 6 is minimum score and 30 is maximum score). We choose accounting measure revenue growth as the dependent variable for our study as this measure provides a general understanding of firm's probability (Wu, 2006). It is computed as a difference of t-4 to t (where t is 2022 financial year)[13]. The moderating variable for the study is the firm capabilities: marketing, technological and operational capability. We operationalize the moderating variables as follows: *Marketing Capabilities (MC):* We follow Dutta et al., (1999) to

[13] We replicate our analysis by taking t-3 revenue growth difference, the results do not show significant difference.

estimate the firms' marketing capabilities by considering log of $Sales_{it}$, which is the total sales as the dependent variable, with the following as inputs: SGA_{it} is Selling and General Administrative expenses, $Receivables_{it}$ is total account receivables for firm *i* at *t*. We add industry and country dummies and $\mathcal{E}_{it}$ is idiosyncratic error.

$$\ln(Sales_{it}) = \beta_0^{MC} + \beta_1^{MC} \ln(SGA_{it}) + \beta_2^{MC} \ln(Receivables_{it}) + \beta_3^{MC} \ln(Sales_{it-1}) + \sum Firm_i + \sum Year_t + \mathcal{E}_{it}^{MC} - \eta_{it}^{MC} \text{ ---------------(1)}$$

Technological Capabilities (TC): We follow the extant literature (Feng et al., 2015), to estimate a firm's technological capabilities by considering the log of patent count ($Patent\_count_{it}$ is the number of patents). The technological capabilities of a firm at a given time will be influenced by the following as inputs: $R\&D\_Exp_{it}$ is R&D expenses, $Patent\_Output_{it}$ is the available stock of patents for firm *i* for the year *t*. We add firm and year dummies and $\mathcal{E}_{it}$ is idiosyncratic error.

$$\ln(Patent\_count_{it}) = \beta_0^{TC} + \beta_1^{TC} \ln(R\&D\_Exp_{it}) + \beta_2^{TC} \ln(Patent\_Output_{it}) + \sum Firm_i + \sum Year_t + \mathcal{E}_{it}^{TC} -- \eta_{it}^{TC} \text{ ---------------(2)}$$

Operational Capabilities (OC): For estimating the operational capabilities, we minimize the operational expense by considering log of operational expenses (OP_Exp_{it}) with the following inputs: C_Assest_{it} is current assets, $PP\_Equipment_{it}$ is plant, property, and equipment costs, and $NEMP_{it}$ is employees count for firm *i* for the year *t*. We add firm and year dummies and $\mathcal{E}_{it}$ is idiosyncratic error.

$$\ln(OP\_Exp_{it}) = \beta_0^{OC} + \beta_1^{OC} \ln(C\_Assest_{it}) + \beta_2^{OC} \ln(PP\_Equipment_{it}) + \beta_3^{OC} \ln(NEMP_{it}) + \sum Industry_i + \sum Country_i + \mathcal{E}_{it}^{OC} + \eta_{it}^{OC} \text{ -------------(3)}$$

The data measure used to compute revenue growth, marketing capability, technological capability and operational capability are extracted from VCC Edge, GlobalData database and in cases where we could not gather information on the measures we resorted to annual report of the firms. We manually obtained the data by downloading the annual report from company's website.

The final sample used for our empirical analysis was 126 unique firms. The reduced sample size accounted to unavailability of data on all the measures. We also controlled for firm characteristics that may also affect firm performance**.** We rely on the previous empirical studies for the control variables in this study which include firm age, firm size and firm type. Firm age (Firm_age) is measured as the natural logarithm of the number of years since incorporation **(**Loderer and Waelchi, 2010). Firm size (Firm_size) is the natural logarithm of number of employees (Brammer and Millington, 2006). The variable firm type (Firm_type) is a dummy variable where B2C firms take the value 1 and zero otherwise.

Data analysis and results

We first present the results of the regression analysis of EOscore on firm performance in the next section. Here we also discuss the moderating effect of firm capabilities (marketing, technological, and operational) on the link between EOscore and performance. Further we present the results addressing the unobserved heterogeneity and endogeneity concerns in our study. We employ Latent Profile Analysis for addressing unobserved heterogeneity and two-stage least square (2sls) regression using instrumental variable for addressing endogeneity concern.

Engagement-oriented firms and Firm performance

The regression model used for exploring the relation between firm performance and EO score:

$$RG_{i\,(t-t\text{-}4)} = \alpha + \beta_1\, EOscore_{i\,t} + \beta_2\, MC_{i\,t-1} + \beta_3\, TC_{i\,t-1} + \beta_4\, OC_{i\,t-1} + \beta_5\, EOscore{*}MC_{i\,t-1} + \beta_6\, EOscore{*}TC_{i\,t-1} + \beta_7\, EOScore{*}OC_{i\,t-1} + \beta_8\, Firm\_age_{i\,t-1} + \beta_9\, Firm\_size_{i\,t-1} + \beta_{10}\, Firm\_type_{i} + \theta_{i\,t}$$

where i denotes each firm and t is year. RG is revenue growth, EOscore is engagement oreinetations core, MC is marketing capabilities, TC is technological capabilities and OC is operational capabilities. We take one year lagged value for each explanatory variable which can help partially mitigate the endogeneity issue.

Table 10: Engagement-orientation and Firm performance

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
EOscore	0.021**	0.012**	0.081*	0.479**	0.462**
	(0.010)	(0.006)	(0.048)	(0.197)	(0.186)
MC		3.27**			2.35*
		(1.492)			(1.328)
TC			2.1*		1.00
			(1.201)		(0.851)
OC				31.10***	26.02**
				(11.44)	(10.89)
EOscore*MC		0.04 **			0.21**
		(0.018)			(0.091)
EOscore*TC			0.082*		0.040*
			(0.041)		(0.023)
EOscore*OC				0.953*	0.889**
				(0.561)	(0.402)
Firm_age	-0.001	-0.003**	-0.0003	-0.00	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001	(0.001)
Firm_size	0.16	0.037	0.025	0.023*	0.041
	(0.029)	(0.026)	(0.029)	(0.013)	(0.026)
Firm_type	0.096	0.106	0.130	0.011	0.06
	(0.110)	(0.98)	(0.112)	(0.107)	(0.101)
_cons	-0.301**	-1.58*	-1.97	-15.29***	-14.50***
	(0.125)	(0.85)	(1.26)	(5.46)	(5.11)
N	126	126	126	126	126
R^2	0.13	0.23	0.07	0.16	0.30
Adj. R^2	0.11	0.19	0.02	0.11	0.24

significance: * p <0.10, **p<0.05, ***p<0.01 Values in parentheses are standard errors

The results in Table 10 show the regression estimates of EOscore on firm performance. As our sample suffered from heteroskedasticity we employed weighted least square. Model 1 shows the main effect of EOscore on revenue growth and the estimate of EOscore (β =0.021, p <0.05) is positive and significant. This indicates that firms that are engagement oriented, i.e., engaged with multiple stakeholders, perform better. Second, we run the regression with each capability (marketing, technological and operational) and results are reported in Model 2, 3 and 4. Model 5 is full model with all three capabilities run together and we find support for the moderating effect of firm capabilities on the link between EOscore and performance (β =0.462, p <0.05), implies the firms with these capabilities perform better and this finding is in line with Mishra and Modi, 2016.

Addressing unobserved heterogeneity

The effect of EO may vary among the firms and thus it is important to capture this heterogeneity among the firms in our sample. We utilize latent profile analysis (LPA) approach a mixture model to address the potential unobserved heterogeneity and identify sub-groups (class or profile) based on firm's engagement orientation score (EOscore). LPA is an ideal approach for classifying firms into homogenous groups by identifying the probability that a firm belongs to one profile instead of the remaining profiles (Sterba, 2013). The engagement orientation score ranges between 6-30 (minimum score 6 and maximum score 30). As we have continuous indicators in the model, LPA is suitable (Oberski, 2016) in our study. For our analysis we run LPA in R using tidyLPA.

Selection of number of profiles

LPA is based on testing multiple models with varying number of classes/profiles (Tein et al., 2013). For deciding on the number of latent profiles we compare each model with its previous model (Masyn, 2013). The number of latent profiles were determined based on multiple fit criteria which include the log-likelihood (ll), Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Sample size-adjusted Bayesian information criterion (SABIC), entropy R-squared, and Bootstrap likelihood ratio test (BLRT) p-values (Schreiber, 2017). Entropy R-square measures how well defined are each class/profile in the model, with acceptable value greater than 0.8 (Biernacki et al., 1999).

The loglikelihood values show significant difference between models except profile 4 and profile 5 showing similar trend in AIC and SABIC values. The BIC values for profile 4 were slightly lower than profile 5. The entropy values for both profiles 4 and 5 were above 0.8. The BLRT p value was significant for the model with profile 4 indicating it is a better fit model as compared to profile 3. However, BLRT p-value for profile 5 is non-significant indicating profile 4 is better model fit than profile 5. We see support for four fit measures and among the multiple fit criteria BIC is counted as the most reliable measure (Nylund-Gibson and Choi, 2018). Thus, the lowest value of BIC corresponding to profile 4 is the best fit model. Table 11 provides the fit measures for the latent profile analysis with profiles from one to six. Even though we have not considered entropy for final model selection, it is worth noting that the profile 4 value was above the cut-off value (acceptable range greater than 0.8).

Table 11: LPA Model fit statistics

Model (Number of profiles)	**N**	**ll(null)**	**ll(model)**	**AIC**	**BIC**	**SABIC**	**Entropy**	**BLRT value**	**BLRT p-value**
1-Profile	126	-	-900	1828	1868	1824	1.00	NA	NA
2-Profile	126	-	-784	1613	1675	1638	0.908	232	0.009
3-Porfile	126	-	-666	1391	1477	1424	0.918	237	0.009
4-Profile	126	-	-621	1317	**1426**	1358	0.899	90	0.009
5-Profile	126	-	-610	1313	1444	1362	0.915	20	0.069
6-Profile	126	-	-577	1262	1415	1319	0.889	67	0.009

As suggested by (Kline, 2011; Masyn, 2013) it is helpful to provide labels to the profiles with the retained 4-Profile model. Firms in Profile 1 scored low on the EO score and are so referred to as "*Low Effect*", containing 8.73% of the firms (n=11). The firms in this profile focus primarily towards addressing shareholder/ investor needs with profit maximization as core intent. Profile 2 scored medium on EO score and are referred to as "*Low to Medium Effect*", containing 19.84% of the firms (n= 25). The firms in this profile focus more on profit generating stakeholders, that is customers and employees. Profile 3 scored medium to high on the EO score and are referred to as

"*Medium to High Effect*". This profile showed the largest number of firms in our sample, comprising 36.51% of the firms (n=46). The firms in this profile engage with multiple stakeholders continuously work towards addressing their needs. Finally, Profile 4 scored highest on EO score and is referred to as "*High Effect*". This profile is the second largest group in our sample comprising 34.92% of the firms (n=44). The firms in this profile make continuous effort to actively engage with multiple stakeholders to offer enhanced stakeholder value.

These labels provide clear distinctions among the profiles based on their level of engagement orientation. Thus, helping to characterize and understand the strategic orientations of the firms in the study.

Endogeneity concerns

The results from the regression analysis indicate a positive association between engagement-oriented firms and its impact on firm performance. However, as engaging with multiple stakeholders is a strategic decision of a firm, this study could suffer from endogeneity concerns. Secondly, the relationship between EO score and firm performance may have issue of reverse causality as better performing firms may selectively chose to invest resources for their stakeholders to sustain in the market. We adopt an instrument variable approach to address the endogeneity problem by employing two-stage least square (2sls) regression. In principle, it means determining EOscore from a set of variables that influence EOscore but are uncorrelated to firm performance

$$EOscore_{it} = \beta\ Z_{it} + \theta_{it}$$

Where Z_{it} are instrument variables estimate the effect of EOscore on firm performance indirectly (without directly using endogenous measure of EOscore).

The instrument selection should satisfy two criteria: relevance and exclusion. The relevance criterion requires the instrument variable and endogenous variable (EOscore in our study) to be correlated and exclusion criterion requires it to be unrelated to the error term. Two - stage least square regression was performed using STATA. Our first instrument is the average number of industries where the independent directors have previously served. Prior studies have documented the influence of industry on social performance (Ibrahim et al., 2003; Rehbein et al., 2004; Brammer and Millington, 2006, Datta and Iskandar-Datta, 2014). Using this as an instrumental variable is based on the following argument: the independent directors with experience in varied number of industries have greater opportunity to have information about customers, suppliers and competitors, act as a link between firm and market and a guiding light to assist firms to operate in shareholder's interest as well as work towards addressing stakeholder interests and promote stakeholder engagement behaviors (Hillman et al., 2001; Jo and Harjoto 2012; Coles et al., 2008). This meets the relevance criterion. Also, it is unlikely that the independent director's past experience would affect the firm's revenue except that it would be helpful to have a stronger network and ability in making strategic decisions. Our second instrument is the proportion of independent directors who have post-graduate degree (Weir et al., 2005). Independent directors with post-graduate degree possess good problem-solving ability and likely have greater opportunity to be as directors on board and this meets the relevance criterion. Also, ex-ante it is unlikely that independent directors opting for post-graduate degree affect firm's future revenue.

We compute the instruments for each firm from Indian Board and Orbis database. For our first instrument variable we calculate the number of industries each independent director has served in the past and then take the average for each firm. Further we check each independent director's educational qualification for our second instrument variable and calculate the fraction of independent directors with post-graduate degree for each firm. As Wooldridge 2012, p.535 suggests *"In the context of the simple IV estimator, we noted that the exogeneity requirement cannot be tested. However, if we have more instruments than we need, we can effectively test whether some of them are uncorrelated with the structural error."* The results of 2sls regression estimates are reported in Table 12 and Table 13

Table 12: Engagement orientation and firm performance: 2sls Instrumental Variable approach

Variable	**First Stage** EOScore	**Second stage** Revenue Growth
Proportion_ID_PG	1.97*** (0.347)	
ID_industry	8.53*** (1.323)	
EOscore		0.049*** (0.017)
Firm_age	-0.023*** (0.008)	-0.003* (0.001)
Firm_type	-0.29 (0.552)	0.137 (0.117)
Firm_size	-0.103 (0.168)	0.048 (0.031)
Constant	16.28*** (1.722)	-1.423** (0.603)
N	125	125
R-squared		0.20
F-staticitic		56.83***
Underidentification test (Kleinbergen-Paap rk LM statistic):	33.26 (p-value = 0.000)	
Weak Identification test (Cragg-Donald Wald F statistic):	45.200	
Overidentification test Hansen J statistic:	0.503 (p-value = 0.478)	

The values in parentheses are Standard errors. * p <0.10, ** p<0.05, ***p<0.01

The estimations of the instruments for EO score are presented in Table 12. Following Stock and Yogo, 2002, F-statistic for first stage is 56.83 which is above the threshold value (i.e. 16.78), and Cragg-Donald F statistic (weak identification test) value is 45. 200 indicating the instruments used in the study are not weak instruments. Thus, supporting the relevance criterion. Secondly, the Hansen J statistic for an overidentification test has p value=0.478; we fail to reject the null hypothesis, indicating no evidence of validity violations. In Table12, Column 1 presents the results of first-stage regression of instruments for EOscore. The instruments average number of industries where the independent directors served and proportion of independent directors with post graduate degree are positive and statistically significant with ($\beta_{id\_industry}$= 1.97 p<0.01 and β_{id_pg}= 8.53, p<0.01 respectively) and as anticipated. Column 2 shows the results of second-stage regression and the effect of EOscore on firm performance is positive and significant (β_{EO}= 0.049, p<0.01). This supports our hypothesis that higher engagement oriented firms perform better.

We also check the moderating effect of each firm capabilities which are marketing, technological and operational. For example, the interaction term EOscore and marketing capability has the endogenous variable EOscore, this interaction term also becomes endogenous. As Wooldridge suggests[14] the interaction of instrument and moderating variable provides a natural instrument to the interaction term. We employ similar interactions for marketing, technological and operational capability. Table 13 reports the results of how these capabilities moderate the link between EO score and firm performance. We use the same instruments (Proportion_ID_PG and ID_Industry) to address the endogeneity in EOscore and its interaction terms.

---

[14] https://www.statalist.org/forums/forum/general-stata-discussion/general/1533191-iv-regression-with-interaction-terms-and-2-instruments

Table13: EO and firm performance with moderating variables: 2sls Instrumental Variable approach

Variable	First Stage		Second stage	First stage		Second stage	First stage		Second stage
	EOscore	MC* EOscore	Revenue growth	EOscore	TC* EOscore	Revenue growth	EOscore	OC* EOscore	Revenue growth
MC * EOscore			0.035**						
			(0.020)						
MC	13.40**	14.24***	2.726						
	(7.213)	(4.824)	(2.198)						
TC * EOscore						0.046**			
						(0.021)			
TC				1.69*	14.25***	1.26*			
				(0.985)	(4.280)	(0.732)			
OC * EOscore									0.93*
									(0.518)
OC							16.49	19.83 *	30.74**
							(1.221)	(10.26)	(14.67)
EOscore			0.029*			0.08			0.49**
			(0.016)			(0.061)			(0.244)
Proportion_ID_PG* MC	0.506	12.01*							
	(2.692)	(6.257)							
ID_industry *MC	-3.28	4.295**							
	(2.992)	(2.011)							
Proportion_ID_PG* TC				2.55**	7.81*				
				(1.201)	(4.246)				
ID_industry *TC				1.25*	2.03*				
				(0.681)	(1.181)				
Proportion_ID_PG* OC							18.93	14.90*	
							(12.471)	(7.920)	
ID_industry *OC							-9.49	0.87**	
							(11.54)	(0.397)	
Proportion_ID_PG	8.08	2.074*		6.99	0.76*		6.42*	-2.99	
	(12.82)	(1.062)		(5.924)	(0.415)		(3.378)	(1.924)	
ID_industry	3.47	0.658*		2.85*	-0.07**		-0.38	1.31**	
	(3.136)	(0.348)		(1.481)	(0.029)		(3.57)	(0.632)	
Firm_age	-0.009	-0.004	-0.003**	-0.024***	-0.017***	-0.003**	-0.25***	-0.012***	-0.001
	(0.009)	(0.004)	(0.001)	(0.101)	(0.006)	(0.001)	(0.008)	(0.004)	(0.001)
Firm_type	-0.116	-0.042	0.130	-0.324	-0.261	0.137	-0.244	-0.126	0.045
	(0.494)	(0.233)	(0.090)	(0.576)	(0.415)	(0.098)	(0.565)	(0.270)	(0.112)
Firm_size	0.051	0.236	0.0541*	-0.086	-0.05	0.051	-0.135	-0.067	0.053*
	(0.133)	(0.063)	(0.028)	(0.157)	(0.113)	(0.032)	(0.148)	(0.071)	(0.029)
constant	12.45**	-1.195	-2.025*	13.82***	1.07	-2.28	8.70*	-1.53	-15.91**
	(5.80)	(1.267)	(1.264)	(4.76)	(2.78)	(1.85)		(1.76)	(6.93)
N	125			125			125		
R-squared			0.21			0.05			0.14
F-statistic			24.03***			14.66**			29.55***
Kleinbergen-Paap rk LM statistic	38.570 (p value = 0.00)			33.32 (p value =0.00)			36.421 (p value = 0.00)		
Kleinbergen-Paap rk Wald F statistic	20.91			15.70			23.48		

Hansen J statistic	2.050 (p value = 0.361)	3.453 (p value= 0.177)	1.370 (p value = 0.504)

Values in parentheses are standard error *p<0.1, **p<0.05, ***p<0.01

In table 13, the results in Column 1-3 correspond to interaction of EOscore with marketing capability (MC). Column 4-6 correspond to interaction of EOscore with technological capability (TC), and Colmuns 7-9 correspond to interaction of EOscore with operational capability (OC).The F statistics value (MC= 24.03 $p<0.01$; TC=14.66 $p<0.05$; OC=29.55 $p<0.01$) and the values obtained for Kleinbergen-Paap rk Wald F statistic (MC =20.91; TC=15.70; OC=23.48) which were well above the Stock–Yogo critical values, indicating the instruments are not weak. Secondly Hansen's J statistics (MC= 2.050 p=0.361; TC=3.453 p =0.177; OC= 1.370 p= 0,504) implying the instruments are valid.

As anticipated the interaction term MC* EOscore (β_{MC*EO} = 0.035 $p<0.05$) in column 3, TC* EOscore (β_{TC*EO} = 0.046 $p<0.05$) in column 6, OC* EOscore (β_{OC*EO} = 0.93 $p<0.1$) in column 9, is positive and significant. Thus, implies that the effect of engagement orientation on firm performance is enhanced when firm possess these capabilities. Overall, these findings support our hypothesis that the impact of EO on firm's financial performance is amplified when firm possess these specific capabilities. These findings support our hypothesis that the impact of engagement orientation on a firm's financial performance is amplified when the firm possesses these specific capabilities.

Further we check the full model with three capabilities included. Table 14 shows the results and as anticipated we see that EOscore is positive and significant. We also see support fro second hypothesis the moderating effect of firm capabilities as interaction of EOscore with MC show (β_{MC*EO}=0.141 p value <0.05) EOscore with TC show (β_{TC*EO} = 0.10 $p<0.1$) EOscore with OC show (β_{OC*EO} = 0.947 p<0.5). The Cragg-Donald Wald F statistic was 17.25, above the threshold value indicating instruments are not weak. Secondly, the Sargan statistic (5.522 p value = 0.237) implying the instruments are valid.

Table 14: Moderating effect of firm capabilities - 2sls Instrumental Variable approach

Variable	**Second Stage**
	Revenue Growth
EOscore	0.430** (0.244)
MC	0.291* (0.174)
TC	0.321 (0.382)
OC	27.157* (14.88)
EOscore*MC	0.141** (0.067)
EOscore*TC	0.010* (0.005)
EOscore*OC	0.947** (0.391)
Firm_size	0.054* (0.028)
Firm _age	-0.002 (0.001)
Firm_type	0.096 (0.109)
Cons	-14.06** (6.644)
Underidentification test (Anderson canon. corr. LM statistic)	53.403(p-value = 0.000)
Weak identification test (Cragg-Donald Wald F statistic)	17.258
Overidentification test (Sargan statistic)	5.522 (p-value = 0.237)

Discussion and conclusions

Theoretical Implications

The shift from shareholder centric approach to stakeholder centric approach has speared the need for firms to invest resources its stakeholders and work along with them to generate value.[15] As indicated by Harrison et al., 2020 p.1225 "*the BRT (Business Roundtable) Statement serves as an important signal that the tide has shifted, replacing shareholder primacy with a multistakeholder purpose for corporations*." We contribute to the stakeholder theory by developing a quantitative measurement model of engagement orientation and novel approach to operationalization it in stakeholder theory. In this study we develop Engagement Orientation as a second order formative construct with six dimensions (customer, employee, suppler, distributor, investor and society) consisting of 21 manifest indicators. Prior studies predominantly worked on reflective measure (eg: Plaza-Úbeda et al., 2010; Mazur and Pisarski, 2015). By utilizing recent advancements (Hair et al., 2017, 2018) in index construction, we effectively measure engagement orientation. We provide strong theoretical support and empirically validate the framework.

Second, we contribute methodologically to the extant literature on stakeholder engagement, proposing a quantitative measurement framework by exploring the link between engagement orientation and firm performance. We empirically validate the framework utilizing primary data and secondary measures. We also explore firm capabilities (marketing, technological, and operational) as moderators on the link between engagement orientation and firm performance. This study utilizes a combination of theoretical lens, stakeholder theory and RBV to explain and develop the hypotheses and describe the results by taking support from Freeman et al., 2021

[15] https://www.businessroundtable.org/for-long-term-success-companies-must-deliver-for-all-stakeholders

(p.1767) argument as *"Though RBV and stakeholder theory are effective frameworks [....], we believe their greatest potential is in their combination"*

Our findings establish a positive relationship between engagement orientation and firm performance which indicates that engagement orientation leads to better performance outcomes. This study also offers empirical support to Aksoy et al., 2022 proposition that firm's stakeholder engagement strategies impact firm outcomes, emphasizing the need for research on multi stakeholder engagement to provide insights to firms that prioritize serving "all their stakeholders, not just shareholders." (p.459) We employ survey method with relatively large and diverse sample with key informants, specifically senior executives across varied industries to develop the engagement orientation construct and empirically investigate the impact on firm performance. Second, the findings are consistent with RBV perspective which highlight that organizational capabilities accumulated skills and knowledge enable firms to understand and offer superior product/services to its stakeholders. DeSarbo et al., 2007 state that it is essential for firms to focus on translating resources through their capabilities rather than just owning them. For instance, the results obtained support the view that stronger capabilities positively impact on firm financial performance through effective stakeholder engagement. Thus, it becomes essential for firms to focus on utilizing resources to translate into better business outcome.

Managerial Implications

Over time the progression of various business orientations highlights how firms have adapted the dynamic market conditions. Managers increasingly recognize the necessity to adapt to the shifting landscape of business from shareholder-focus approach to stakeholder-focus approach. The concept of stakeholder theory came into prominence in the late 90's (Freeman,1984) has since become a cornerstone in strategic management, emphasizing the importance of engaging with all parties that affect or are affected by the business. Recent research highlights the value of learning from stakeholders (Kujala and Sachs, 2019) and “interacting with them in which actions of each may affect the other.”(Noland and Philips 2010, p.40). Thus, engaging multiple stakeholders is becoming integral to businesses to have a competitive edge and ensuring long-term sustainability in this highly dynamic environment.

The insights gleaned from this study can guide managers to assess the needs of disparate groups of stakeholders. Firms can use engagement orientation as a tool to systematically evaluate and monitor the engagement with its stakeholders. The study introduces a composite score—EOscore—that assesses engagement across six dimensions: customers, employees, suppliers, distributors, investors, and society. To optimize engagement outcomes, managers should consider all six dimensions collectively, as the EOscore offers a holistic, evidence-based view that supports informed decision-making.

Furthermore, the study presents empirical evidence showing performance of firm is positively impacted by engagement orientation, based on data collected from senior executives across various industries. Another implication that stems from our findings is that managers need to focus on building organizational capabilities which can enhance the link between engagement orientation and performance. By understanding the business environment and developing adaptive capabilities, managers can better respond to the evolving needs of diverse stakeholder groups. In summary, this study offers a framework for measuring engagement orientation and offers actionable insights that enable firms to make data-driven decisions. By embracing a stakeholder-focused approach and enhancing their engagement strategies, firms can achieve sustainable success in a dynamic marketplace.

Limitations and future research directions

Like all other research, the findings of the current study have some limitations. First, although the study establishes that firms that are engagement oriented perform better with strong theoretical support and empirical validation. The final sample size utilized for empirical investigation was 126 firms. A larger sample would help gain richer insights and have robust results. Second, our study builds on cross sectional data (survey data) which can limit understanding the effect of adaptation. Teece (2010) state that *"an entrepreneur may be able to intuit a new model but not be able to rationalize and articulate it fully, so experimentation and learning is likely to be required."*(p.187) Thus, longitudinal studies would help firms to assess the accrued benefits over time. Understanding the linkages between engagement orientation dimensions over time would help firms make strategic decisions which would benefit multiple stakeholders. Another limitation is that our study examines firm capabilities (marketing, technological and operational) as variables that moderate the link between engagement orientation and firm performance. Considering other non-financial firm-level indicators and examining the proposed relationship can provide a deeper insight. Another limitation is the study population, a multi-country study can give a holistic view of the engagement orientation construct.

References

Anderson, J. C., & Narus, J. A. (1984). A model of the distributor's perspective of distributor-manufacturer working relationships. *Journal of Marketing*, *48*(4), 62-74.

Achrol, R. S., & Kotler, P. (1999). Marketing in the network economy. *Journal of Marketing*, *63*(4_suppl1), 146-163.

Aksoy, L., Banda, S., Harmeling, C., Keiningham, T. L., & Pansari, A. (2022). Marketing's role in multi-stakeholder engagement. *International Journal of Research in Marketing*, *39*(2), 445-461.

Alt, E., Diez-de-Castro, E. P., & Javier Llorens-Montes, F. (2015). Linking employee stakeholders to environmental performance: The role of proactive environmental strategies and shared vision. *Journal of Business Ethics*, 128(1), 167–181.

Armstrong, J. S., & Collopy, F. (1996). Competitor orientation: Effects of objectives and information on managerial decisions and profitability. *Journal of Marketing Research*, *33*(2), 188-199.

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly*, 421-458.

Baker, W. E., & Sinkula, J. M. (1999). The synergistic effect of market orientation and learning orientation on organizational performance. *Journal of the Academy of Marketing Science*, *27*(4), 411-427.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99-120.

Becker, J. M., Klein, K., & Wetzels, M. (2012). Hierarchical latent variable models in PLS-SEM: guidelines for using reflective-formative type models. *Long range planning*, *45*(5-6), 359-394.

Becker, J.-M., Ringle, C.M., Sarstedt, M. and Völckner, F. (2015), "How collinearity affects mixture regression results", *Marketing Letters*, Vol. 26 No. 4, pp. 643-659.

Ben Brik, A., Rettab, B., & Mellahi, K. (2011). Market orientation, corporate social responsibility, and business performance. *Journal of Business Ethics*, *99*, 307-324.

Berman, S. L., Wicks, A. C., Kotha, S., & Jones, T. M. (1999). Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *Academy of Management Journal*, *42*(5), 488-506.

Biernacki, C., & Govaert, G. (1999). Choosing models in model-based clustering and discriminant analysis. *Journal of Statistical Computation and Simulation*, *64*(1), 49-71.

Blau, P. (2017). *Exchange and power in social life*. Routledge.

Bosse, D. A., & Sutton, T. (2019). The stakeholder perspective in strategic management. In J. S. Harrison, J. B. Barney, R. E. Freeman, & R. A. Phillips (Eds.), The Cambridge handbook of stakeholder theory. Cambridge University Press.

Brammer, S., & Millington, A. (2006). Firm size, organizational visibility and corporate philanthropy: An empirical analysis. Business Ethics: A European Review, 15(1), 6–18.

Bourne, L., & Walker, D. H. (2005). Visualising and mapping stakeholder influence. *Management Decision*, *43*(5), 649-660.

Choi, J., & Wang, H. (2009). Stakeholder relations and the persistence of corporate financial performance. *Strategic Management Journal*, *30*(8), 895-907.

Calton, J. M., & Lad, L. J. (1995). Social contracting as a trust-building process of network governance. *Business Ethics Quarterly*, 271-295.

Clark, L. A., & Watson, D. (2016). Constructing validity: Basic issues in objective scale development.

Chahal, H., Gupta, M., Bhan, N., & Cheng, T. C. E. (2020). Operations management research grounded in the resource-based view: A meta-analysis. *International Journal of Production Economics*, *230*, 107805.

Chin, W.W. and Dibbern, J. (2010), “A permutation based procedure for multi-group PLS analysis: results of tests of differences on simulated data and a cross cultural analysis of the sourcing of information system services between Germany and the USA”, in Esposito.

Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, *16*(1), 64-73.

Coff, R. W. (1999). When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power. *Organization science, 10*(2), 119-133.

Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of Management*, *31*(6), 874-900.

Clark, L. A., & Watson, D. (2016). Constructing validity: Basic issues in objective scale development.

Day, G. S. (1994). The capabilities of market-driven organizations. *Journal of Marketing*, *58*(4), 37-52.

Deshpandé, R., Farley, J. U., & Webster Jr, F. E. (1993). Corporate culture, customer orientation, and innovativeness in Japanese firms: a quadrad analysis. *Journal of Marketing*, *57*(1), 23-37.

Dierickx, I., & Cool, K. (1989). Asset stock accumulation and sustainability of competitive advantage. *Management Science*, *35*(12), 1504-1511.

Dillman, D. A. (2011). *Mail and Internet surveys: The tailored design method--2007 Update with new Internet, visual, and mixed-mode guide*. John Wiley & Sons.

Diamantopoulos, A., Riefler, P., & Roth, K. P. (2008). Advancing formative measurement models. *Journal of Business Research*, *61*(12), 1203-1218.

Dobni, C. B., & Luffman, G. (2003). Determining the scope and impact of market orientation profiles on strategy implementation and performance. *Strategic Management Journal*, *24*(6), 577-585.

Datta, S., & Iskandar-Datta, M. (2014). Upper-echelon executive human capital and compensation: Generalist vs specialist skills. *Strategic Management Journal*, *35*(12), 1853-1866.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?. *Strategic Management Journal*, *21*(10-11), 1105-1121.

Fernandez-Feijoo, B., Romero, S., & Ruiz, S. (2014). Effect of stakeholders’ pressure on transparency of sustainability reports within the GRI framework. *Journal of Business Ethics*, *122*, 53-63.

Fornell, C., & Larker, D. (1981). Structural equation modeling and regression: guidelines for research practice. *Journal of Marketing Research*, *18*(1), 39-50.

Freeman, R. E., Harrison, J. S., & Zyglidopoulos, S. (2018). *Stakeholder theory: Concepts and strategies*. Cambridge University Press.

Freeman, R. E. (2010). *Strategic management: A stakeholder approach*. Cambridge university press.

Freeman, R. E., Dmytriyev, S. D., & Phillips, R. A. (2021). Stakeholder theory and the resource-based view of the firm. *Journal of Management*, *47*(7), 1757-1770.

Harrison, J. S., Phillips, R. A., & Freeman, R. E. (2020). On the 2019 business roundtable “statement on the purpose of a corporation”. *Journal of Management*, *46*(7), 1223-1237.

Gefen, D., Straub, D., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the association for information systems*, *4*(1), 7.

Goodstein, J. D., & Wicks, A. C. (2007). Corporate and stakeholder responsibility: Making business ethics a two-way conversation. *Business Ethics Quarterly*, *17*(3), 375-398.

Greenley, G. E., & Foxall, G. R. (1997). Multiple stakeholder orientation in UK companies and the implications for company performance. *Journal of Management Studies*, *34*(2), 259-284.

Grewal, R., & Tansuhaj, P. (2001). Building organizational capabilities for managing economic crisis: The role of market orientation and strategic flexibility. *Journal of Marketing*, *65*(2), 67-80.

Grewal, R., Chandrashekaran, M., Johnson, J. L., & Mallapragada, G. (2013). Environments, unobserved heterogeneity, and the effect of market orientation on outcomes for high-tech firms. *Journal of the Academy of Marketing Science*, *41*, 206-233.

Gilliland, D. I., & Bello, D. C. (2002). Two sides to attitudinal commitment: The effect of calculative and loyalty commitment on enforcement mechanisms in distribution channels. *Journal of the Academy of Marketing Science*, *30*, 24-43.

Gatignon, H., & Xuereb, J. M. (1997). Strategic orientation of the firm and new product performance. *Journal of Marketing Research*, *34*(1), 77-90.

Griffith, D. A., Harvey, M. G., & Lusch, R. F. (2006). Social exchange in supply chain relationships: The resulting benefits of procedural and distributive justice. *Journal of Operations Management*, *24*(2), 85-98.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, *19*(2), 139-152.

Hair, J. F. (2009). Multivariate data analysis.

Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2017a), A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), Sage, Thousand Oaks, CA.

Harrison, J. S., & Wicks, A. C. (2013). Stakeholder theory, value, and firm performance. *Business Ethics Quarterly*, *23*(1), 97-124.

Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). Research methods for business. *Education+ Training*, *49*(4), 336-337.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long range planning*, *46*(1-2), 1-12.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2-24.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, *109*, 101-110.

Hartline, M. D., & Ferrell, O. C. (1996). The management of customer-contact service employees: An empirical investigation. *Journal of Marketing*, *60*(4), 52-70.

Harrison, J. S., Bosse, D. A., & Phillips, R. A. (2010). Managing for stakeholders, stakeholder utility functions, and competitive advantage. *Strategic Management Journal*, *31*(1), 58-74.

Henisz, W. J., Dorobantu, S., & Nartey, L. J. (2014). Spinning gold: The financial returns to stakeholder engagement. *Strategic Management Journal*, *35*(12), 1727-1748.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*, 115-135.

Hult, G. T. M., & Ketchen Jr, D. J. (2001). Does market orientation matter?: A test of the relationship between positional advantage and performance. *Strategic Management Journal*, *22*(9), 899-906.

Ibrahim, N. A., Howard, D. P., & Angelidis, J. P. (2003). Board members in the service industry: An empirical examination of the relationship between corporate social responsibility orientation and directorial type. *Journal of Business Ethics*, *47*, 393-401.

Jarvis, C. B., S. B. MacKenzie, and P. M. Podsakoff. 2003. A critical review of construct indiciators and measurement model misspecification in marketing and consumer research. Journal of Consumer Research 30 (2): 199–218.

Jones, T. M. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *Academy of Management Review*, *20*(2), 404-437.

Jones, T. M., Harrison, J. S., & Felps, W. (2018). How applying instrumental stakeholder theory can provide sustainable competitive advantage. *Academy of Management Review*, *43*(3), 371-391.

Jauch, L. R., & Sekaran, U. (1978). Employee orientation and job satisfaction among professional employees in hospitals. *Journal of Management*, *4*(1), 43-56.

Jo, H., & Harjoto, M. A. (2012). The causal effect of corporate governance on corporate social responsibility. *Journal of Business Ethics*, *106*, 53-72.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, *30*(2), 199-218.
Jones, T. M. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *Academy of Management Review*, *20*(2), 404-437.
Katsikeas, C. S., Samiee, S., & Theodosiou, M. (2006). Strategy fit and performance consequences of international marketing standardization. *Strategic Management Journal*, *27*(9), 867-890.

Kirca, A. H., Jayachandran, S., & Bearden, W. O. (2005). Market orientation: A meta-analytic review and assessment of its antecedents and impact on performance. *Journal of Marketing*, *69*(2), 24-41.

Kline, R. B. (2011). Principles and practice of structural equation modeling (3rd Ed.). New York, NY: Guilford Press.

Kohli, A. K., & Jaworski, B. J. (1990). Market orientation: the construct, research propositions, and managerial implications. *Journal of Marketing*, *54*(2), 1-18.

Kohli, A. K., Jaworski, B. J., & Kumar, A. (1993). MARKOR: a measure of market orientation. *Journal of Marketing Research*, *30*(4), 467-477.

Kotler, P. (1972). A generic concept of marketing. *Journal of Marketing*, *36*(2), 46-54.

Kumar, V., Jones, E., Venkatesan, R., & Leone, R. P. (2011). Is market orientation a source of sustainable competitive advantage or simply the cost of competing?. *Journal of Marketing*, *75*(1), 16-30.

Kumar, N., Stern, L. W., & Anderson, J. C. (1993). Conducting interorganizational research using key informants. *Academy of Management Journal*, 36(6), 1633–1651.

Kline, R. B. (2015). Principles and practice of structural equation modeling: Guilford publications. *Principles and practice of structural equation modeling: Guilford publications*.

Kumar, N., Scheer, L. K., & Steenkamp, J. B. E. (1995). The effects of perceived interdependence on dealer attitudes. *Journal of Marketing Research*, *32*(3), 348-356.

Kull, A. J., Mena, J. A., & Korschun, D. (2016). A resource-based view of stakeholder marketing. *Journal of Business Research*, *69*(12), 5553-5560.

Lai, C. S., Chan, D. Y. C., Yang, C. F., & Hsu, W. C. (2015). The value creation scale of supplier-distributor relationship in international markets. *Journal of Business & Industrial Marketing*, *30*(2), 171-181.

Loderer, C. and Waelchli, U. (2010), "Firm age and performance", Working paper, University of Bern.

Levitt, T. (1960). Growth and profits through planned marketing innovation. *Journal of Marketing*, *24*(4), 1-8.

Lourenço, I. C., Branco, M. C., Curto, J. D., & Eugénio, T. (2012). How does the market value corporate sustainability performance?. *Journal of Business Ethics*, *108*, 417-428.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*(1), 135-172.

Lui, S. S., & Ngo, H. Y. (2012). Drivers and outcomes of long-term orientation in cooperative relationships. *British Journal of Management*, *23*(1), 80-95.

Lusch, R. F., & Brown, J. R. (1996). Interdependency, contracting, and relational behavior in marketing channels. *Journal of Marketing*, *60*(4), 19-38.

Maignan, I., & Ferrell, O. C. (2004). Corporate social responsibility and marketing: An integrative framework. *Journal of the Academy of Marketing Science*, *32*, 3-19.

Marston, C., & Straker, M. (2001). Investor relations: a European survey. *Corporate communications: an international journal*, *6*(2), 82-93.

Marston, C. (2004). *A survey of European investor relations*. Edinburgh: Institute of Chartered Accountants of Scotland.

MacKenzie, S. B., Podsakoff, P. M., & Jarvis, C. B. (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*, *90*(4), 710.

Masyn, K. E. (2013). Latent class analysis and finite mixture modeling. In T. Little (Eds), The Oxford Handbook of Quantitative Methods (551-611). New York, NY: Oxford University Press.

Mazur, A. K., & Pisarski, A. (2015). Major project managers' internal and external stakeholder relationships: The development and validation of measurement scales. *International Journal of Project Management*, *33*(8), 1680-1691.

Menon, A., Jaworski, B. J., & Kohli, A. K. (1997). Product quality: Impact of interdepartmental interactions. *Journal of the Academy of Marketing Science*, *25*, 187-200.

Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, *58*(3), 20-38.

Mishra, S., & Modi, S. B. (2016). Corporate social responsibility and shareholder wealth: The role of marketing capability. *Journal of Marketing*, *80*(1), 26-46.

Noble, C. H., Sinha, R. K., & Kumar, A. (2002). Market orientation and alternative strategic orientations: A longitudinal assessment of performance implications. *Journal of Marketing*, *66*(4), 25-39.

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. Translational Issues in Psychological Science, 4(4), 440- 461. https://doi.org/10.1037/tps0000176

Oliver, R. L., & Anderson, E. (1994). An empirical test of the consequences of behavior- and outcome-based sales control systems. *Journal of Marketing*, *58*(4), 53-67.

Oberski, D. (2016). Mixture models: Latent profile and latent class analysis. In J. Robertson & M. Kaptein (Eds.), Modern statistical methods for HCI (pp. 275–287). Cham, Switzerland: Springer Inter-national Publishing.

P. Blau "Exchange and power in social life", John Wiley & Sons, New York (1964)

Peter, J. P. (1981). Construct validity: A review of basic issues and marketing practices. *Journal of Marketing Research*, *18*(2), 133-145.

Petersen, B. K., & Martin, H. J. (1996). CEO perceptions of investor relations as a public relations function: An exploratory study. *Journal of Public Relations Research*, *8*(3), 173-209.

Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS quarterly*, 623-656.

Pereira, V., & Bamel, U. (2021). Extending the resource and knowledge based view: A critical analysis into its theoretical evolution and future research directions. *Journal of Business Research*, *132*, 557-570.

Plaza-Úbeda, J. A., de Burgos-Jiménez, J., & Carmona-Moreno, E. (2010). Measuring stakeholder integration: Knowledge, interaction and adaptational behavior dimensions. *Journal of Business Ethics*, 93(3), 419–442.

Narver, J. C., & Slater, S. F. (1990). The Effect of a Market Orientation on Business.

R. Cropanzano, M.S. Mitchell Social exchange theory: An interdisciplinary review. *Journal of Management*, 31 (6) (2005), pp. 874-900,

R.M. Emerson. Social exchange theory Annual Review of Sociology, 2 (1) (1976), pp. 335-362.

Ramani, G., & Kumar, V. (2008). Interaction orientation and firm performance. *Journal of Marketing*, *72*(1), 27-45.

Rehbein, K., Waddock, S., & Graves, S. B. (2004). Understanding shareholder activism: Which corporations are targeted?. *Business & Society*, *43*(3), 239-267.

Rossiter Hofer, A., J. Smith, R., & R. Murphy, P. (2014). Spillover effects of a firm's relationship marketing orientation in the logistics triad. *The International Journal of Logistics Management*, *25*(2), 270-288.

Rumelt, R. P. (1984). Towards a strategic theory of the firm. *Competitive Strategic Management*, *26*(3), 556-570.

Schreiber, J. B. (2017). Latent class analysis: an example for reporting results. *Research in Social and Administrative Pharmacy*, *13*(6), 1196-1201.

Schilke, O. (2014). On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Strategic Management Journal*, 35(2), 179–203.

Slater, S. F., Olson, E. M., & Hult, G. T. M. (2006). The moderating influence of strategic orientation on the strategy formation capability–performance relationship. *Strategic Management Journal*, *27*(12), 1221-1231.

Sterba, S.K. (2013). Understanding Linkages Among Mixture Models. Multivariate Behav Res. 2013 48(6): 775-815.

Saxe, R., & Weitz, B. A. (1982). The SOCO scale: A measure of the customer orientation of salespeople. *Journal of Marketing Research*, *19*(3), 343-351.

Stock, J. H., & Yogo, M. (2002). Testing for weak instruments in linear IV regression.

Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information systems*, *13*(1), 24

Sulkowski, A. J., Edwards, M., & Freeman, R. E. (2018). Shake your stakeholder: Firms leading engagement to cocreate sustainable value. *Organization & Environment*, *31*(3), 223-241.

Surroca, J., Tribó, J. A., & Waddock, S. (2010). Corporate responsibility and financial performance: The role of intangible resources. *Strategic Management Journal*, *31*(5), 463-490.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, *48*(1), 159-205.

Tein, J. Y., Coxe, S., & Cham, H. (2013). Statistical power to detect the correct number of classes in latent profile analysis. Structural Equation Modeling, 20, 640-657. doi: 10.1080/10705511.2013.824781.

Torugsa, N. A., O'Donohue, W., & Hecker, R. (2012). Capabilities, proactive CSR and financial performance in SMEs: Empirical evidence from an Australian manufacturing industry sector. *Journal of Business Ethics*, *109*, 483-500.

Turker, D. (2009). Measuring corporate social responsibility: A scale development study. *Journal of Business Ethics*, *85*, 411-427.

Vinzi, V. E., Chin, W. W., Henseler, J., & Wang, H. (2010). *Handbook of partial least squares* (Vol. 201, No. 0). Berlin: Springer.

Whitener, E. M., Brodt, S. E., Korsgaard, M. A., & Werner, J. M. (1998). Managers as initiators of trust: An exchange relationship framework for understanding managerial trustworthy behavior. *Academy of Management Review*, *23*(3), 513-530.

Vinzi, V., Chin, W.W., Henseler J. and Wang, H. (Eds), Handbook of Partial Least Squares: Concepts, Methods and Applications (Springer Handbooks of Computational Statistics Series), Springer, Heidelberg, Dordrecht, London, New York, NY, Vol. II, pp. 171-193.

Watson, R., Wilson, H. N., Smart, P., & Macdonald, E. K. (2018). Harnessing difference: a capability-based framework for stakeholder engagement in environmental innovation. *Journal of Product Innovation Management*, *35*(2), 254-279.

Weir, B., Stone, D., & Hunton, J. (2005). Does graduate business education contribute to professional success? *Accounting Horizons*, *19*(2), 85–100.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171-180.

Wu, M. L. (2006). Corporate social performance, corporate financial performance, and firm size: A meta-analysis. *Journal of American Academy of Business*, 8, 163-171.

Appendix

Table A1 – Select Literature Review on Strategic Orientations of the Firm

Types of Orientation	Relevant Studies	Summary of Findings
Employee Orientation	Jauch and Sekaran (1978)	Three kinds of employee orientation have been discussed- *professional identification, organizational loyalty and peer loyalty*. Organizational loyalty has a significant impact on job satisfaction, while controlling for professional identification and peer loyalty.
Market Orientation	Kohli and Jaworski (1990)	*"Organization wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization wide responsiveness"* (p.6) will affect firm performance, employee response and customer response. This relationship is moderated by supply side and demand side moderators.
Market Orientation	Naver and Slater (1990)	When a firm focuses on *"continuously collecting information on target-customers' needs and competitors' capabilities and uses this information to create continuously superior customer value"* (p.21) then this would impact its performance positively and this has been seen in both commodity and non-commodity business.
Customer Orientation	Deshpande et al (1993)	Customer orientation and innovations are key determinants of firm performance even when culture is controlled. "*Customer orientation has been defined as the set of beliefs that puts the customer first, while not excluding those of all the other stakeholders*." (p.27)
Entrepreneurial Orientation	Lumpkin and Dess (1996)	Entrepreneurial orientation affects firm performance and environmental factors and organizational factors moderate this relationship. Entrepreneurial orientation is defined as dimensions which are useful in charactering and distinguishing key entrepreneurial process. These dimensions are - *firm's autonomy, innovativeness, risk taking, pro activeness and competitive aggressiveness*.
Competitor Orientation	Armstrong and Callopy (1996)	Focusing on competitors strategies and designing own (firm) profitability strategies based on competitors strategies reduces firms' profits.
Technological Orientation	Gatingon and Xuereb (1997)	*"When a firm focuses using its technological background for the development of new products or builds a new technical solution to answer and meet new needs of the users*" (p.78) they are more prone to make radical, dissimilar costly and advantageous innovations, if the firm is customer and competitor oriented also.

Learning Orientation	Baker and Sinkula (1999)	Learning orientation is a moderator of market orientation. New product development can be positive outcome of learning orientation. Market orientation is necessary but not a sufficient for competitive advantage. *Learning orientation has been defined as "a set of values that influence the degree to which an organization is satisfied with its theories in use, mental models and dominant logics which may or may not have their bases in the marketplace*." (p.413)
Relationship Orientation	Garbinro and Johnson (1999)	Relationships with customers are a continuum of transactional to collaborative. When organizations categorize their *relationships among customers as transactional to collaborative* it affects future intentions of purchase and this relationship is mediated by levels of satisfaction, trust and commitment
Stake Holder Orientation	Berman et al (1999)	Of the five stakeholder relationships only *employees and product safety/quality* affect *firm performance, community, diversity and natural environment* have no effect on firm performance. Further, stakeholder relationships do not drive firm strategy.
Strategic Orientations (multiple)	Nobel, Sinha and Kumar (2002)	Selling and competitor orientation positively affects firm performance whereas production and customer orientation did not affect firm performance. Branding is an important component of market orientation and the relationship between strategic orientation and firm performance is moderated by organizational learning.
Market Orientation - Meta Analysis	Kirca, Jayachandran and Bearden (2005)	Market Orientation affects firm performance thru, *customer loyalty, innovativeness, and quality*. The effect of market orientation on firm performance is higher in manufacturing firms in comparison to service firms.
Interaction Orientation	Ramani and Kumar (2008)	*Focusing on individual customers and conducting marketing activities with the customers along with "customer empowerment and customer value management*"(p.40) enhances firm profitability and firm's relationships with the customers
Market Orientation	Kumar et al., (2011)	Market orientation has a short-term and long run influence on sales and profit. However, as more firms become market oriented the competitive advantage of market orientation decreases and being market oriented is a failure preventer than success producer

A2: Formal Content – Invitation for participation

Dear Sir/Madam,

Greetings!!

I am Sandhya Banda doctoral student (FPM) from the Indian School of Business. As part of my doctoral dissertation, I am conducting a research study on a firm's orientation toward engaging with its stakeholders and the expected benefits for the firm.

This is joint work with my advisor Dr. V. Kumar, and Prof. Anita Pansari.

The responses to this survey will help us provide insight into areas of importance for researchers and to help managers prioritize decisions related to these matters.

The online survey will only take about 5-6 minutes to complete. Kindly click the link below to participate in the survey.

Participation in the survey is completely voluntary, and we assure the confidentially of all your responses. The report will not include any personally identifiable information. This survey is approved by the Institutional Review Board at ISB.

Thank you for your time and cooperation.

Sincerely,

Sandhya Banda

Table A3: Scale Purification

Initial Item Pool	Item excluded	Item included	Source
Customer Engagement (CE)			
"Our products are reasonably priced, as compared to our competitors"		CE1	Adapted from Menon et al (1997); Kumar and Pansari, 2015 and refined
"Our customers get the worth of their money, while buying our products"		CE2	
"Our customers are provided rewards/incentives for each converted referral"	1a		
"We monitor all the conversation about our firm on all social media pages"	1a		
"We use customer feedback mechanism for improving our products and services"		CE3	
Employee Engagement (EE)			
"The firm provides frequent (quarterly) feedback to its employees"		EE1	Adapted from Oliver and Anderson (1994); Hartline and Ferrell (1996); Kumar and Pansari 2015 and refined
"The firm provides mentorships and idea development programs to its employees"	1a		
"Flow of communication in our firm is mostly bottom to top, helping employees to have their voice"		EE2	
"Our firm has training programs for updating knowledge and skills and present them with avenues for their individual growth"		EE3	
"Our firm permit employees to use their own judgement in solving problems"		EE4	
"We work with our employees beyond the work sphere by sponsoring initiatives and extracurricular activities that foster inclusion and participation of employee's families"	1b		
Society/ Community Engagement (SOE)			
"We provide opportunities to employees by involving them in idea generation process and employees sharing ideas for new products"	1a		Adapted from Turker (2009) and refined
"We develop training programs to increase environmental awareness, skills and expertise of employees"		SOE1	
"Our firm emphasizes the importance of its social responsibilities to the society"		SOE2	
"Our firm implements special programs to minimize its negative impact on the natural environment"	1a		
"Our firm targets sustainable growth which considers future generations"		SOE3	
"Our firm conducts research & development projects to improve the well-being of the society in the future"		SOE4	

"Our firm encourages employees to participate in voluntary activities"	1b		
"Our firm contributes to campaigns and projects that promote the well-being of the society"	1b		
Supplier Engagement (SUE)			
"We are willing to put more effort and investment in building our business in the supplier's product"		SUE1	Adapted from Lusch and Brown (1996); Kumar et al. (1995) and refined
"In dealing with our suppliers, we have a mutual understanding of the role of each party"		SUE2	
"The procedures and routines we have developed to obtain this item are tailored to a particular supplier"	1a		
"It would be difficult for us to replace this vendor"	1a		
"We are committed to improvements that may benefit the relationship with our major supplier as a whole and not only ourselves"		SUE3	
"We share the problems that arise in the course of dealing with our major suppliers"	1b		
Distributor Engagement (DE)			
"We have dedicated a great deal of time and effort to training this distributor on how to represent our product line"		DE1	Adapted from Andersson and Narus (1984); Gilliland and Bello (2002), Lai et al. (2015) and refined
"We need to keep working with this distributor since leaving would create a hardship for our firm"		DE2	
"Our distributor is better able to reduce customer complaints"		DE3	
"Our distributor provides information on competition and helps predict the sales volume"	1a		
Investor Engagement (IE)			
"Our firm aligns its goals with the investor goals"		IE1	Adapted from Peterson and Martin (1996); Marston and Staker (2001); Marston (2004) and refined
"We keep our investors informed about firm's plans for growth, financial performance, and crisis management"		IE2	
"We ensure to have a robust investor relation program to make sure their opinion matters, and their voices are heard"		IE3	
"Investor relations meeting allow to showcase the expertise and diversity within the firm that builds trust and personal capital"		IE4	
"Our firm maintains a formal board-shareholder engagement policy"	1a		
"Our firm provides details regarding governance to our shareholders"	1a		

Note: 1a: First-level purification based on EFA 1b: Second-level purification based on CFA

Table A4: Variables in the study and definitions

Variable name	Definition	Source
Dependent variable		
Revenue growth	The difference of Net sales over four years for each firm	VCC Edge
Independent variable		
EO score	The sum of average score of six dimensions of Engagement orientation construct (range 6 to 30) Computation of EOscore Avg_customer engagement: (CE1+CE2+CE3)/3 Avg_employee engagement: (EE1+EE2+EE3+EE4)/4 Avg_society engagement: (SOE1+SOE2+SOE3+SOE4)/4 Avg_supplier engagement: (SUE1+SUE2+SUE3)/3 Avg_distributor engagement: (DE1+DE2+DE3)/3 Avg_investor engagement: (IE1+IE2+IE3+IE4)/4 EOscore = (Avg_customer engagement+ Avg_employee engagement+ Avg_society engagement + Avg_supplier engagement+ Avg_distributor engagement+ Avg_investor engagement)	Survey data
Moderating variables		
Marketing Capability	Elaborated in text	VCCEdge, GlobalData
Technological Capability	Elaborated in text	VCCEdge, GlobalData
Operational Capability	Elaborated in text	VCCEdge, GlobalData
Control variables		
Firm_age	Log (the number of years from its incorporation)	VCCEdge and Annual reports
Firm_size	Log (number of employees)	VCCEdge and Annual reports
Firm_type	Dummy variable =1 if B2C; 0 otherwise	VCC Edge and Indian Board
Board variables		
Proportion_Indep_PG	Fraction of independent directors with postgraduate degree	Indian Board and Orbis
Indep_industry	Average number of industries independent directors has in past for each firm	Indian Board and Orbis