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Research Article

The Effects of Agile Marketing Capabilities on Drone Technology Adoption among Courier Service Companies in Malaysia

Wan Marhaini Wan Omar[1], Syerina Azlin Md Nasir[2] and Nik Nur Zaheerah Abdul Rahman[3]
[1,3]*Faculty of Business and Management, Universiti Teknologi MARA Kelantan, Lembah Sireh, Kelantan, Malaysia*
[2]*College of Computing, Informatics and Mathematics, Universiti Teknologi MARA Kelantan, Lembah Sireh, Kelantan, Malaysia*

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ABSTRACT

Drone technology has emerged as a transformative solution for addressing last-mile delivery challenges within the rapidly evolving logistics landscape. In Malaysia, the adoption of drone technology for delivery services remains in its early stages. Despite its potential benefits, concerns remain regarding cost implications and practicality. Addressing these challenges, this study aims to examine the influence of agile marketing capabilities dimensions on drone technology adoption among Malaysian courier service companies. To provide a robust theoretical foundation, the study integrates the Dynamic Capability (DC) theory and Diffusion of Innovation (DOI) theory into a unified framework. Using a simple random sampling technique, data were collected from 244 courier service companies operating in Wilayah Persekutuan Kuala Lumpur and Selangor, two states recognized for their well-developed courier infrastructure. The proposed relationships were analyzed using regression analysis. The findings highlight customer-oriented responsiveness, high flexibility and absorptive capacity capabilities significantly influence drone technology adoption among Malaysian courier service companies. However, human collaboration was found to have no significant impact on adoption. This study contributes to the existing body of knowledge by identifying critical dimensions of agile marketing capabilities that drive drone technology adoption in the courier service industry. The insights gained provide practical implications for courier service companies seeking to enhance their capabilities and integrate emerging technologies in this rapidly evolving sector. Future research should explore the impact of external factors, such as regulations and public perception, as well as technological advancements on adoption rates and operational outcomes to provide a more nuanced understanding of the variables shaping the long-term integration of drone technology in the logistics industry.

Keywords: Agile Marketing Capabilities, Drone Technology Adoption, Courier Service Company.

INTRODUCTION

Drone technology has emerged as a game-changing solution to the problems of last-mile delivery within the rapidly changing logistics landscape. Malaysian courier services in particular stand to benefit greatly from implementing this advanced technology as it can improve the accessibility, sustainability and efficiency of their operations [1]. However, technological advancements alone are insufficient; the successful integration of drone technology by courier services will however depend on the agility and dynamism of their marketing capabilities that will enable them to successfully navigate evolving market scenarios and customer demands [2]. According to [3], the Dynamic Capabilities (DC) theory examines how companies leverage their dynamic capabilities to address internal and external competencies. The theory provides a framework that could assists courier companies to develop agile marketing capabilities in the context of drone adoption. The ability to recognize market opportunities, seize them and reorganize resources are all necessary for integrating drone technology into current operations and marketing strategies [4]. Meanwhile, the Diffusion of Innovation (DOI) theory provides insights on how and why new ideas and technologies spread through cultures [5]. This theory is relevant as it helps understand the adoption process of

drone technology within the courier industry, highlighting the importance of factors like the technology's relative advantage, compatibility, complexity, trialability, and observability in influencing its adoption rate. While the combined application of both theories offers valuable insights, there are limitations to consider. In DC theory, firm's internal organizational capabilities are the main focus. Thus, external factors like government regulations, society views of drone technology and supporting infrastructure development are still crucial to drone adoption [6]. Traditional models might not be able to capture these external influences effectively. Furthermore, [7] asserts that although DOI theory offers insightful information, it runs the risk of oversimplifying the inherent complexity of technology adoption. Moreover, it can be difficult to measure how well agile marketing campaigns drive the adoption of drone technology because current research may not have the accurate metrics and data collection methods required to assess how dynamic capabilities affect the adoption of innovations [8]. Examining the impact of dynamic capabilities on drone adoption could help courier companies make informed decisions strategically. Most of the courier companies undergone transformation process driven by technologies such as drones, autonomous vehicle and AI. By exploring the factors that influence drone adoption, courier companies could enhance their competitiveness in logistic sector.

Therefore, this study aims to investigate the impact of agile marketing capabilities on the adoption of drone technology among courier service companies in Malaysia to provide practical insights for industry practitioners and inform future research in this emerging field. The findings will offer valuable insights to courier service companies on the strategic importance of developing robust agile marketing capabilities to effectively leverage emerging technologies and stay competitive in the rapidly evolving logistics sector. This is crucial, as the successful integration of drone technology into courier services requires more than just technological advancements; it also necessitates the development of agile marketing capabilities to navigate the dynamic market conditions and customer preferences effectively. The paper starts by reviewing the dimensions of agile marketing capabilities and the important of drone technology in the courier service industry. The subsequent sections then present the methodological procedures, analysis and results. Finally, the paper concludes with discussion and future research directions.

LITERATURE STUDY

Drone Technology Adoption

Drones, also known as Unmanned Aerial Vehicles, are robotic aircraft that can be piloted remotely or flown autonomously. According to [9], the drone can be defined as "an aircraft that does not have a pilot but is controlled by someone on the ground, used especially for dropping bombs or for surveillance, which means careful watching of a place". The use of drones has both commercial and humanitarian purposes, but logistics service providers have shown limited attention, possibly due to technological constraints such as weight limits, battery life, and interference with commercial aviation, [10]. Drones are versatile technologies that can be equipped with various tools, but they do not qualify as "general-purpose" technologies. Drone is not new in logistic industry because big companies like Amazon.com, DHL Express, UPS, FedEx Corporation SF Express has already used drones for storing and warehousing. For instance, Amazon already employs over 45,000 autonomous robots in 20 fulfilment centres, including Kiva robots that deliver shelves to human package pickers [11]. However, limited studies were discussed in the context of courier service industry. There are some potential business cases for drones in operations, where they can provide measurable benefits and fit economic and strategic factors [12]. For example, when integrated with technologies like cameras, sensors, and barcode readers, drones can reduce labour-intensive and risky manual work at heights or in dangerous places. However, the business case for drones remains unclear compared to traditional investment options like forklifts, mounted cameras, and material handling systems due to their limited payload, automation level, and suitability for indoor applications, [13]. Additionally, [13] suggested that drone applications implemented as externally managed "drone-as-a-service" systems have lower entry barriers. Existing research on drone technology has primarily focused on its technical capabilities and applications, such as traffic management, rather than on the organizational readiness for adoption. The literature has explored drone delivery, drone use in construction sites, and the feasibility of warehouse drone implementation, [14] instead of organization technology adoption in courier service. Further exploration of the technology adoption perspective could provide valuable insights to the courier service companies in Malaysia.

Agile Marketing Capabilities

Agile marketing capabilities refer to a firm's proficiency in rapidly sensing and responding to market changes through iterative processes, cross-functional collaboration, and data-driven decision-making. This dynamic capability enables organizations to swiftly adapt their marketing strategies, tactics, and processes in alignment with evolving market dynamics, thereby enhancing their competitiveness and performance [15]. The concept differs from conventional marketing strategies in that agile features enable it to adapt to changing conditions and resolve real-world problems, such as lengthy product development cycles, squandered time and resources, etc. Agile

responses are incremental and iterative, with a focus on consumer and market feedback. With the tumultuous global environment facing business today, the ability to use agility to address the challenges posed by digital transformation is often the key to sustainability. Being agile marketing means moving swiftly and clearly the extent to which an entity rapidly iterates between making sense of the market and executing marketing decisions to adapt to market changes [16]. In this context, to meet customer expectations requires to shipping cost, time, area and others, the courier services companies need to identify and adjust business development based on economic and technology environmental in making innovative decision making for delivery services. The more emerging technology that have been uses by the courier, the more competitive courier industry because the customers have a better decision making to select low-cost shipping in their shopping [6]. In fact, the courier services companies need to recognize, quickly react and alert about the technology changes as mentioned earlier. In line with this notion, the question arises as to whether those in the logistics industry who are agile in their strategic focus are the ones who are likely to be more adaptive to innovations like the drone implementations. The era of the Industrial Revolution 4.0 sees disruptive technology as innovation that affects the way business operates and therefore will impact nearly every facet of human's life. Therefore, in this study four dimensions of agile marketing capabilities were selected to examine whether the dimensions can influence the adoption of drone technology among the courier service company in Malaysia.

1. Customer-Oriented Responsiveness

Customer – oriented responsiveness can be defined as continuously recognize and adapt to shifts in the requirements and demands of the customer [15]. This dimension describes the abilities to recognize in a timely and dynamic way and respond to customer-related changes in order to appropriately meet their requirements and expectations. It shows how a business should understand customers' needs and expectations and provide superior value through acquiring customer knowledge; formulating and disseminating customer-focused strategies; and responsiveness to the potential market [17]. Businesses can enhance their capabilities and perform innovative activities by getting ideas from customers and having access to information about how markets are growing [18]. Thus, drone is one of the innovations and emerging technology where it has software and application that serve effective delivery service to the customers. By these conveniences of drone itself, the courier did not have to worry about the weight of parcel or package to deliver to the customers and meeting the customer expectations due to the higher speed and endurance because it takes short time to deliver to the customer [19]. High speed and safe delivery services from courier service regarding to the customers' request become their responsibility to fulfil that customers' request for the responsive market orientation. Hence, this hypothesis is proposed:

H1: There is a positively influence between customer-oriented responsiveness and drone technology adoption.

2. High Flexibility

Flexibility is correlated with a company's capacity to respond quickly to changes in the market. It is defined as the capacity to flexibly and adaptably modify strategies, operations, and planning in order to deal with changes and more effectively use available resources to satisfy client wants and requests [15]. Flexibility which also known as agility is a state of dynamic that adapted to the specific circumstances, catering to the change, self-improvement and ability to react to changes [20]. Agility is achieved in the executors' systems, as a high level of flexibility provides possibilities to make changes at low cost within a short time frame, while a low level might limit or even block possible changes. According to [15], high flexibility means to deal with changes by adopting a flexible and adaptable strategy. For courier service industry, adaptation and flexibility are crucial. Additionally, flexibility allows the firm to limit disadvantages in cost and time which may arise because of the adaptation need and growth in many international markets, and also, understanding distributor's motivations enables firms to co-create the right

programs or educate distributors, thus satisfying the need of responsiveness and flexibility [21]. The adoption of drone with flexibility among courier services companies for logistics operation can be adaptable strategy because of its company capacity to respond quickly to technology changes in making strategies and decisions. Having said that, it is a good opportunity for courier service Company in to adopt this drone technology to meet customers' needs and preferences which can lower shipping cost, time and area. Therefore, it is proposed that:

H2: There is a positively influence between high flexibility and drone technology adoption.

3. Human collaboration

Human collaboration refers to establish personal connections with coworkers and a cooperative work atmosphere [15]. To better design successful, customer-focused marketing strategies, close alignments, collaboration, and engagement among individuals and departments are necessary to build relationships based on trust and foster a collaborative work environment. According to [22], human collaboration needs to build positive psychology or

positive emotion to create positive work environment to be more receptive, more creative, making better decisions, having improved communication, making new connections, experiencing new ways of being and finding new learning opportunities. The integration of drone technology into the courier service industry necessitates effective human collaboration to optimize delivery operations. [23] examined a hybrid delivery system combining traditional vehicles and drones, particularly during the COVID-19 pandemic. Their research indicated that such integration could increase delivery capacity and prioritize time-sensitive shipments, underscoring the necessity for human oversight in managing and coordinating these hybrid fleets. Furthermore, a study by [24] analyzed a system where delivery trucks and crowdsourced drones collaborate for last-mile deliveries. Their findings suggest that human collaboration is vital for tasks such as package assignment and route planning, ensuring the seamless operation of drone-assisted deliveries. Hence, human collaboration is essential in coordinating operations, managing uncertainties, and optimizing the integration of drones into existing delivery frameworks. This hypothesis is proposed:

H3: There is a positively influence between human collaboration and drone technology adoption

4. Absorptive Capacity Capabilities

Absorptive capacity capabilities defined as an organization's ability to identify, assimilate, transform, and apply knowledge, is crucial for the success of drone technology adoption [25]. A study by [26] believed that absorptive capacity is a dynamic skill that includes learning new information, integrating it, transforming it, and using it to spur technology development [27]. For that reason, absorptive capacity has been identified as a crucial catalyst for obtaining a competitive edge and promoting innovation, highlighting the complementary nature of internal capabilities and external collaboration [14]. In the context of the courier service industry, this capability is crucial for the effective adoption of drone technology. Organizations with high absorptive capacity are better positioned to integrate innovative technologies, such as drones, into their operations. This involves not only acquiring and understanding drone technology but also effectively implementing and utilizing it to enhance service delivery [28]. The dynamic capability to adapt and apply new knowledge facilitates the seamless incorporation of drones, leading to improved operational efficiency and competitiveness. According to [29] stated that organizations with enhanced absorptive capacity are better positioned to integrate new technologies such as drone technology, leading to improved innovation outcomes. On that note, absorptive capacity plays a pivotal role in the successful adoption of drone technology within the courier service industry. Thus, it is proposed that:

H4: There is a positively influence between absorptive capacity capabilities and drone technology adoption

METHODS

This study adopts a quantitative research approach, which is well-suited for deductive, objective, and outcome-oriented studies. It ensures reliability and validity through established statistical procedures and techniques [30] - [31]. The research follows a cross-sectional design, where data are collected, analyzed, and summarized statistically at a single point in time. The measurement scale for this study was developed by adopting validated items from

previous literature as displays in Table 1. The constructs were operationalized using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), with 30 items assessing respondents' agreement on four key variables: customer-oriented responsiveness, high flexibility, human collaboration, and absorptive capacity capability in relation to drone technology adoption. Pre-test has been conducted for the study in order to strengthen the content validity of the survey instrument. This involved investigating the degree of relevance of each variable item and confirming the proposed items in the survey through the expert opinions of industry representatives and academics. Three experts have been selected from the industry as well as academia based on their vast experiences and wide knowledge in the courier service industry. The feedback from the experts was used to guide the items to be refined for clarity. The refined questionnaire has been proceeded for the next phase of the instrument validation. The study has been continued with a pilot test to identify and estimate the inter-item internal consistency and reliability of the measured items. The refined questionnaires were then distributed randomly to the managers and owners of the selected courier service companies in Selangor and Wilayah Persekutuan Kuala Lumpur. These two locations were selected due to higher courier infrastructures by states in Malaysia. The respondents were approached online, and the survey was shared through email and WhatsApp application. A total of 100 questionnaires were collected from the identified respondents who were willing to participate in the survey. According to [32], 100 samples for a pilot study is considered adequate. Reliability tests have been employed to assess the internal inconsistency of the measurement items.

Table 1. Measurement Items and Sources

Dimensions / Construct	No of Items	Sources
Customer-oriented responsiveness	6	(Moi & Cabiddu, 2021; Christopher, 2010)
High flexibility	6	(Moi & Cabiddu, 2021; Hagen et al. 2018)
Human collaboration	6	(Moi & Cabiddu, 2021; Bernstein & Turban. 2018)
Absorptive capacity capabilities	6	(Bosch et al. 2005; Zahra & George, 2002)
Drone Technology Adoption	6	(Kirschtein, 2020; Joerss et al. 2016)

Following the completion of the pilot test, an online main survey was conducted targeting courier service companies located in Selangor and Wilayah Persekutuan Kuala Lumpur. The questionnaire was randomly distributed to company owners and managers, resulting in 244 responses. Empirical data were subsequently collected from these companies for analysis. The collected data underwent a rigorous screening process to ensure accuracy, remove missing values, identify outliers, and verify the normal distribution of variables. Data analysis including descriptive and inferential statistics were conducted using the Statistical Package for Social Sciences (SPSS) software to derive meaningful insights and to identify the relationship between the predictor and the outcome.

RESULTS

Demographic Profile

Frequency analysis has been conducted for 244 respondents and a detailed breakdown of respondent is presented in Table 2. Analysis of the collected responses showed that majority respondents are female which is 153 respondents (62.7%) compared to male respondents which is only 91 (37.3%). Meanwhile, analysis of collected responses also accounted that majority respondents from the age group of 26 to 35 years old with 84 respondents (34.4%), followed by the age group of 36 to 45 years old, which is reported around 69 respondents (28.3%). Furthermore, 124 respondents (50.8%) are the courier companies located in Wilayah Persekutuan Kuala Lumpur, whereas 120 respondents (49.2%) were from Selangor. Additionally, majority respondents who hold positions as supervisor has responded the survey questionnaire which have been accounted about 69 respondents (28.3%) and only 1 respondent (0.4%) that hold position as a director. An assessment of managerial experience indicated that majority respondents have managerial experience of 3 to 5 years which is reported around 117 respondents (48%).

Table 2. Demographic's Profile

Category		Frequency (n=244)	Percentage (%)
Gender	Male	91	37.3
	Female	153	62.7

Age	18 to 25 years old	64	26.2
	26 to 35 years old	84	34.4
	36 to 45 years old	69	28.3
	46 to 55 years old	25	10.2
	56 years old and above	2	0.8
Education	SPM	47	19.3
	STPM	22	9.0
	Pre-Diploma	10	4.1
	Diploma	64	26.2
	Bachelor's Degree	72	29.5
	Master's Degree	18	7.4
	PhD	11	4.5
Location	WP Kuala Lumpur	124	50.8
	Selangor	120	49.2
Position	Director	1	0.4
	Executive Officer	34	13.9
	Business Owner	49	20.1
	Manager	43	17.6
	Supervisor	69	28.3
	Other	48	19.7
Managerial Experience	1 to 2 years	88	36.1
	3 to 5 years	117	48.0
	6 to 8 years	36	14.8
	More than 8 years	3	1.2

Descriptive Statistics and Reliability Analysis

Descriptive analysis serves as a simple quantitative summary of the collected data, providing valuable insights to elaborate on the study's results. Table 3 indicates the analysis of mean and standard deviation for the dependent variable (drone technology adoption) and independent variables (customer-oriented responsiveness, high flexibility, human collaboration, and absorptive capacity capability). Based on the results, human collaboration has the highest mean value, with the score of 3.9809. This indicates that the respondents highly value the importance of internal collaboration within their organizations. This was followed by absorptive capacity capability, with a mean of 3.8851, suggesting that the company's ability to acquire, integrate and adopt new knowledge is also a crucial factor. Interestingly, the lowest mean value was recorded for drone technology adoption, at 3.8600. Nevertheless, it is noteworthy that all variables had a mean score above 3.000, suggesting that the majority of respondents agree with the statements related to each variable and consider them as significant dimensions influencing the adoption of drone technology within courier service companies. Regarding the reliability assessment, Cronbach's alpha (α) is the most widely used method to assess the internal consistency of a measurement scale [33]. Different thresholds have been suggested in the literature [34] - [35], with the generally accepted minimum level being 0.7. This means that an α value exceeding 0.7 indicates that the variables are internally consistent and suitable measures for the study. In the case of this research (refer Table 3), the results for all variables varied between 0.783 and 0.868., all of which are above the 0.7 threshold. Since all values are above 0.7 threshold, this suggests that the constructs used are reliable and the measurements are appropriate for the research context.

Table 3. Descriptive Statistics and Reliability Analysis

Variable	Mean	Std. Deviation	Cronbach's Alpha
Customer-Oriented Responsiveness	3.8754	0.77378	0.783
High Flexibility	3.8764	0.80881	0.868
Human Collaboration	3.9809	0.77282	0.844
Absorptive Capacity Capabilities	3.8851	0.80227	0.859
Drone Technology Adoption	3.86	0.74326	0.831

Correlation Analysis

The results indicate that there are strong positive correlations between the dimensions of agile marketing capabilities and drone technology adoption among the surveyed courier service companies. Drone technology adoption demonstrates a strong positive correlation with all four agile marketing capabilities dimensions: customer-oriented responsiveness (r = 0.767), high flexibility (r = 0.864), human collaboration (r = 0.769), and absorptive capacity capability (r = 0.849). Furthermore, all four dimensions show significant positive correlation with drone technology adoption. This finding suggests that the courier service companies with greater customer-oriented responsiveness, higher flexibility, stronger human collaboration and possess more absorptive capacity capability are more likely to adopt drone technology.

Table 4. Correlation Analysis

		Customer-Oriented Responsiveness	High Flexibility	Human Collab	Absorptive Capacity Capabilities	Drone Technology Adoption
Customer Oriented Responsiveness	Pearson Correlation	1	.772**	.747**	.787**	.767**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	244	244	244	244	244
High Flexibility	Pearson Correlation	.772**	1	.846**	.873**	.864**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	244	244	244	244	244
Human Collaboration	Pearson Correlation	.747**	.846**	1	.817**	.769**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	244	244	244	244	244
Absorptive Capacity Capabilities	Pearson Correlation	.787**	.873**	.817**	1	.849**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	244	244	244	244	244
Drone Technology Adoption	Pearson Correlation	.767**	.864**	.769**	.849**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	244	244	244	244	244

**. Correlation is significant at the 0.01 level (2-tailed).

Regression Analysis

The model summary in regression output provides key statistical metrics that describe how well the model's dimensions (IVs) explain the variation in the dependent variable (DV). In this study, the model (Table 5) has a strong explanatory power (R^2 = 79.3%), meaning that the dimensions effectively explain most of the variance in drone technology adoption among the sample. The Adjusted R^2 (78.9%) confirms that the model is reliable, though it's possible some individual variables might not contribute significantly to the overall model. The F-statistic (228.465) and p-value (0.001) indicate that the regression model is statistically significant overall, suggesting the model's dimensions collectively have a meaningful impact on the dependent variable. The Standard Error (0.34124) is relatively small, indicating good predictive accuracy. In other words, the model provides a strong and reliable prediction for drone technology adoption within the courier services industry.

Table 5. **Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.890[a]	0.793	0.789	0.34124

a. Predictors: (Constant), AbsorptiveCapacityCap, CustomerOrientedResp, HumanCollaboration, HighFlexibility

ANOVA (Analysis of Variance) in regression analysis is used to assess whether the overall regression model is statistically significant. The ANOVA test displayed in Table 6 shows that the overall regression model is statistically significant (p = 0.001). The F-statistic (228.465) indicates that all dimensions collectively explain a significant portion of the variance in drone technology adoption. This suggests that the model is a good fit overall. However,

further analysis of the individual predictor variables (using the coefficients table) is necessary to determine which specific factors are most influential in driving drone technology adoption among the courier service companies.

Table 6. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.413	4	26.603	228.465	<.001[b]
	Residual	27.83	239	0.116		
	Total	134.244	243			

a. Dependent Variable: DroneTechAdoption
b. Predictors: (Constant), AbsorptiveCapacityCap, CustomerOrientedResp, HumanCollaboration, HighFlexibility

The Coefficients Table in multiple regression analysis provides insight into how each of the individual predictor variables influences the dependent variable (DV). It helps identify which variables are significant predictors and the direction of their influence (positive or negative). The findings displayed in Table 7 revealed that three dimensions namely customer-oriented responsiveness ($t = 3.115$, $p = 0.002$), high flexibility ($t = 6.696$, $p = 0.001$) and absorptive capacity capabilities ($t = 4.905$, $p = 0.001$) were found to have a significant effect on drone technology adoption. Among these, high flexibility is considered the most influential dimension in drone technology adoption, with the highest standardized beta value ($\beta = 0.465$, $p = 0.001$) compared to other dimensions. In contrast, human collaboration ($p = 0.874$) was found to not have a significant impact on drone technology adoption, as indicated by the p-value being greater than 0.05.

Table 7. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.477	0.121		3.931	<.001
	Customer Oriented Responsiveness	0.152	0.049	0.158	3.115	0.002
	High Flexibility	0.427	0.064	0.465	6.696	<.001
	Human Collaboration	-0.009	0.057	-0.009	-0.159	0.874
	Absorptive Capacity Capabilities	0.303	0.062	0.327	4.905	<.001

a. Dependent Variable: DroneTechAdoption

CONCLUSION AND FUTURE RESEARCH DIRECTION

With the advancement of technology, courier companies can now deliver goods to previously unreached destinations using drone technology. However, the feasibility and value of drone adoption remain in question. Due to the accelerated growth of e-commerce, courier service companies are expected to provide speedy and flexible services. By leveraging agile marketing capabilities, courier companies could overcome these challenges through drone adoption. Therefore, this study is carried out to determine the influence of agile marketing capabilities on drone technology adoption among Malaysian courier companies by combining the theories of Diffusion of Innovation and Dynamic Capabilities. Based on correlation analysis, all dimensions show significant positive correlation with drone technology adoption. The findings from regression analysis reveal that customer-oriented responsiveness, high flexibility and absorptive capacity capabilities are influential dimensions in drone technology adoption. The strong positive relationships between these dimensions with drone technology adoption signifies their critical roles in assisting the courier companies adapting to rapidly evolving market, technologies and operational efficiency. While human collaboration dimension is correlated but considered less influential with drone adoption. This is might due to the adoption of drone technology by courier companies in Malaysia is still in its early stages. Based on this study, key agile marketing capabilities to facilitate courier companies adopting drone technology were identified as practical guides to enhance their competitiveness. This suggest that focusing on customer-oriented responsiveness, high flexibility and absorptive capacity capabilities is more impactful for increasing drone adoption in Malaysian courier

services. Prioritizing these dimensions could fully realize the benefits of drones such as improved delivery efficiency, cost savings and sustainability. With these findings, valuable insights into the factors influencing the adoption of drone technology in the logistics industry are offered, however, a deeper understanding is further required.

Expanding the scope of research to examine the influence of external factors, such as regulatory frameworks, public perceptions and infrastructure, will provide a better understanding of the opportunities and challenges associated with the use of drones in logistics operations. In addition, studies in different regions and countries can provide valuable insights into best practices and strategies tailored to different cultural, economic and legal aspects. Studies on the evolution of drone use and the long-term impact of agile marketing capabilities on competitiveness and performance will also offer valuable insights with a longitudinal approach. Combining quantitative analysis with qualitative methods could gain deeper insights into the interactions between organizational capabilities and external variables, exploring the experiences, challenges, and strategies of courier companies implementing drone technology. Moreover, as drone technology continues to evolve, it is valuable to investigate the impact of emerging developments on adoption rates and operational outcomes, such as autonomous navigation, artificial intelligence, and improved battery efficiency. Finally, the implication of drone adoption should be comprehensively investigated by assessing environmental and social factors including its potential to reduce carbon emissions, improve accessibility in remote areas, and address public concerns about privacy and safety. By building on the findings of this study, future research can foster a deeper understanding of the factors driving drone adoption in the courier service sector, ultimately helping businesses leverage emerging technologies in an ever-evolving logistics landscape.

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