

[研究論文]

The Determinants of Membership Subscription to Food Delivery Platforms under AI-Driven Dynamic Pricing: A Case Study in Taiwan

AIアルゴリズムに基づくダイナミック・プライシングがフードデリバリー・プラットフォームにおける会員加入に与える影響：台湾を事例として

Chen-Wei Ma [†]

[†] Graduate School of Economics, Nagoya City University

Abstract

Since 2023, Taiwan's leading online food delivery (OFD) platforms, Uber Eats and foodpanda, have formally adopted AI-driven dynamic pricing strategies during peak hours. Meanwhile, consumers can obtain free delivery through membership programs. This study investigates whether uncertainty about delivery fees influences subscription decisions. Five independent variables—uncertainty avoidance, price-saving orientation, perceived usefulness, perceived price fairness, and sociability—were examined to predict membership subscription behavior, and purchase intention was investigated as a mediator in these relationships. The results indicate that perceived price fairness positively influences subscription behavior and that purchase intention is an indirect-only mediator for perceived usefulness and sociability, a complementary mediator for price-saving orientation, and a competitive mediator for uncertainty avoidance.

要旨

2023年以降、台湾のデリバリー・プラットフォームでは、ピーク時間帯にダイナミック・プライシングが導入されている。一方で、会員プログラムへの加入により配送料が免除される。本研究では、配送料の不確実性が会員プログラムへの加入行動に及ぼす影響を検討した。不確実性回避、価格節約志向、知覚有用性、知覚価格公平性、社交性を独立変数とし、購買意図を媒介変数として分析を行った。分析の結果、知覚価格公平性は会員加入に対して正の影響を示した。また、購買意図は重要な媒介的役割を果たし、異なるタイプの媒介効果が確認された。本研究の結果は、台湾における非会員消費者のダイナミック・プライシングへの反応を明らかにするとともに、会員加入を左右する要因を示した。

1. Introduction

In Taiwan, online food delivery (OFD) platforms such as Uber Eats and foodpanda offer substantial convenience. According to a survey by Market Intelligence & Consulting Institute (MIC), approximately 71.2% of consumers in Taiwan have used OFD services [1]. During the COVID-19 pandemic, restrictions on dining out led to significant growth in the food delivery service industry [2]. The convenience of ordering diverse cuisines through a single device further encouraged OFD adoption [3]. As the competition among OFD platforms has intensified, many companies have introduced membership programs that offer delivery fee waivers or discounts. Although the app remains available to non-members, some users subscribe to obtain free delivery [4].

While fixed delivery fees allow consumers to easily assess subscription decisions, OFD platforms have recently shifted to dynamic pricing to address demand fluctuations. A notable example is Taiwan, where, in 2023, Uber Eats and foodpanda began to formally implement dynamic pricing during peak hours. Given the relative novelty of OFD services, empirical research on how delivery fees influence subscription behavior remains limited, particularly in the context of dynamic pricing strategies. Accordingly, this study investigates factors influencing this subscription behavior. Although the impact of the pandemic has subsided, OFD services remain embedded in consumers' daily lives [5]. While existing research has examined the pandemic's influence on food delivery services [6][7], the present study extends the established literature by focusing on the post-pandemic period.

[研究論文]

2026年1月16日受付, 2026年5月20日改訂, 2026年6月22日受理

© 情報システム学会

Notably, neither Uber Eats nor foodpanda has disclosed how dynamic pricing is calculated. Because delivery fees fluctuate based on distance, weather, demand, and delivery driver supply, pricing is presumably determined algorithmically. The AI black box problem may, therefore, undermine consumers' trust, particularly when the pricing mechanism lacks transparency [8]. Consequently, this algorithmic uncertainty may influence consumers' subscription decisions.

2. Literature Review

2.1. Shipping Fees and Dynamic Pricing

In the context of online shopping, shipping fees are major attributes that influence consumers' buying decisions, with consumers being generally reluctant to pay such fees [9][10]. According to mental accounting theory, visually salient surcharges such as shipping fees are perceived as additional losses, leading consumers to prefer integrated pricing over segregated pricing [11][12]. Recognizing this reluctance, in Taiwan, both Uber Eats and foodpanda have implemented threshold-based free delivery for members, which may prompt additional purchases through order padding [13].

Meanwhile, dynamic pricing, which is driven by various factors, is a strategic response to changes in market conditions—such as demand, supply, and inventory—to maximize profits [14][15]. Dynamic pricing is prevalent in industries with distinct peak and off-peak seasons such as hospitality [16] and aviation [17], and it enables companies to optimize revenue. However, price discrimination can lead to consumer dissatisfaction, especially when the pricing mechanism is unclear [18].

2.2. Uncertainty Avoidance and Membership Subscription

The concept of uncertainty avoidance (UA) has been widely discussed in cross-cultural psychology. UA refers to the extent to which individuals feel uncomfortable with uncertain or ambiguous situations and seek to reduce such uncertainty [19]. It is a crucial factor in the context of consumer behavior, with consumers from high-UA cultures tending to be more cautious. Similarly, individuals in high-UA cultures tend to evaluate products associated with higher levels of uncertainty less positively and, thus, exhibit weaker behavioral intentions [20]. Given these points, to reduce perceived uncertainty, reassurance measures such as transparent return policies and product guarantees are often necessary [21].

In recent years, OFD service companies have shifted delivery fees from a fixed pricing scheme to a dynamic pricing model during peak hours under which delivery fees may be several times higher than the original delivery fee. Under dynamic pricing, delivery fee uncertainty becomes more pronounced, particularly for consumers with high UA. By subscribing to a membership program and meeting the required spending threshold, consumers can obtain free delivery, thereby reducing perceived uncertainty regarding delivery fees. This transition may prompt non-member users of OFD to consider subscribing to the membership. Based on this reasoning, the first hypothesis is proposed.

H1: Consumers with higher uncertainty avoidance are more likely to subscribe to food delivery service memberships.

2.3. Price-Saving Orientation and Membership Subscription

Today's consumer loyalty programs provide various types of rewards. While financial rewards such as discounts or vouchers are common [22], experiential rewards can also bring positive effects to brands [23]. Generally, consumers prefer immediate rewards and monetary rewards over non-monetary rewards, as they provide a broader range of options and flexibility [24]. In turn, monetary incentives can affect consumer behavior and purchasing decisions. For example, price reductions on food products have been shown to significantly increase sales and improve dietary behavior [25], and monetary benefits have been proven effective in attracting new members to loyalty programs [26]. Price factors are also crucial determinants of success in the food delivery service industry [27].

Price incentives are key factors that influence consumer behavior, particularly purchasing decisions [28]. Research has confirmed that price-saving orientation has an indirect positive effect on consumers' attitudes via post-usage usefulness [29] and positively influences consumers' intention to use food delivery applications [30]. Therefore, the second hypothesis is proposed.

H2: Consumers with higher price-saving orientation are more likely to subscribe to food delivery service memberships.

2.4. Perceived Usefulness and Membership Subscription

Perceived usefulness (PU), or “the degree to which a person believes that using a particular system would enhance his or her job performance,” is one of the core constructs of the technology acceptance model (TAM) proposed by Davis [31]. In this study, PU is conceptualized as the benefits and advantages, such as time savings or access to a wider range of food choices, that are generated by food delivery services. Specifically, the TAM posits that perceived usefulness and perceived ease of use influence consumers' attitude toward a new technology and, subsequently, their intention to use it. Davis [32] suggested that PU plays a more influential role than perceived ease of use in determining the usage of new systems; accordingly, we may expect that when consumers perceive a service as useful, their intention to continue using it is likely to increase.

In the mobile commerce context, PU has a positive impact on users' attitudes regarding using mobile applications [33] and positively influences the intention to use mobile commerce [34]. In the food delivery industry, PU is considered a crucial factor that shapes consumer behavior. When consumers perceive food delivery services as time-saving and efficient, their intention to use them increases [35]. Similarly, research has found that PU has a positive impact on usage intention toward food delivery services [36]. Accordingly, the third hypothesis is proposed.

H3: Consumers with higher perceived usefulness are more likely to subscribe to food delivery service memberships.

2.5. Perceived Price Fairness and Membership Subscription

Perceived price fairness can be defined as “a consumer's assessment and associated emotions of whether the difference (or lack of difference) between a seller's price and the price of a comparative other party is reasonable, acceptable, or justifiable” [37]. While research on consumers' behavioral intention regarding dynamic pricing in OFD services remains limited, a recent survey by YouGov [38] revealed that consumers' attitudes on this issue are divided, with 43% of respondents considering dynamic pricing in OFD services to be unfair compared to 40% who consider it fair.

In this study, perceived price fairness refers to users' perceptions of the OFD membership subscription fee. When consumers consider the price to be unfair, their buying intention decreases and negative outcomes such as negative word-of-mouth may occur [39]. Conversely, if users of the OFD services perceive the membership fee as fair and believe that the benefits outweigh the costs, they are more likely to subscribe to the service. However, changes in delivery fees or unclear pricing strategies may reduce consumers' perceived price fairness. Therefore, the fourth hypothesis is proposed.

H4: Consumers with higher perceived price fairness are more likely to subscribe to food delivery service memberships.

2.6. Sociability and Membership Subscription

Sociability can be defined as “the extent to which the communication environment mediated by social software is perceived to facilitate social interaction and to enhance social connectivity” [40]. Research has demonstrated that consumers' interactions through social commerce, such as recommendations and ratings, have

been found to increase trust levels and intention to buy [41]. This implies that personal behavior is influenced not only by one's own motivation but also by the opinions and actions of others.

OFD services similarly create opportunities for social interaction. Indeed, research has confirmed that social influence positively affects consumers' purchase behavior and continuous use intention toward OFD services [42][43]. In the OFD service context, sociability can be understood as the extent to which OFD platforms facilitate and enhance interactions among users. Platform features such as rating systems, as well as threshold-based free delivery provided by membership programs, may also promote collaborative ordering. These features not only facilitate information sharing but also encourage social interactions among users. Accordingly, it is reasonable to assume that consumers with higher sociability are more likely to engage with the service and subsequently subscribe to a membership program. Therefore, the fifth hypothesis is proposed.

H5: Consumers with higher sociability are more likely to subscribe to food delivery service memberships.

2.7. Mediating Effect of Purchase Intention

In addition to examining the direct effects of uncertainty avoidance, price-saving orientation, perceived usefulness, perceived price fairness and sociability on membership decisions, this research incorporates purchase intention as a mediating variable to better understand the mechanism of consumers' decision-making process.

Based on the theory of planned behavior (TPB), intention is a crucial factor that predicts actual behavior [44]. In the context of food delivery services, when consumers perceive positive attributes such as usefulness or price savings, these attributes may form intentions to continue using the service or make purchases through the platform and, further, influence users' intention to subscribe to a membership program. Accordingly, the following hypotheses are proposed to examine the mediating effect of purchase intention in the relationship between the independent variables and membership subscription behavior.

H6a–e: Purchase intention mediates the effects of the independent variables (a) uncertainty avoidance, (b) price-saving orientation, (c) perceived usefulness, (d) perceived price fairness, and (e) sociability on membership subscription.

3. Case Study

3.1. Research Context

Uber Eats and foodpanda are the two leading food delivery platforms holding a dominant market share in Taiwan. Both platforms offer membership subscription programs (e.g., Uber One and pandapro), which allow users to gain benefits such as free delivery or food coupons. In addition, both platforms have implemented dynamic pricing strategies for delivery fees during peak hours, whereby delivery fees are adjusted based on external factors such as demand and weather conditions. As this pricing mechanism may be complex and unpredictable, subscribing to a membership program may help to reduce such uncertainty by ensuring free delivery. This perk may prompt non-members to reconsider whether to subscribe to the membership program. This study centers on Uber Eats and foodpanda to examine the factors influencing non-members' decisions to subscribe to membership programs in the context of dynamic pricing strategies.

3.2. Data Collection and Measures

To examine the factors influencing membership subscription under dynamic pricing conditions, questionnaires were distributed from November 4 to November 14, 2024. The questionnaires were collected online using SurveyCake [45], facilitated by Meta Survey Marketing Research Co., Ltd. This study targeted consumers who had experienced dynamic delivery fees on Uber Eats or foodpanda when they were non-members. After 30 invalid responses were excluded due to insufficient response variation, the final sample consisted of 471 respondents (196 males, 275 females), with individuals aged 36–45 representing the largest age group (39.1%).

The dependent variable, membership subscription, was measured based on whether respondents had

subscribed to a membership program after encountering dynamic delivery fees. Among the 471 respondents, 329 participants subscribed to at least one loyalty program (Uber One or pandapro) after the dynamic pricing strategy was implemented. As a key feature of this study, the dependent variable captures actual subscription behavior rather than merely behavioral intention, thereby mitigating self-report bias and enhancing validity.

Psychological constructs were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree") to capture respondents' attitudes and perceptions. The items measuring uncertainty avoidance were adapted from [46]; those for price-saving orientation were adapted from [29]; those for perceived usefulness were adapted from [46][47]; those for perceived price fairness were adapted from [48]; those for sociability were adapted from [49]; and those for purchase intention were adapted from [50][51]. The detailed measurement items for the survey are provided in the Appendix.

3.3. Factor Analysis

Table 1. Factor Loadings of Independent Variables

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Q14	.756				
Q13	.724				
Q15	.697				
Q7		.814			
Q8		.695			
Q9		.632			
Q11			.829		
Q10			.561		
Q12			.479		
Q5				.847	
Q4				.603	
Q3					.831
Q1					.425

Note. KMO measure of sampling adequacy = .868; Bartlett's Test of Sphericity: $p < .001$.

Factor 1: perceived price fairness; Factor 2: perceived usefulness;

Factor 3: sociability; Factor 4: price-saving orientation; Factor 5: uncertainty avoidance.

To validate the factor structure of the questionnaire items, exploratory factor analysis (EFA) was implemented using SPSS. The analysis was conducted using principal axis factoring (PAF) with promax rotation. The number of factors was fixed at five, and items with factor loadings below .40 were removed from the analysis. As shown in Table 1, the KMO measure of sampling adequacy was .868, indicating that the sample was suitable for the analysis. Bartlett's Test of Sphericity was also significant ($p < .001$), confirming that the data were appropriate for factor extraction. Items Q2 and Q6 were excluded from further analysis due to low factor loadings ($< .40$).

Five factors were retained, explaining 54.53% of the total variance. Based on the factor structure, these factors were subsequently identified as perceived price fairness (Q14, Q13, Q15), perceived usefulness (Q7, Q8, Q9), sociability (Q11, Q10, Q12), price-saving orientation (Q5, Q4), and uncertainty avoidance (Q3, Q1). Next, the items measuring the mediating variable were subjected to the same factor analysis procedure to further assess their dimensionality. The results indicate that the three items loaded onto a single construct, purchase intention, thereby confirming the unidimensionality of the scale.

Table 2. Confirmatory Factor Analysis

Construct	Item	λ	z	CR	AVE	Cronbach's α
Uncertainty avoidance	Q1	.357	--	.635	.512	.503
	Q3	.947	2.62**			
Price-saving orientation	Q4	.688	--	.757	.612	.746
	Q5	.866	13.97***			
Perceived usefulness	Q7	.763	--	.787	.551	.785
	Q8	.748	15.88***			
	Q9	.716	15.16***			
Sociability	Q10	.738	--	.694	.531	.693
	Q11	.719	10.20***			
Perceived price fairness	Q13	.786	--	.821	.604	.821
	Q14	.760	16.42***			
	Q15	.785	16.97***			
Purchase intention	Q16	.807	--	.837	.631	.836
	Q17	.786	18.43***			
	Q18	.789	18.51***			

Note. $\chi^2 = 79$, $df = 75$, $\chi^2/df = 1.053$, $p = .353$; CFI = .999, TLI = .998, SRMR = .024, RMSEA = .011.

** $p < .01$, *** $p < .001$. CR = composite reliability; AVE = average variance extracted.

After the EFA was performed to identify the underlying dimensional structure, Q2 and Q6 were removed due to low factor loadings. Subsequently, a confirmatory factor analysis (CFA) was conducted using the maximum likelihood (ML) estimation method. The removal of Q12 due to its low factor loading ($\lambda = .458$) improved the convergent validity and reliability of the sociability construct. Furthermore, as shown in Table 2, the CFA results indicated an acceptable model fit. Most factor loadings exceeded the recommended threshold of .50 [52]. Although Q1 exhibited a relatively low factor loading ($\lambda = .357$), it was retained to preserve the content validity of uncertainty avoidance, as removing the item would result in a single-item construct; in addition, the satisfactory overall measurement model fit further supports the retention of the item. However, the results of this construct should be interpreted with caution.

Cronbach's alpha was used to examine the internal consistency of the measurement constructs. Except for uncertainty avoidance, the Cronbach's alpha values of the other five constructs ranged from .693 to .836, indicating acceptable reliability. Uncertainty avoidance was measured using two items, which inherently limits the interpretability of Cronbach's alpha. Therefore, the inter-item correlation was examined, and the two items showed a significant positive correlation ($r = .338$, $p < .001$), indicating acceptable internal consistency for this construct. In addition, composite reliability (CR) and average variance extracted (AVE) were examined, and most constructs demonstrated acceptable CR ($> .70$) and AVE ($> .50$) scores [52]. However, uncertainty avoidance (CR = .635) and sociability (CR = .694) were found to be slightly below the thresholds. These two constructs were retained due to the satisfactory model fit and theoretical considerations.

3.4. Logistic Regression Results (Total Effect Model)

A logistic regression using the factor scores derived from the CFA was conducted to analyze the relationships between the latent constructs and membership subscription. As shown in Table 3, perceived price fairness had a significant positive effect ($B = 1.277$, $p < .001$; $\text{Exp}(B) = 3.584$), but sociability ($B = -0.213$, $p = .526$) and price-saving orientation ($B = 0.026$, $p = .956$) were not found to be significant predictors. Although perceived usefulness ($B = 0.639$, $p = .198$) and uncertainty avoidance ($B = -0.878$, $p = .105$) did not reach the conventional significance threshold of .05, perceived usefulness exhibited a positive coefficient, consistent with the hypothesized direction. In comparison, uncertainty avoidance exhibited a negative relationship with

membership subscription, which was opposite to the hypothesized direction. To assess potential multicollinearity, variance inflation factors (VIFs) were examined. Values ranged from 1.228 to 6.135, indicating no serious multicollinearity concerns.

Table 3. Logistic Regression Results

Construct	<i>B</i>	<i>SE</i>	<i>p</i>	Exp(<i>B</i>)	95% CI for Exp(<i>B</i>)	VIF
Uncertainty avoidance	-0.878	0.542	.105	0.415	[0.144, 1.202]	1.228
Price-saving orientation	0.026	0.469	.956	1.026	[0.410, 2.572]	5.402
Perceived usefulness	0.639	0.497	.198	1.895	[0.716, 5.017]	6.135
Sociability	-0.213	0.337	.526	0.808	[0.417, 1.563]	2.688
Perceived price fairness	1.277***	0.342	<.001	3.584	[1.835, 7.003]	4.387
Constant	0.991	0.116	<.001	2.693		

Note. ****p* < .001. Nagelkerke's R^2 = .247; CI = confidence interval; VIF = variance inflation factor.

3.5. Mediating Effect

To examine the mediating role of purchase intention in the relationship between the independent variables and membership subscription, mediation analyses using bootstrapping [53] were conducted. According to contemporary mediation analysis perspectives [54], the presence of mediation effects is confirmed in this study, as the 95% confidence interval of the indirect effect does not include zero, indicating statistical significance. The bootstrap analysis with 5,000 samples and 95% confidence intervals was conducted using the PROCESS macro (Model 4) [55], which corresponds to a simple mediation model.

Table 4. Mediation Analysis Results

Construct	Path	<i>B</i>	<i>SE</i>	<i>p</i>	95% CI	Mediation Type
Uncertainty avoidance	Indirect	1.337	0.316		[0.816, 2.059]	Competitive
	Direct	-1.611	0.508	.002	[-2.607, -0.614]	
Price-saving orientation	Indirect	0.913	0.327		[0.322, 1.614]	Complementary
	Direct	0.703	0.336	.037	[0.044, 1.362]	
Perceived usefulness	Indirect	2.327	0.752		[0.941, 3.931]	Indirect-only
	Direct	-0.819	0.662	.216	[-2.117, 0.479]	
Sociability	Indirect	1.274	0.241		[0.851, 1.787]	Indirect-only
	Direct	-0.090	0.293	.758	[-0.665, 0.484]	
Perceived price fairness	Indirect	0.272	0.278		[-0.255, 0.835]	None
	Direct	1.307	0.319	<.001	[0.682, 1.932]	

Note. *SE* for indirect effects represents bootstrap standard errors; CI = confidence interval.

As shown in Table 4, the indirect effects of perceived usefulness ($B = 2.327$, 95% CI [0.941, 3.931]) and sociability ($B = 1.274$, 95% CI [0.851, 1.787]) do not include zero, indicating a significant mediation effect. Furthermore, their direct effects were not significant ($p = .216$ and $p = .758$, respectively), which suggests indirect-only mediation effects. For uncertainty avoidance, while the indirect effect was significant and positive ($B = 1.337$, 95% CI [0.816, 2.059]), its direct effect was significant and negative ($B = -1.611$, $p = .002$), which indicates a competitive mediation.

Regarding price-saving orientation, both its indirect effect ($B = 0.913$, 95% CI [0.322, 1.614]) and direct effect ($B = 0.703$, $p = .037$) were significant, indicating a complementary (partial) mediation. However, the total effect of price-saving orientation was not significant ($B = 0.026$, $p = .956$). Lastly, while the direct effect of perceived price fairness was significant ($B = 1.307$, $p < .001$), the indirect effect was not ($B = 0.272$, 95% CI [-0.255, 0.835]), demonstrating no mediation (direct-only).

4. Discussion

Hypothesis 1, which proposes that consumers with higher uncertainty avoidance are more likely to subscribe to food delivery service memberships, is not supported, as the total effect was negative (though non-significant, $p = .105$). Instead, the findings reveal a competitive mediation pattern in which the negative direct effect was partially offset by a positive indirect effect through purchase intention. This suggests that uncertainty avoidance may discourage subscription directly while also increasing it indirectly. Overall, uncertainty avoidance may reduce consumers' likelihood of subscribing, as consumers may perceive the membership fee as a sunk cost and question its cost-effectiveness, which discourages subscription.

Hypothesis 2, which proposes that consumers with higher price-saving orientation are more likely to subscribe to food delivery service memberships, is partially supported. This result is consistent with prior research [30], indicating that price-saving orientation promotes the use of OFD applications. Although the total effect was not significant ($B = 0.026$, $p = .956$), both the indirect and direct effects were significant, which suggests that while the individual paths are valid, the overall effect is diluted or attenuated when other strong predictors are included in the model, resulting in significant path-specific effects despite a non-significant total effect.

Hypothesis 3, which proposes that consumers with higher perceived usefulness are more likely to subscribe to food delivery service memberships, is not supported (indirect-only mediation observed). Although the total and direct effects were non-significant, the significant indirect effect ($B = 2.327$, 95% CI [0.941, 3.931]) suggests that perceived usefulness influences membership subscription only through purchase intention. This finding extends prior research linking perceived usefulness to usage intention in food delivery services [36], as membership subscription can be viewed as the behavioral extension of usage intention.

Hypothesis 4, which proposes that consumers with higher perceived price fairness are more likely to subscribe to food delivery service memberships, is supported. This finding is partially consistent with a prior empirical study of automobile customers by Opat et al. [56], which demonstrated that price fairness increases consumers' satisfaction and loyalty; membership subscription can be viewed as an extension of these outcomes. In the food delivery context, when consumers perceive membership pricing as fair, they are more willing to subscribe.

Hypothesis 5, which proposes that consumers with a higher level of sociability are more likely to subscribe to food delivery service memberships, is not supported (indirect-only mediation observed), as a significant indirect effect ($B = 1.274$, 95% CI [0.851, 1.787]) was observed during mediation analysis. This result extends prior research by Carlson et al. [57] demonstrating that sociability positively influences user engagement in the context of social media brand pages. In the context of food delivery services, the influence of sociability on subscription behavior operates through purchase intention.

Among Hypotheses 6a–6e, which propose that purchase intention mediates the effects of the independent variables on membership subscription, H6a, H6b, H6c, and H6e are supported. Specifically, purchase intention acts as an indirect-only mediator for perceived usefulness and sociability, a complementary mediator for price-saving orientation, and a competitive mediator for uncertainty avoidance. Interestingly, the results of this study demonstrate that perceived price fairness exerts a strong direct influence on membership subscription, distinguishing it from the other variables, which primarily operate through purchase intention.

5. Summary

5.1. Managerial Implications and Conclusion

The findings provide several managerial implications for the food delivery industry. First, perceived price fairness was found to directly influence subscription behavior. Beyond the convenience and benefits provided by a platform, it is essential to ensure that membership fees align with the value provided, as consumers subscribe when the benefits outweigh the costs. Second, the findings indicate that price-saving orientation, perceived usefulness, and sociability influence membership subscription indirectly through purchase intention, which suggests that platforms should adopt differentiated marketing strategies targeting these variables by first increasing users' purchase intention and subsequently converting it into long-term subscriptions.

By contrast, despite its positive indirect effect, uncertainty avoidance may discourage subscription. Although dynamic pricing may increase profitability and membership programs may reduce the risk of delivery fee volatility, consumers with high uncertainty avoidance may still be sensitive to additional uncertainty and, thus, hesitate to subscribe. Accordingly, platforms in high uncertainty-avoidance markets should provide detailed information and supportive measures to mitigate consumers' perceived uncertainty.

Finally, although this study does not explicitly investigate the black-box problem of AI algorithms, this issue may further increase consumers' perceived uncertainty when using food delivery services. Therefore, firms should increase algorithmic transparency to reduce information asymmetry.

Overall, these findings provide valuable insights into how non-member consumers in Taiwan respond to dynamic pricing in the context of OFD services. In particular, this study clarifies membership adoption behavior under dynamic pricing conditions by identifying its key determinants more comprehensively.

5.2. Limitations and Future Directions

It is noteworthy that although only one independent variable exhibited a significant total effect, several demonstrated significant indirect effects through purchase intention. These findings highlight the underlying mechanisms and enrich the existing literature on membership subscription in the food delivery industry.

Regarding limitations, this study focuses only on consumers in Taiwan who were non-members when they experienced dynamic pricing situations. However, consumers' degree of uncertainty avoidance may vary across countries and regions, as consumers from different cultures may have different reactions to such situations. Future research may extend these findings by incorporating comparisons between different countries or regions.

In addition, this study adopts a cross-sectional design and only captures consumers' perceptions and membership subscription behavior at a single point in time. While the dynamic pricing strategy is relatively new to the food delivery industry, it has long been implemented in industries such as aviation and hospitality. Future research may continue to track whether consumers' attitudes toward dynamic pricing strategies change as consumers become more familiar with and reliant on OFD services.

Acknowledgments

The author expresses deep gratitude for the numerous valuable comments and suggestions received during the development of this research. These insights have been instrumental in improving this paper. Any remaining errors or omissions, however, are solely the responsibility of the author.

References

- [1] Market Intelligence & Consulting Institute (MIC), "Food Delivery Survey: The Usage Gap between Two Major Platforms Narrows to Less than 10%; Subscription Members Reach 40%," 2025, <https://mic.iii.org.tw/news.aspx?id=706>, 2026.5.17 Accessed. (In Chinese)
- [2] Wetzler, T., "Food Delivery App Boom Continues Following Lockdown-Driven Growth," Adjust, 2021, <https://www.adjust.com/blog/food-delivery-apps-thrive-following-covid-growth/>, 2026.5.17 Accessed.
- [3] Swiggy Explorer, "How Food Delivery Apps Are Changing the Way We Eat?," Swiggy Diaries, 2024, <https://blog.swiggy.com/food/how-food-delivery-apps-are-changing-the-way-we-eat/>, 2026.5.17 Accessed.
- [4] Carey, M., "The Food Delivery App Subscription Services That Are Actually Worth the Money," Spoon University, 2024, <https://spoonuniversity.com/reviews/the-food-delivery-app-subscription-services-worth-the-money/>, 2026.5.17 Accessed.
- [5] Yao, P., Osman, S., Sabri, M. F., Zainudin, N. and Li, Y., "Do Consumers Continue to Use O2O Food Delivery Services in the Post-Pandemic Era? Roles of Sedentary Lifestyle," *Heliyon*, Vol.9, No.9, 2023.
- [6] Ali, S., Khalid, N., Javed, H. M. U., and Islam, D. M. Z., "Consumer Adoption of Online Food Delivery Ordering (OFDO) Services in Pakistan: The Impact of the COVID-19 Pandemic Situation," *Journal of Open Innovation: Technology, Market, and Complexity*, Vol.7, No.1, 2020, Art.10.

- [7] Muangmee, C., Kot, S., Meekaewkunchorn, N., Kassakorn, N. and Khalid, B., “Factors Determining the Behavioral Intention of Using Food Delivery Apps During COVID-19 Pandemics,” *Journal of Theoretical and Applied Electronic Commerce Research*, Vol.16, No.5, 2021, pp.1297-1310.
- [8] Shin, D., “The Effects of Explainability and Causability on Perception, Trust, and Acceptance: Implications for Explainable AI,” *International Journal of Human-Computer Studies*, Vol.146, 2021, Art.102551.
- [9] Nguyen, D. H., De Leeuw, S., Dullaert, W. and Foubert, B. P., “What Is the Right Delivery Option for You? Consumer Preferences for Delivery Attributes in Online Retailing,” *Journal of Business Logistics*, Vol.40, No.4, 2019, pp.299-321.
- [10] Lewis, M., “The Effect of Shipping Fees on Customer Acquisition, Customer Retention, and Purchase Quantities,” *Journal of Retailing*, Vol.82, No.1, 2006, pp.13-23.
- [11] Thaler, R., “Mental Accounting and Consumer Choice,” *Marketing Science*, Vol.4, No.3, 1985, pp.199-214.
- [12] Kim, H. M., “The Effect of Salience on Mental Accounting: How Integration Versus Segregation of Payment Influences Purchase Decisions,” *Journal of Behavioral Decision Making*, Vol.19, No.4, 2006, pp.381-391.
- [13] Cachon, G. P., Gallino, S. and Xu, J., “Free Shipping Is Not Free: A Data-Driven Model to Design Free-Shipping Threshold Policies,” Available at SSRN, 2018, Art.3250971.
- [14] Dublino, J., “What Is Dynamic Pricing and How Does It Affect E-Commerce,” *Business.Com*, 2025, <https://www.business.com/articles/what-is-dynamic-pricing-and-how-does-it-affect-ecommerce/>, 2026.5.17 Accessed.
- [15] Deksnyte, I. and Lydeka, Z., “Dynamic Pricing and Its Forming Factors,” *International Journal of Business and Social Science*, Vol.3, No.23, 2012.
- [16] Juaneda, C., Raya, J. M. and Sastre, F., “Pricing the Time and Location of a Stay at a Hotel or Apartment,” *Tourism Economics*, Vol.17, No.2, 2011, pp.321-338.
- [17] Burger, B. and Fuchs, M., “Dynamic Pricing—A Future Airline Business Model,” *Journal of Revenue and Pricing Management*, Vol.4, No.1, 2005, pp.39-53.
- [18] Poort, J. and Zuiderveen Borgesius, F. J., “Does Everyone Have a Price? Understanding People's Attitude Towards Online and Offline Price Discrimination,” *Internet Policy Review*, Vol.8, No.1, 2019, pp.1-20.
- [19] Hofstede, G., Hofstede, G. J. and Minkov, M., “Cultures and Organizations: Software of the Mind,” 3rd ed., McGraw-Hill, 2010, pp.188–190.
- [20] Anne Lee, J., Garbarino, E. and Lerman, D., “How Cultural Differences in Uncertainty Avoidance Affect Product Perceptions,” *International Marketing Review*, Vol.24, No.3, 2007, pp.330-349.
- [21] Zimu, F., “Exploring the Impact of Cultural Factors on Consumer Behavior in E-Commerce: A Cross-Cultural Analysis,” *Journal of Digitainability, Realism & Mastery (DREAM)*, Vol.2, No.03, 2023, pp.31-36.
- [22] Zakaria, I., Rahman, B. A., Othman, A. K., Yunus, N. A. M., Dzulkippli, M. R. and Osman, M. A. F., “The Relationship Between Loyalty Program, Customer Satisfaction and Customer Loyalty in Retail Industry: A Case Study,” *Procedia - Social and Behavioral Sciences*, Vol.129, 2014, pp.23-30.
- [23] Gorlier, T. and Michel, G., “How Special Rewards in Loyalty Programs Enrich Consumer–Brand Relationships: The Role of Self-Expansion,” *Psychology & Marketing*, Vol.37, No.4, 2020, pp.588-603.
- [24] Jang, D. and Mattila, A. S., “An Examination of Restaurant Loyalty Programs: What Kinds of Rewards Do Customers Prefer?,” *International Journal of Contemporary Hospitality Management*, Vol.17, No.5, 2005, pp.402-408.
- [25] French, S. A., “Pricing Effects on Food Choices,” *The Journal of Nutrition*, Vol.133, No.3, 2003, pp.841S-843S.
- [26] Ruzeviciute, R. and Kamleitner, B., “Attracting New Customers to Loyalty Programs: The Effectiveness of Monetary Versus Nonmonetary Loyalty Programs,” *Journal of Consumer Behaviour*, Vol.16, No.6, 2017, pp. e113-e124.
- [27] Nivornusit, R., Kraiwanit, T. and Limna, P., “Food Delivery Competition in the Digital Economy: Price War Strategy in a Developing Country,” *Digital Business*, Vol.4, No.1, 2024, Art.100076.
- [28] Wardana, C. K., Kumalasari, S. and Setyawan, A. A., “Consumer Reactions to Price Discount and Store Atmosphere on Shopping Behavior in Modern Retail Industry,” *Digital Bisnis: Jurnal Publikasi Ilmu Manajemen*

- dan E-Commerce, Vol.2, No.1, 2023, pp.198-210.
- [29] Yeo, V. C. S., Goh, S. K. and Rezaei, S., “Consumer Experiences, Attitude and Behavioral Intention Toward Online Food Delivery (OFD) Services,” *Journal of Retailing and Consumer Services*, Vol.35, 2017, pp.150-162.
- [30] Allah Pitchay, A., Ganesan, Y., Zulkifli, N. S. and Khaliq, A., “Determinants of Customers' Intention to Use Online Food Delivery Application Through Smartphone in Malaysia,” *British Food Journal*, Vol.124, No.3, 2022, pp.732-753.
- [31] Davis, F. D., “Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology,” *MIS Quarterly*, Vol.13, No.3, 1989, pp.319-340.
- [32] Davis, F. D., “User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impacts,” *International Journal of Man-Machine Studies*, Vol.38, No.3, 1993, pp.475-487.
- [33] Indarsin, T. and Ali, H., “Attitude Toward Using M-Commerce: The Analysis of Perceived Usefulness, Perceived Ease of Use, and Perceived Trust: Case Study in Ikens Wholesale Trade, Jakarta–Indonesia,” *Saudi Journal of Business and Management Studies*, Vol.2, No.11, 2017, pp.995-1007.
- [34] Mollick, J., Cutshall, R., Changchit, C. and Pham, L., “Contemporary Mobile Commerce: Determinants of Its Adoption,” *Journal of Theoretical and Applied Electronic Commerce Research*, Vol.18, No.1, 2023, pp.501-523.
- [35] Chen, H. S., Liang, C. H., Liao, S. Y. and Kuo, H. Y., “Consumer Attitudes and Purchase Intentions Toward Food Delivery Platform Services,” *Sustainability*, Vol.12, No.23, 2020, Art.10177.
- [36] An, S., Eck, T. and Yim, H., “Understanding Consumers' Acceptance Intention to Use Mobile Food Delivery Applications Through an Extended Technology Acceptance Model,” *Sustainability*, Vol.15, No.1, 2023, Art.832.
- [37] Xia, L., Monroe, K. B. and Cox, J. L., “The Price Is Unfair! A Conceptual Framework of Price Fairness Perceptions,” *Journal of Marketing*, Vol.68, No.4, 2004, pp.1-15.
- [38] Simeon, L., “Fair or Foul? Unpacking Consumer Sentiment Towards Dynamic Pricing in Food Delivery Apps,” YouGov, 2024, <https://yougov.com/articles/50029-fair-or-foul-unpacking-consumer-sentiment-towards-dynamic-pricing-in-food-delivery-apps>, 2026.5.17 Accessed.
- [39] Malc, D., Mumel, D. and Pisman, A., “Exploring Price Fairness Perceptions and Their Influence on Consumer Behavior,” *Journal of Business Research*, Vol.69, No.9, 2016, pp.3693-3697.
- [40] Gao, Q., Dai, Y., Fan, Z. and Kang, R., “Understanding Factors Affecting Perceived Sociability of Social Software,” *Computers in Human Behavior*, Vol.26, No.6, 2010, pp.1846-1861.
- [41] Hajli, N., “Social Commerce Constructs and Consumer's Intention to Buy,” *International Journal of Information Management*, Vol.35, No.2, 2015, pp.183-191.
- [42] Chang, W., Chao, R.-F. and Le, N. A., “Examining the Impact of Social Influence on Purchase Behavior of Online Food Delivery in Vietnam: The Moderating Role of Trust and Physical Obstacles During the COVID-19 Pandemic,” *International Journal of Research in Business and Social Science*, Vol.12, No.6, 2023, pp.1-10.
- [43] Lee, S. W., Sung, H. J. and Jeon, H. M., “Determinants of Continuous Intention on Food Delivery Apps: Extending UTAUT2 with Information Quality,” *Sustainability*, Vol.11, No.11, 2019, Art.3141.
- [44] Ajzen, I., “The Theory of Planned Behavior,” *Organizational Behavior and Human Decision Processes*, Vol.50, No.2, 1991, pp.179-211.
- [45] 25Sprout, “SurveyCake,” <https://www.surveycake.com>, 2026.4.13 Accessed.
- [46] Akhtar, S., Irfan, M., Kanwal, S., Pitafi, A. H. and Amin, A. M., “Investigating the Moderating Role of Uncertainty Avoidance on Mobile Banking Adoption: A Cross-Cultural Study,” *Asian Journal of Arts, Humanities and Social Studies*, Vol.1, No.2, 2018, pp.59-73.
- [47] Koch, J., Frommeyer, B. and Schewe, G., “Online Shopping Motives During the COVID-19 Pandemic—Lessons from the Crisis,” *Sustainability*, Vol.12, No.24, 2020, Art.10247.
- [48] Bernarto, I., Purwanto, A. and Masman, R. R., “The Effect of Perceived Risk, Brand Image and Perceived Price Fairness on Customer Satisfaction,” *Jurnal Manajemen*, Vol.26, No.1, 2022, pp.35-50.
- [49] Cheek, J. M. and Buss, A. H., “Shyness and Sociability,” *Journal of Personality and Social Psychology*, Vol.41, No.2, 1981, pp.330-339.

- [50]Yin, X., Wang, H., Xia, Q. and Gu, Q., “How Social Interaction Affects Purchase Intention in Social Commerce: A Cultural Perspective,” *Sustainability*, Vol.11, No.8, 2019, Art.2423.
- [51]Lu, B. and Chen, Z., “Live Streaming Commerce and Consumers’ Purchase Intention: An Uncertainty Reduction Perspective,” *Information & Management*, Vol.58, No.7, 2021, Art.103509.
- [52]Hair, J. F., Black, W. C., Babin, B. J. and Anderson, R. E., “Multivariate Data Analysis,” 8th ed., Cengage Learning, 2019, p.151, p.776.
- [53]Preacher, K. J. and Hayes, A. F., “Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models,” *Behavior Research Methods*, Vol.40, No.3, 2008, pp.879–891.
- [54]Zhao, X., Lynch Jr, J. G. and Chen, Q., “Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis,” *Journal of Consumer Research*, Vol.37, No.2, 2010, pp.197–206.
- [55]Hayes, A. F., “Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach,” Guilford Press, 2013, pp.85–90.
- [56]Opata, C. N., Xiao, W., Nusenu, A. A., Tetteh, S. and Asante Boadi, E., “The Impact of Value Co-Creation on Satisfaction and Loyalty: The Moderating Effect of Price Fairness (Empirical Study of Automobile Customers in Ghana),” *Total Quality Management & Business Excellence*, Vol.32, No.11-12, 2021, pp.1167-1181.
- [57]Carlson, J., Rahman, M., Voola, R. and De Vries, N., “Customer Engagement Behaviours in Social Media: Capturing Innovation Opportunities,” *Journal of Services Marketing*, Vol.32, No.1, 2018, pp.83-94.

Appendix: Measurement Items

Construct	Measurement Items
Uncertainty avoidance [46]	Q1. I tend to avoid dynamic pricing as it increases uncertainty. Q2. It is better to have a high price that you know about, than to have an uncertain price which might be better. Q3. It is important that the price and service charge are clearly labeled when used in online food delivery (OFD) services.
Price-Saving Orientation [29]	Q4. I can save money when using OFD services by joining a platform membership. Q5. OFD memberships offer better value for my money.
Perceived usefulness [46][47]	Q6. I like to search for cheap food deals in different food shops on OFD platforms. Q7. OFD services are beneficial to my daily life. Q8. I use OFD services to save time.
Sociability [49]	Q9. Using OFD services improves my food choices. Q10. I enjoy socializing with others (e.g., ordering together) when using OFD services. Q11. I prefer using OFD services with others rather than alone.
Perceived price fairness [48]	Q12. I feel unhappy if I cannot join in when others initiate an OFD order. Q13. The membership fees of OFD platforms are reasonable. Q14. OFD membership fees are in accordance with the benefits provided. Q15. OFD membership fees are acceptable.
Purchase intention [50][51]	Q16. I intend to purchase food through OFD services. Q17. I am likely to purchase food through OFD services when needed. Q18. I will consider purchasing food through OFD services in the future.
Dependent variable	Q19. Did you subscribe to an OFD platform membership (e.g., Uber Eats, foodpanda) after experiencing dynamic delivery fees (regardless of the reason; any past subscription counts)?

Note. The survey was conducted in Mandarin Chinese. Measurement items are English translations of the original questionnaire.

Author Biography

Chen-Wei Ma

He received his master’s degree in Management from Nagoya City University in 2022, where he is currently pursuing a Ph.D. degree. His research interests include consumer behavior and digital marketing.