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by Thamthanakoon, N., Huang, I.Y., Eastham, J., Ward, S. and Manning, L.

DOI link to the version of record on the publisher's site

Thamthanakoon, N., Huang, I.Y., Eastham, J., Ward, S. and Manning, L. 2021. Factors driving Thailand rice farmer decision-making in the choice of marketing channel. *British Food Journal*.

02 July 2021

Factors driving Thailand rice farmer decision-making in choice of marketing channel

Nithicha Thamthanakoon[a], Iona Y Huang[b]*, Jane Eastham[c], Shane Ward[d], Louise Manning[e]

a Department of Agricultural and Resource Economics, Faculty of Economics, Kasetsart University, Bangkok, Thailand

b Department of Land, Farm and Agribusiness Management, Harper Adams University, Newport, Shropshire, UK

c Department of Food Science and Agri-Food Supply Chain Management, Harper Adams University, Newport, Shropshire, UK

d School of Biosystems & Food Engineering, University College Dublin, Ireland

e School of Agriculture, Food and Environment, Royal Agricultural University, Cirencester, Gloucestershire, UK

*Corresponding author. Tel: +44 1952 815156

E-mail address: ihuang@harper-adams.ac.uk

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Abstract

Purpose: Since the end of the latest Rice Pledging Scheme, Thai rice farmers have had more freedom in selecting marketing channels. Understanding the determinants of farmers' decision-making associated with these channels is of particular interest to multiple stakeholders in the rice value chain. This study aims to examine how economic, relational, and psychological factors concurrently underpin Thai rice farmers' decision making and influence their marketing channel choice.

Design/methodology/approach: Drawing on the Theory of Reasoned Action and utility maximization of farmers' decision making, this study used structural equation modelling to examine data collected from a nationwide sample of Thai rice farmers (n=637), focusing on their past and intentional use of the three major marketing channels for paddy rice.

Findings: The determinants identified include four direct independent variables: attitude, subjective norm (social referents), transaction conditions and economic goals, and two indirect independent variables: past behavior and trust. Multi-group analysis suggests that rice co-operative users were more empowered to consider economic goals and attitude towards the channel, whilst rice miller and local collector users were more likely to be influenced by their social referents and the transaction conditions offered by the channel.

Originality: Our study makes a unique and substantive contribution to the knowledge of farmers' decision-making about marketing channel choice in Thailand and theoretically the indirect role of past behavior in predicting prospective intention.

Practical implications: The findings highlight the need for policy to address trust and transparency issues with intermediaries and to empower farmers through improvement of market access.

1. Introduction

Market participation of farmers has been seen as a fundamental part of rural development in developing countries. Marketing channels play a critical role in linking farmers to markets (Fischer and Qaim, 2014). There are different types of market channels for primary producers ranging from informal markets through several business model iterations to formal trading channels such as contract farming or trading through a range of intermediaries (Shepherd, 2007). There is a growing academic interest in farmers' marketing channel use. Within this literature, most tend to focus on high-value products (Tsourgiannis *et al.,* 2008; Milford, 2014), and/or modern channels such as collective sales (Fischer and Qaim, 2014; Zhang *et al.,* 2017), export (Stanton and Burkink, 2008; Arinloye *et al.,* 2015) or contract farming arrangements (Schipmann and Qaim, 2011; Barrett et al, 2012). As suggested by Poole (2017), domestic markets for staple grain crops, characteristically produced by emerging and semi-subsistence farmers in developing countries, contribute more to broad-based rural development due to the scale of such farmers.

Some recent studies have considered marketing channel use and their efficiency associated with paddy and/or milled rice specifically in Tanzania (Mgale and Yunxuan, 2020); India (Kakati and Chakraborty, 2017; Kumar *et al.,* 2019); Vietnam (Pham *et al.,* 2019) and Indonesia (Yonida *et al.,* 2020). Whilst direct selling to consumers or retailers has increasingly been used for milled rice (Kakati and Chakraborty, 2017; Kumar *et al.,* 2019; Yonida *et al.,* 2020), the main marketing channels highlighted for paddy rice were traditional channels such as local agents/collectors, rice millers and wholesale traders (Kakati and Chakraborty, 2017; Kumar *et al.,* 2019; Pham *et al.,* 2019; Mgale and Yunxuan, 2020), and modern farmer organizations (Pham *et al.,* 2019; Mgale and Yunxuan, 2020).

Thailand is one of the main rice producers in the world (FAO, 2018) with 46% of total agricultural land dedicated for rice production (OAE, 2019). Nationally, 79.9% of rice farmers (3.5 million) are small-scale farmers with less than 3.2 hectares of land per household (OAE, 2019). The vast majority of small-scale farmers are located in the Northeast and North regions

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53 (83.23% and 77.63% respectively) (OAE, 2019). This sector has experienced successive policy

54 interventions ranging from low-interest loans to rice farmers to fixed higher-than-market price

55 for paddy rice (Poapongsakorn and Pantakua, 2014; Ricks and Laiprakobsup, 2021). Four main

56 marketing channels for paddy rice have been used by rice farmers in Thailand (Srisompun,

57 2014). They are: agricultural cooperatives, local collectors (or middlemen), rice millers and

58 central paddy market. The interventions, most notably, a series of Rice Pledging Schemes (RPS),

59 were often associated with the promotion of particular market channels (Liese *et al.,* 2014).

60 Therefore, the share of any specific rice marketing channel would vary under different policy

61 intervention schemes (Poapongsakorn, 2010). For example, central paddy markets, established in

62 1980, had a market share of nearly 24% by 1997 (Isvilanonda, 2010) due to the fact that the

63 initial RPS was implemented by the Bank for Agriculture and Agricultural Cooperatives which

64 operated in central paddy markets. However, the RPS introduced in 2011 favoured rice millers

65 more (Ricks and Laiprakobsup, 2021). By 2013, the share of central paddy markets dropped by

66 near half to 12.59% (Srisompun, 2014). The RPS ended in 2014 (Ricks and Laiprakobsup,

67 2021). It is possible that the channel use may have changed again since then. Thai rice farmers

68 have had more freedom in selecting marketing channels, so understanding the determinants of

69 farmers' decision-making associated with these channels is of particular interest to multiple

70 stakeholders in the rice value chain.

71   In terms of the rationale behind the farmers choice of marketing channel, some studies

72 have taken a socio-economic perspective, focusing on characteristics such as level of education,

73 farm size, location, and social network (Abebe *et al.,* 2016; Pham *et al.,* 2019; Mgale and Yan,

74 2020), transaction cost analysis (Escobal and Cavero, 2012; Mgale and Yan, 2020), utility

75 maximization (Blandon *et al.,* 2010) or asset specificity (Pham *et al.,* 2019). Other studies

76 incorporate relationship dynamics between channel members such as power and trust

77 (Schipmann and Qaim, 2011; Abebe *et al.,* 2016; Mgale and Yunxuan, 2020).

78   Since Gasson's (1973) seminal study, farmers' goals and objectives have featured highly in

79   much empirical research on farmers' decision-making (Beedell and Rehman, 2000; Borges,

80   2015). In the context of economic decision-making, a framework relevant to farmers' goals is

81   expected utility maximization (Nuthall and Old, 2018). If the farmer acts purely as an economic

82   agent they would select a marketing channel by evaluating the expected utility or net benefits of

83   the channel (Blandon et al., 2010; Arinloye et al., 2015). Profit is one aspect of the expected

84   utility, but other aspects include incentives received from buyers (Arinloye et al., 2015), and

85   payment mechanisms and grading (Blandon et al., 2010).

86   The Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) and its later variant the

87   Theory of Planned Behavior (TPB) (Ajzen, 1991; 2011) are used widely to study farmers'

88   decision-making (Burton, 2004; Hansson et al., 2012; Meijer et al., 2015). However, its

89   application to farmers' marketing channel choice has generally been limited (Dunay et al.,

90   2018). Dunay et al. (2018) found that attitudes and subjective norms, key exogenous factors in

91   the TRA, along with goals and objectives, strongly influenced farmers' decision-making.

92   Considering that farmers do not always make purely economic or economically optimal

93   decisions (Howley, 2015; Howley et al., 2015), we see the need to apply social-psychological

94   perspectives to studies associated to farmers' decision making. Our lens of enquiry is marketing

95   channel choice by rice farmers in Thailand. This study aims to examine how economic,

96   relational, and psychological factors concurrently underpin farmers' decision making and

97   influence marketing channel choice by Thai rice farmers. Our study makes a unique and

98   substantive contribution to existing knowledge of farmers' decision-making about marketing

99   channel choice in Thailand.

100   **2. Theoretical Framing of the Study**

101   We propose an integrated framework (Fig. 1) illustrating the key decision factors influencing

102   farmers' marketing channel use behavior. As a central premise, TRA identifies that conscious

103   cognition is a causal agent in decision making and choice (Fishbein and Ajzen, 1975; Ajzen,

104   1991; 2011). According to Fishbein and Ajzen (1975), an individual's intention to perform a

105   behavior is an immediate antecedent of that prospective behavior and the intention is influenced

106   by that individual's attitude towards the behavior and subjective norms (social influences from

107   friends, family, experts, policy makers etc.). Our framework extends the TRA model by drawing

108   upon economic goals and transaction conditions to develop a more holistic overview of farmers'

109   decision-making regarding marketing channel choice.

110   **Take in Figure 1 here**

111   *2.1 Past behavior and intention*

112   It is important to note that there are three aspects of behavior: retrospective behavior, intention

113   and prospective behavior. According to Fishbein and Ajzen (2010), empirically, many studies

114   based on self-report surveys have assessed intentions and past (retrospective) behavior at the

115   same time. Based on the conclusions of several meta-analyses of the relationship between

116   intention, prospective behavior (Armitage and Conner, 2001) and/or retrospective behavior

117   (Albarracin *et al.,* 2001), Fishbein and Ajzen (2010) concluded that "intentions are found to

118   predict behavior quite well" (p.51) whilst acknowledging that the findings from the meta

119   analyses were inconsistent in that "intentions sometimes predict past behavior better than future

120   behavior but at other times predict future behavior better than past behavior" (p. 50). We argue

121   that current intention cannot be used as a predictor of past behavior because prediction is about

122   the future not the past and temporal precedence is one of the criteria for prediction (Kenny, 1979;

123   Hair *et al.,* 2013). Ajzen (1991; 2011) explicitly points out that past behavior does not constitute

124   a causal antecedent of intention due to its lack of regularity. We, therefore, propose that past

125   behavior exerts influence on intention indirectly, through the outcomes of the appraisal of the

126   channel used, typically including attitude towards and trust in the channel. Past behavior itself is

127   influenced by subjective norm, economic goal and transaction condition offered.

128   **2.2 Attitude and subjective norm**

129   Attitude is a latent disposition defined as the decision maker's favorable or unfavorable

130   evaluation of the performance of a particular behavior or as a response to a given behavior

131   (Fishbein and Ajzen, 1975; 2010). Commitment to a given marketing channel is empirically

132   linked to two evaluative attitudinal constructs: satisfaction, informed by past experience (Selnes,

133   1998; Schirmer *et al.,* 2018) and trust. Trust entails a channel member's belief in an exchange

134   partners' integrity or honesty (Morgan and Hunt, 1994). In line with the TRA framework which

135   sees attitude as the antecedent of behavior, we delineate causal paths from past behavior to trust

136   (H1a), trust to attitude (H1b), past behavior to attitude (H1c), and from attitude to channel use

137   intention (H1d) as shown in Figure 1.

138   Subjective norm is narrowly defined in the TRA framework as perceived social pressure to

139   perform (or not to perform) a particular behavior (Fishbein and Ajzen, 2010) that can inform

140   channel use intention. Social pressure to perform a given behavior can arise in the context of this

141   study from extension officers, neighbors and peer groups, and family members (Meijer *et al.,*

142   2015; van Dijk *et al.,* 2016). We therefore propose causal paths from subjective norm to past

143   behavior (H2a) and from subjective norm to intention (H2b) as shown in Figure 1.

144   **2.2 Economic goal and transaction condition**

145   We delineate two categories of utility maximization intrinsic to market exchange: economic

146   goals held by farmers and consideration of transaction conditions offered by the channel. These

147   can be achieving higher price, lower costs of selling or better cash flow, depending on individual

148   farmers' circumstances. Price per se is rarely the sole determining factor (Tsourgiannis *et al.,*

149   2012), particularly when the heterogeneity in socioeconomic characteristics of farmers and farm

150   is taken into consideration (Hansson *et al.,* 2012). Cost-focused farmers are more motivated by

151   reducing costs than achieving a higher price (Tsourgiannis *et al.,* 2012) or having a healthy cash

152   flow (Blandon *et al.,* 2010). Whilst economic goals are about what farmers want to achieve

153   through a transaction, the other side of the coin is the transaction conditions offered by the

154   channel (Shepherd, 2007). Indeed, farmers are concerned not only with the price offered but also

155 channel accessibility, mode and speed of payment, grading and standard, purchase volumes of

156 buying and other costs of selling such as transportation (Blandon *et al.,* 2010; Tsourgiannis *et al.,*

157 2008; 2012; Arinloye *et al.,* 2015). In summary, we propose causal paths from economic goal to

158 past behavior (H3a), from economic goal to intention (H3b), from transaction condition to past

159 behavior (H4a) and from transaction condition to intention (H4b) as shown in Figure 1.

160 **3. Materials and methods**

161 **3.1 Study area, sampling and data collection**

162 This study focuses on understanding the factors that influence rice farmers' choice of marketing

163 channel. The study area covered three of the four geographical regions in Thailand: North,

164 Northeast and Central regions with a collective share of 98.5% of the total rice production in

165 Thailand (OAE, 2019). A two-phase sequential approach was adopted for data collection. Phase

166 one involved preliminary in-depth interviews conducted in 2015 with 33 rice farmers from three

167 provinces as shown in Figure 2a. The interviews aimed to explore marketing channel choice and

168 validate/inform the development of the measures of the key concepts as depicted in Figure 1.

169 The findings of the interviews were used to inform the phase-two survey in relation to

170 questionnaire design, sampling and the actual data collection process. Phase two cross-sectional

171 survey questionnaires were collected in person in 2016 from nine provinces as shown in Figure

172 2b and produced the main data for this study.

173 **Take in Figure 2 here**

174 To ensure a representative sample, the selection of the provinces and villages took into

175 consideration three main factors: the number of crops, farm size and rice varieties. For phase-one

176 interviews, a theoretical sampling was used to select one representative province for each region.

177 Two villages in each province were selected at the recommendation of the sub-district

178 administrative organization (SAO) in each region. Individual rice farmers were identified by the

179 Agricultural Extension Officers (AEO) based on the criteria provided by the researchers. For the

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180   second stage survey, a three-step sampling procedure was adopted. Three representative

181   provinces in each region were firstly selected based on the agricultural census data for each

182   province. This is followed by selecting villages from the nine chosen provinces with the

183   assistance of the administration officers of the SAO and AEOs in each province, leading to the

184   identification of a total of 21 villages (four in the North, seven in the Northeast and ten in the

185   Central region). Finally, the respective SAO or AEO helped send requests for assistance to the

186   head of villages, or government officers attached to the village, who called an assembly in the

187   village and promoted the survey to the individual rice farmers.

188   Phase-one interviews were conducted face-to-face and fully recorded by the first author.

189   Phase two questionnaires were distributed and collected in person by the first author and three

190   assistants under the supervision of the first author. Prior to the data collection, the assistants were

191   all trained by the first author. A total of 661 valid questionnaires were collected, 24 of which

192   reported using channels which were excluded for detailed analysis due to small sizes of sub-

193   groups. Therefore, the main data analysis was based on responses from 637 rice farmers, selling

194   rice to any of the three main marketing channels: millers, local collectors and cooperatives. The

195   specific number of respondents from each province can be found in Figure 2b.

196   **3.2 Questionnaire design and measures of analytical variables**

197   The questionnaire was designed to collect information for analytical variables as specified in the

198   proposed model (Figure 1) and also relevant socio-demographic information. Particular attention

199   was paid to specific and precise wording. Findings from the preliminary in-depth interviews

200   were used to contextualize the measures for Thai rice farmers where appropriate. Measures for

201   the variables in the proposed model were also developed through synthesis of the scales

202   established from previous studies (Selnes, 1998; Fishbein and Ajzen, 2010; Hernández-

203   Espallardo *et al.,* 2012).

204   Two channel use behavioral variables were proposed in the conceptual framework: past

205   behavior and intention. Past behavior was measured by asking respondents to indicate how much

206 rice they sold to any of the three channels between February 2014 (end of last RPS) and June

207 2016 (when survey conducted). The scale ranged from "never", then "less than 10%" to "always

208 - over 90%" against each channel. Intention, defined as the likelihood of a farmer selling the

209 next rice crop to use any particular marketing channel, was measured using the statement "Next

210 crop, I intend to sell to this marketing channel" scaling from most unlikely (1) to most likely (7).

211 The influencing variables considered were attitude, trust, subjective norms and economic

212 goal and transaction conditions. All variables were measured with 7-point scale. For the variable

213 economic goal, respondents were asked to indicate the level of importance from 'not important at

214 all' (1) to 'extremely important' (7). All other variables were measured using Likert scale (from

215 1=strongly disagree to 7=strongly agree) against each relevant statement.

216 Attitude towards a particular channel used was seen as a latent predisposition as shown in

217 either a favorable or unfavorable manner (Fishbein and Ajzen, 2010). Two evaluative statements

218 (adapted from Hernández-Espallardo *et al.,* 2012) were used to measure attitude: "This channel

219 is a good choice for me" and, "Overall, I am happy with this channel". Trust was measured using

220 two items in relation to honesty/integrity and reliability (Morgan and Hunt, 1994). The two

221 items were: "I choose this channel because I don't have to worry about being cheated on: 1) the

222 weighing scale and 2) rice quality grading assessment".

223 Subjective norms were measured against five normative referents: friends and/or

224 neighbors, family members, government officers, mass media and harvest machine drivers (all

225 validated through phase-one interviews). The statement used were adapted from Fishbein and

226 Ajzen (2010): "Most of my friends and neighbors sell their rice to this channel"; and "My family

227 member/Government officer/Rice harvest machine driver recommend that I should sell to this

228 channel".

229 The construct, economic goal, was measured with three items identified from preliminary

230 interviews and extant literature (Blandon *et al.,* 2010; Tsourgiannis *et al.,* 2012). The three goals

231 were: selling at a higher price, minimizing cost, and enhancing cash flow. Transaction conditions

10

232 offered by the channel were measured with items adapted from Blandon *et al.* (2010) and

233 Tsourgiannis *et al.* (2012) and contextualized after the preliminary interviews. Transaction

234 condition was conceptualized to include mode of payment, buying capacity, costs of selling and

235 accessibility offered by channels. The items for transaction conditions provided by a specific

236 channel included: cash payment, confidence in being paid, buying any quantity, easiness to

237 access, price offer and cost of transportation.

238   All measures of the variables in the proposed model were tabulated in the questionnaire

239 against each specified marketing channel previously used or where there was an intention to use.

240 Common method bias was checked by using Harman's single factor test. Constraining the

241 number of factors extracted to one, the total variance explained by all indicators of the

242 independent variables was 27.31%, which showed that common method bias was not an issue for

243 the observed items of the determinant factors.

244 **3.3 Analytical procedure**

245 Socio-demographic characteristics of the respondents were first summarized. Descriptives of the

246 analytical variables were explored. ANOVA test was used to compare the differences of socio-

247 demographic attributes across the sub-groups of different channel users.

248   The proposed model was tested based on the main survey data using covariance-based

249 structural equation modelling (SEM) with AMOS 26. SEM tests a series of regression equations

250 simultaneously, encompassing the modelling of correlated independents, measurement error,

251 multiple latent independent and dependent variables with single or multiple observed indicators,

252 path analysis and analysis of covariance (Blunch, 2013; Hair *et al.,* 2017). Maximum likelihood

253 estimation was used to infer the value of the unobserved, or latent variables. This method makes

254 use of full information or all data points available (Arbuckle, 2017). A two-step strategy

255 (Blunch, 2015) for SEM was adopted, followed by multi-group analysis.

256   The first step was a confirmatory factor analysis (CFA) or measurement modelling of the

257   observed and latent variables. Model fit was assessed using standard model fit indices. To assess

258   the model fit, the criteria provided by Hair *et al.* (2013) were adopted. The indices suggested by

259   Hair *et al.* (2013) vary slightly according to sample size (N) and number of measures or

260   indicators (m). They suggested that if $N > 250$ and $12 < m < 30$, the significant p-values for

261   likelihood ratio chi-square expected should be less than .05 ($p < .05$), comparative fit index (CFI)

262   should be greater than .92, room mean square residual (RMR) should be less than.08, and the

263   root mean square error of approximation (RMSEA) be less than .07. Minor modifications were

264   made according to the modification indices for the covariances produced by AMOS. As a result,

265   two indicators ('government officer' and 'rice harvest machine driver') for the latent variable

266   'subjective norm', and two for the latent variable 'transaction condition' ('Price offer' and 'cost

267   of transportation') were deleted.

268   Secondly, structural equation modelling was run based on the modified measurement

269   model and structure of the proposed relationship between the latent variables. For the two single-

270   indicator channel choice variables (i.e. past behavior and intention), Hayduk and Littvay's

271   (2012) approach was used to fix the measurement error variances of the two items. Therefore,

272   0.1 was assigned to the error of past behavior and 0.3 to the error of intention, assuming less

273   error for actioned practice than predictive actions. One modification was done to improve the

274   structural model fit. Details are provided in the results section. Thresholds for model fit

275   assessments (Hair *et al.,* 2013) can be found in Table 3.

276   Finally, multi-group analysis (MGA) for different user groups of rice marketing channels

277   was conducted based on the modified structural model. The MGA compared the differences of

278   the model structure and individual path coefficients (standardized regression weights) across the

279   subgroups.

280   **4. Results**

281   4.1 Socio-demographic characteristics of the respondents and marketing channel used

282   The socio-economic characteristics of the sample population of rice farmers across the three

283   regions in Thailand are presented in Table 1. Of the 637 rice farmers who sold rice to any of the

284   three main marketing channels (i.e. millers, local collectors or co-ops), 27 percent were (170

285   farmers) were from the North region, 46 percent (293 farmers) were from the Northeast and 27

286   percent (174 farmers) were from the Central region. There were 384 female farmers (60% of the

287   total). The average age of the respondents were 52 years. On average, the farmers received about

288   4 years of formal education. The average farm size was 8.7 Rais (1.4 ha) in the North region, 9.7

289   Rais (1.5 ha) in the Northeast and 26.2 Rais (4.2 ha) in the Central region. When compared with

290   the agricultural census conducted by the National Statistical Office, Thailand (OAE, 2019), the

291   sample is largely representative of rice farmers in Thailand in terms of education and farm size.

292   Females and older farmers were slightly over represented in this sample.

293   **Take in Table 1 here**

294   In terms of the marketing channel used for selling rice, 369 farmers (57.9% of the 637

295   respondents) sold rice to a miller, 120 farmers (18.8%) to a cooperative and 201 farmers (31.6%)

296   to a local collector. The majority of the farmers only sold rice to one channel (91.9%) and 49

297   respondents used two marketing channels and two used all three channels. For respondents who

298   selected more than one channel, their responses for each channel were treated separately. This

299   means the final sample for the SEM analysis was a pooled sample with a total of 690 channel-

300   specific responses.

301   Statistically significant differences in channel used were found when region, gender,

302   education and farm size were considered (Table 1). Chi-Square test of independence indicated

303   that millers and local collectors were used more by farmers in the Northeast region whilst

304   cooperatives were used more by those in the North region ($X^2 = 56.065$, $p < .001$). Female

305   farmers were more likely to use local collectors ($X^2 = 6.65$, $p = .036$). When compared by

306   education, those who had completed more than seven years of education were more likely to use

13

307   cooperatives ($X^2 = 29.06$, p <.001). Those who farmed more than 12 Rais (or 1.92 ha) of rice were

308   more likely to have used millers ($X^2 = 20.16$, p < .001).

309   4.2 Modelling results of determinants of paddy rice marketing channel use

310   SEM analysis involved confirmatory factor analysis (CFA) of the measurement model, structural

311   modelling and multi-group comparisons. The good model fit thresholds and indices were

312   explained in section 3.3 and also presented in Table 3.

313   The initial CFA was based on the original 19 observed indicators of the seven latent

314   variables of the proposed model as shown in Figure 1. The results showed poor model fit

315   (X^2=630.59 with df =126 and probability level =.00; X^2/df=5.01; CFI=.859; RMSEA=.078,

316   PCLOSE =.000, N=690). Based on the modification indices and regression weights, four items

317   with large modification indices were removed as explained in section 3.3. The modified CFA

318   model (Model 2) with the remaining 15 indicators was improved to a good fit (X^2=171.597 with

319   df=71 and probability level=.00; X^2/df=2.417; GFI=.967; CFI=.964; RMSEA=.045 and

320   PCLOSE=.804, N=690).

321   Convergent and discriminant validity of the five latent variables based on the modified

322   measurement model were then examined. The validity test results for all five latent variables

323   were shown in the last section of Table 2. The average variance extracted (AVE) is used to test

324   convergent validity. The recommended level is greater than 0.50. The AVE of attitude, trust and

325   subjective norm were above 0.5. Transaction condition and economic goals were below 0.5.

326   However, considering the exploratory nature of this study and other conditions being met, we

327   decided to retain the constructs. Discriminant validity is confirmed because all square root of

328   AVE (diagonals in the table) is greater than inter-construct correlations. Maximum shared

329   variances (MSVs) were all less than AVEs. Construct/composite reliability (CR) measures the

330   inherent consistency of the indicators of a construct. A CR coefficient of greater than 0.6 is

331   considered acceptable (Hair *et al.,* 2017). CRs of the five latent variables in the present study

332   ranged from 0.601 to 0.842.

334   Table 2 presents the descriptive statistics for the two behavioral variables (intention and

335   past behavior) and the five AMOS-imputed factor scores of the five determinant latent variables.

336   It can also be seen in Table 2 that statistically significant differences in the means value of

337   intention (p < .05), past behavior (p < .01), attitude (p < .10), trust (p < .01) and transaction

338   conditions (p < .0) were found across different channel user groups. Local collector users

339   reported the highest frequency of past use of this channel and highest level of intention to sell to

340   this channel whilst co-op users reported the lowest of both. Local collector users also had the

341   highest rating on attitude towards this channel, trust in this channel, and transaction condition

342   offered by the channel. Miller was the least trusted channel and the transaction condition of the

343   co-op was rated the lowest by their users. Subjective norm and economic goals showed no

344   statistically significant differences across the three channels (p = .26 and .71 respectively).

345   The CFA model fitting retained 15 observed items which were subjected to structural

346   equation modelling with AMOS. The proposed model (Model 1) was first tested, and the model

347   fit indices and results are presented in column 3 of Table 3. Model 1 had poor model fit indices

348   with none meeting the standard threshold (see column 2 of Table 3). Examination of the

349   modification indices suggested that a covariance should be added between the error terms of past

350   behavior (e14) and intention (e15) (M.I.=129.468). Adding the covariance between the two error

351   terms led to much improved model fit indices as shown in Model 2 (column 4 of Table 3) with

352   all model fit indices better than the thresholds shown in column 2. A Chi Square difference test

353   showed statistically significant difference between model 1 and model 2 (p <.0001). The

354   modified model with path coefficients is presented in Figure 3.

15

357   All causal paths in model 2 apart from the one from H3b (economic goal to intention) were

358   statistically significant and the statistical estimates can be found in Table 4. The factors

359   identified in the model account for 48.2% of the variance of farmers' intentional channel use

360   (R^2=.482). Subjective norm, economic goal and transaction condition have statistically

361   significant and strong influence on past behavior (R^2=.75) with transaction condition being the

362   strongest influencing factor for past behavior (std. β = .476, p < .001).

363   **Take in Table 4 here**

364   Given the statistically significant differences found in intention, past behavior, attitude,

365   trust and transaction condition amongst the three marketing channels, it is important to conduct a

366   multiple group analyses (MGA) on the structural weights of model 2 based on channel used.

367   Table 4 presents the MGA results. This includes the structural weights coefficients (standardized

368   regression), the significance probability (p value) for each structural path and the results of

369   comparison of each individual path. The MGA showed statistically significant differences in

370   model structural weights amongst the three channels (X^2= 92.338; df=36; p < .0001). For rice

371   miller users, all but one hypothesized causal path were supported. The exception was H3b

372   (economic goal to intention). For local collector users, three hypothesized causal paths not

373   supported were: H1d (attitude to intention), H3a (economic goal to past behavior), and H3b

374   (economic goal to intention). For cooperative users, four causal paths were not supported. They

375   were: H1b (trust to attitude), H3a (economic goal to past behavior), H2b (subjective norm to

376   intention) and H4b (transaction condition to intention). Interestingly, cooperative users' intention

377   to continue using this channel seemed to be mainly motivated by economic goals, which was in

378   direct contrast with those selling to millers and local collectors whose intention was mainly

379   influenced by subjective norm and transaction condition offered by the channel.

5. Discussion

380

381 Thai rice farmers have mainly relied on rice millers, local collectors and cooperatives to take

382 paddy rice to market. Over 90 percent of the farmers used one channel only. This is extremely

383 high compared to the proportion (47.9 percent) found in Tanzania rice famers (Mgale and

384 Yunxuan, 2020). Of the three channels, miller and local collector were the two most commonly

385 used channels in all three regions. Bigger farmers were more likely to use millers and smaller

386 farms more likely to use local collectors. Cooperatives were used more by those with higher

387 level of education. Those findings are largely consistent with observations in other countries

388 (Pham *et al.,* 2019; Mgale and Yunxuan, 2020). Aside from the socio-demographic

389 characteristics of channel users, the hypothesized causal paths to the farmers' past channel use

390 (i.e. past behavior) and intentional use were largely confirmed despite some nuances found

391 amongst the users of the three channels.

392 The role of past behavior was an unresolved issue for TRA/TPB (Fishbein and Ajzen,

393 2010). Our data supported the hypothesized causal paths that past behavior was influenced by

394 subjective norm and transaction condition across all three channel user groups. Past behavior

395 was also influenced by economic goals for those selling to millers. As for the relative importance

396 of the influencing factors, transaction condition and subjective contributed more to the past

397 channel choice than economic goal. The proposed influence of past behavior on attitude either

398 directly or indirectly via trust was also supported by the data. This enriches existing

399 understanding of the role of past behavior in TRA/TPB framework and is worthy of application

400 in other sectors and behavioral contexts.

401 Attitude was shown to have statistically significant, albeit weak, influence on intention of

402 using millers and cooperatives, but not local collectors. Attitude was formed directly through

403 past experience of the channel use (past behavior) and indirectly via trust through the construct

404 of operational honesty in grading and weighing particularly for miller and local collector users.

405 This is similar to the results of Mgale and Yan (2020) who found that farmers' trust in the

406   channel affects their choice of millers and large-scale traders. It also partly concurs with

407   Schipmann and Qaim, (2011) who suggested that lack of trust in grading processes was one of

408   the reasons for farmers to withdraw from a given marketing channel. However, the trust-attitude

409   path was not supported by those who sold to cooperatives.

410   Subjective norm in the form of family/friends and neighbors was found to have

411   consistently influenced past behavior in all situations and influenced intention to use local

412   collectors and millers, but not cooperatives. This partly corroborates the findings of van Dijk *et*

413   *al.* (2016) that farmers tend to be influenced by their immediate social referents. Pham *et al.*

414   (2019) and Mgale and Yan (2020) both found that access to marketing information affects rice

415   farmers' channel choice in Vietnam and Tanzania. Friends and neighbors could be important

416   sources of market information for Thai rice farmers.

417   Farmers' expected utility maximization in the forms of economic goal and transaction

418   condition is of varied influence in this study. Economic goal to intention path was not supported

419   by miller and local collector users. This partially supports the findings of some previous studies

420   (Howley *et al.,* 2015; Abebe *et al.,* 2016) that famers' decision may not always follow a purely

421   economic rationale and that in developing countries smallholder farmers tend to trade via

422   middlemen even if the profit margin is low especially if there is a personal relationship with the

423   collector (Pham *et al.,* 2019). The level of activity required from the farmer in engaging with

424   these different marketing channels has also been shown to be of influence e.g. if the rice is

425   collected from the farm gate or if the farmer has to take the rice to the mill (Kakati and

426   Chakraborty, 2017), mediated in part by whether the farmers have access to personal transport

427   (Pham *et al.,* 2019). Mgale and Yunxian (2020) also echo this finding that most farmers in their

428   study still sell through local collectors. They cite distance to market and also inability to act

429   outside the farm gate. Also critical is the direct contrast with cooperative users who were perhaps

430   more empowered through collective action to consider their economic goals.

431   Transaction condition in the forms of cash payment, confidence of receiving payment,

432   accessibility and buying any quantity affects the decision of farmers to sell to rice millers and

433   local collectors. Our study reinforces that speed and mode of payment (cash payment in this

434   case) and buying capacity are generally big concerns for small-scale farmers (Blandon *et al.,*

435   2010; Barrett *et al.,* 2012). However, farmers who sold to cooperatives were not statistically

436   significantly influenced by transaction condition, perhaps because there were other factors of

437   more influence. Preliminary interviews suggested that this might have been due to the fact that

438   some farmers did not want to be tied up to cooperatives.

439   The findings of this study have some interesting managerial implications for farmers and

440   marketing channels. For rice farmers, only the cooperative users' intention was motivated by

441   economic goals, whilst for miller and local collector users, farmers were more motivated by

442   services and accessibility of the marketing channels (transaction condition) i.e. being paid in

443   cash. This seemed to suggest either that miller and local collector users lacked power to

444   negotiate and had to sacrifice higher economic return for market accessibility or that being paid

445   in cash had an advantage for them as individuals that took precedence over any negative aspects

446   of the transaction. It can be argued that to enhance their own economic status and profitability,

447   farmers need to take more collective actions as shown by cooperative users in this study.

448   Although considerations of perceived personal and collective economic benefit versus the

449   perceived loss of personal autonomy were not part of this study, Pham *et al.* (2019) highlighted

450   in their study in Vietnam that the farmers who were involved in more formal networks e.g.

451   farmers group had achieved better price for their paddy rice. Joining cooperatives may also help

452   smallholders to reduce transportation costs through collective action. For rice marketing

453   channels, the study shows the importance of past behavior in influencing farmers' trust and

454   attitudes, which then influence their future intention. The findings highlight the importance of

455   providing farmers with good services in an honest and transparent way. Mode and speed of

456   payment are just as important as flexibility of purchase quantity in keeping suppliers.

457   The findings have also important implications for policy makers in developing

458   interventions to safeguard rice farmers' welfare in selling their produce to markets. Firstly,

459   whilst some farmers have engaged in post-farm gate marketing activity, others simply wish to

460   sell at the farm gate to a local collector regardless of own economic goals. Coupled with the high

461   percentage of single marketing channel dependence, this suggests a need to empower rice

462   farmers and improve farmers' access to market. Measures may include investing in rural

463   infrastructure and enhancing access to marketing information as identified by Pham *et al.* (2019)

464   and Mgale and Yan (2020). The fact that majority of farmers only had primary school education

465   and farmers with high school or above education were more likely to use collective action

466   channel (i.e. cooperative) suggests that rural education system is an area for improvement. The

467   finding that trust and transaction conditions played a substantive role in channel choice

468   demonstrates the farmers' concern about integrity and services offered by the channels. Policy

469   makers may address this issue by developing standards for rice purchasing from farmers,

470   especially ensuring the reliability of the weighing and grading process. Without this assurance,

471   farmers may simply take use the marketing channel of lower economic return but less transaction

472   risk.

473   There are several limitations to this research. The scope of this study is inevitably limited

474   by time, sector and country contexts. As mentioned in the introduction, the use of marketing

475   channels in Thailand has changed over time. Whilst four marketing channels have been reported

476   in literature, this study found that central paddy market was only used by less than 5% of the

477   respondent rice farmers, much lower than the previously found 12.6% (Srisompun, 2014). It is

478   possible this might reflect the impact of the end of the latest RPS in 2014. Due to the small

479   number of users, it was statistically inappropriate to model the determinant factors for the use of

480   central paddy market. Secondly, a theoretical limitation is that this study only looked at past

481   behavior and intentional behavior whilst the original TRA/TPB suggest that intention is a

482   predictor of actual behavior which requires a longitudinal study with multiple data collection

483   points, not an element of the methodology described herein. Future studies can look at measuring

484   all three elements of self-reported or indeed observed behaviors: past behavior, behavioral

485   intention and actual behavior. The covariance between the error terms of past behavior and

486   intention was fairly high, indicating a strong correlation between the two behavioral variables.

487   Whilst we recognize the merit of single indicator for the two behavioral constructs (Hayduk and

488   Littvay, 2012), it is possible that intention and past behavior could be measured with multiple

489   meaningful indicators. Future studies into other influencing variables, and in other contexts will

490   also help to develop a more holistic understanding of marketing channel choice by farmers.

491   **6.   Conclusions**

492   This study looked at marketing channels used by Thai rice farmers and the data showed some

493   statistically significant differences in channel use by region, gender, education and farm size. It

494   then examined how economic, relational, and psychological factors driving Thai rice farmers'

495   decision-making toward their intentional choice of marketing channel. The theoretical model

496   was proposed and tested and suggests that farmers' channel use intention is influenced directly

497   by attitude, subjective norm, economic goal and transaction condition, and indirectly by past

498   behavior and trust via attitude. Subjective norm, economic goal and transaction conditions also

499   influence past behavior directly. We believe we have made some substantive contributions to the

500   study of this subject with these findings. Further research can test the nuanced interaction of

501   these factors in influencing self-reported attitudinal and behavioral intention and the actual

502   behavior exhibited in practice. Past behavior in all situations was found to have significantly

503   influenced attitude, which then consistently influenced intention albeit weakly especially in the

504   negative intentional group. This finding is of interest for wider exploration in wider industrial

505   and behavioral contexts.

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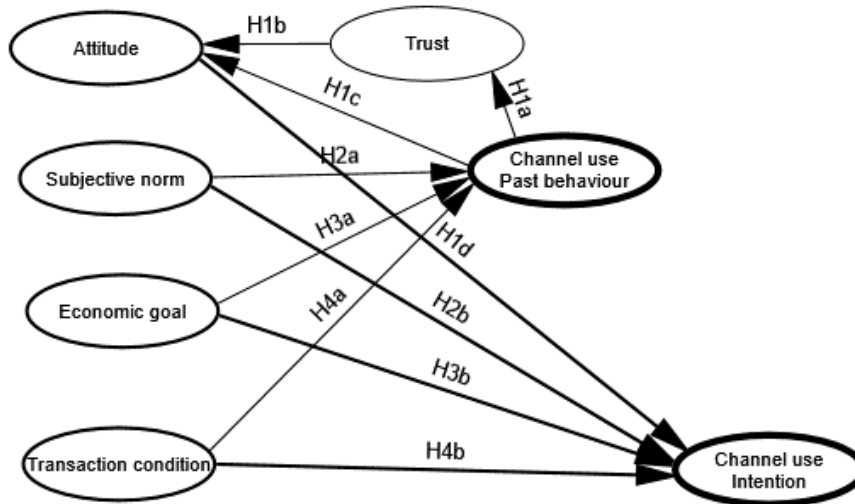
649 **Figure 1. Conceptual model of factors influencing marketing channel use behavior**
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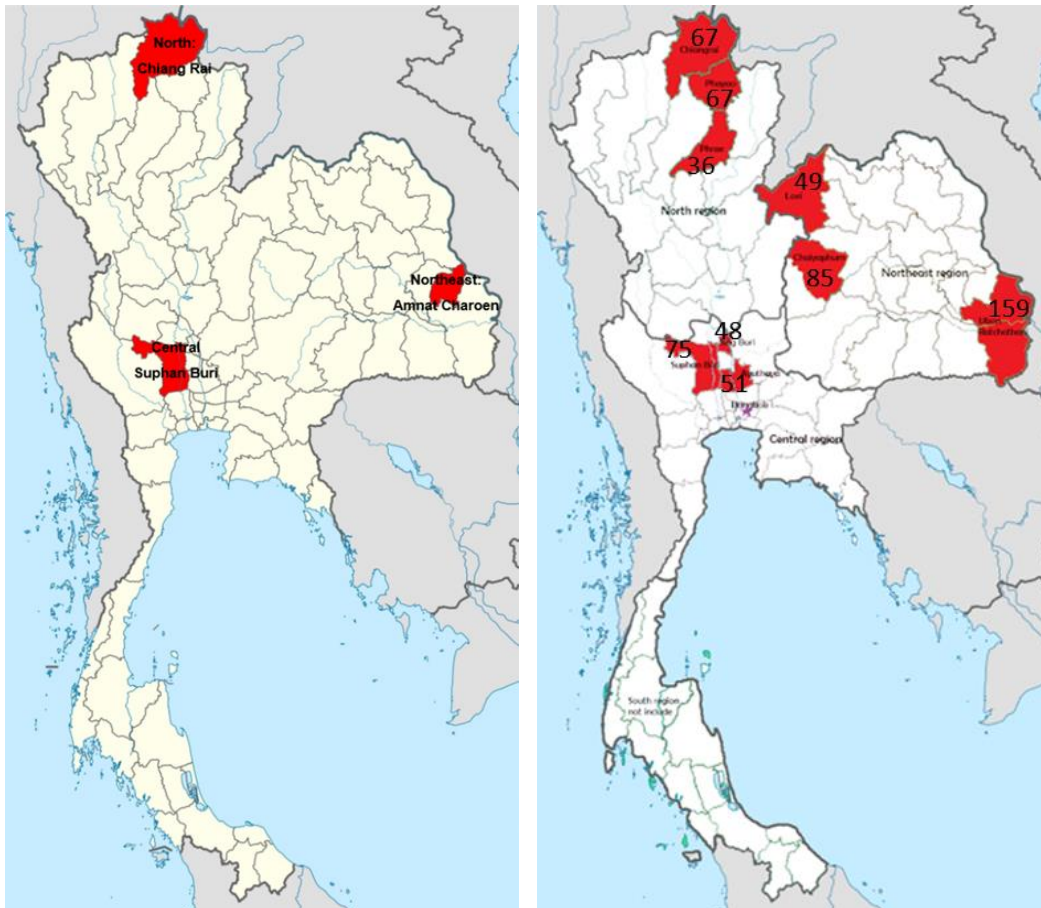
653 2a. Provinces for phase-one interviews   2b. Provinces for phase-two surveys
654   (with number of responses)
655
656 **Figure 2. Study area with provinces marked in red**

657

Figure 3. Modified model of channel choice behavior for Thai rice farmers (Model 2) (Model

659   fit indices are in Table 3)

660

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Table 1. Socio-demographic characteristics of the respondents, pooled number of responses by channel use, and Chi-Square test for independence of channel used by key attributes

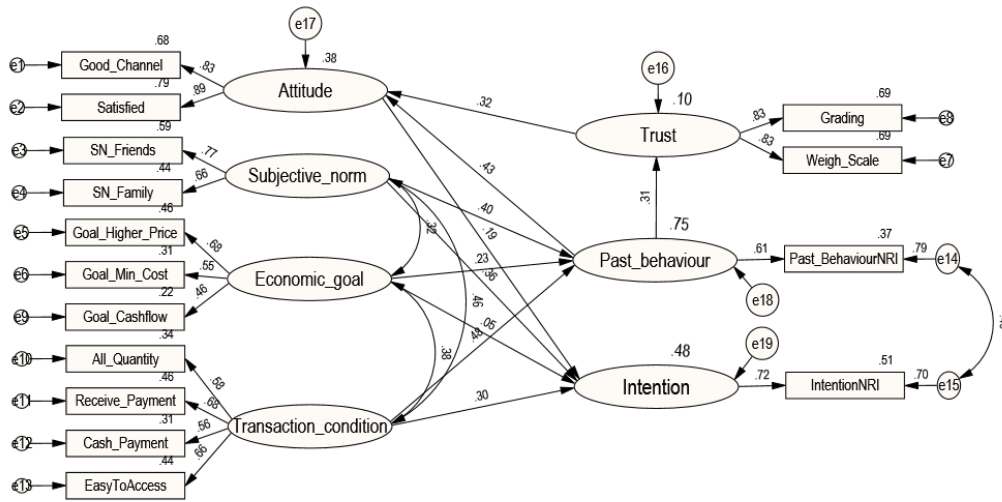| Attribute	Region	N	Min	Max	Mean	SD	Medi
Age (year)	North	170 (27%)	25	71	50.21	9.03	
	Northeast	293 (46%)	18	84	54.1	10.80	
	Central	174 (27%)	27	82	53.76	11.00	
	Total	637(100%)	18	84	52.97	10.53	
Education (year)	North	170	0	16	7.5	4.03	
	Northeast	293	0	16	5.89	2.97	
	Central	174	2	18	6.74	3.77	
	Total	637	0	18	6.55	3.56	
Household size (person)	North	170	1	7	4.24	1.22	
	Northeast	293	1	12	4.82	1.85	
	Central	174	1	10	4.06	1.64	
	Total	637	1	12	4.46	1.68	
Rice sold (percentage)	North	149	2%	100%	59.2%	21.0%	52.9
	Northeast	208	4%	100%	54.3%	20.3%	52.2
	Central	77	89%	100%	99.8%	1.2%	100
	Total	434	2%	100%	64.1%	25.1%	58.8
Rice farm size (Rai) (1 Rai = 0.16 ha)	North	170	2	90	10.21	8.77	
	Northeast	293	2	54	15.28	9.76	
	Central	174	2	240	28.06	26.22	
	Total	637	2	240	17.42	17.27	

		Channel Used N					
Unique number of respondents	Region	Miller	Miller & Co-op	Co-op	Local collector	Miller & Local collector	All thr channe
170	North	56	11	43	57	3	0
293	Northeast	170	1	20	93	8	1
174	Central	92	21	22	33	5	1
637	**Total**	**318**	**33**	**85**	**183**	**16**	**2**

Pooled number of responses	Region *	Miller (pooled n)	% of 637	Co-op (pooled n)	% of 637	Local collector (pooled n)	% of 63
184	North	70	11.0%	54	8.5%	60	9.4%
304	Northeast	180	28.3%	22	3.5%	102	16.0%
202	Central	119	18.7%	44	6.9%	39	6.1%
690	**Total**	369	57.9%	120	18.8%	201	31.6%

Chi-Square test for independence (channel used by gender, education and farm size)*							
		Miller		Co-op		Local collector	
		n	% by row	n	% by row	n	% by ro
Gender (X²=6.65, .036)	Male	148	54.0%	58	21.20%	68	24.8%
	Female	221	53.1%	62	14.90%	133	**32.0%**
Education (X²=29.06, <.001)	≤ 7 years	265	55.0%	62	12.90%	155	32.2%
	> 7 years	89	50.3%	53	**29.90%**	35	19.8%
Farm size (X²=20.16, <.001)	≤ 12 Rais	150	45.3%	60	18.10%	121	**36.6%**
	> 12 Rais	219	**61.0%**	60	16.70%	80	22.3%

*Chi-Square test of channel used by region: X^2=56.065, p <.001

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Table 2. Descriptives, reliability and validity test results for key latent variables and comparison by channel used

		Intention[a]	Past behavior[a]	Attitude	Trust	Subjective Norm	Economic Goal	Transaction condition
Pooled number of responses = 690	Mean	0.81	0.89	5.92	5	5.27	4.04	4.61
	Min	0.14	0.17	1.82	1.39	2.36	1.51	2.67
	Max	1	1	6.89	6.48	6.06	4.51	5.06
	SD	0.314	0.24	1.09	1.21	0.83	0.44	0.51
By channel used	N	Mean	Mean					
Miller	369	0.81	0.89	5.84	4.79	5.26	4.05	4.58
Local Collector	201	0.85	0.93	6.05	5.33	5.33	4.04	4.75
Co-op	120	0.76	0.79	5.95	5.09	5.18	4.01	4.48
(ANOVA test p)		**	***	*	***	(.26)	(.71)	***

Validity test results for key latent variables

	CR	AVE	MSV	1	2	3	4	5
1. Attitude (Satisfaction)	0.842	0.728	0.204	**0.853**				
2. Trust	0.819	0.693	0.197	0.444	**0.833**			
3. Subjective Norm	0.675	0.511	0.209	0.369	0.269	**0.715**		
4. Economic Goal	0.601	0.359	0.198	0.199	-0.052	0.301	**0.600**	
5. Transaction condition	0.775	0.465	0.209	0.364	0.239	0.457	0.391	**0.682**

Note: [a] Variables were negatively skewed and therefore transformed using formula 1/(K-old variable) where K = largest possible value + 1 (Pallant, 2020, p. 98);

* p < .10; ** P < .05; *** P < .01

Table 3. Model fit indices for the proposed model and modified model

Model fit indices [a]	Threshold of good model fit	Model 1 (proposed)	Model 2 (modified[b])
X^2 (chi square)	-	303.336	213.691
df (Degree of freedom)	-	79	78
p	Expect $p < .05$ when N > 250	.000	.000
Normed chi square	$X^2/df < 3$	3.840	2.740
Goodness of fit index	GFI >.95	.945	.960
Root Mean Square Error of Approximation	RMSEA <.06	.064	.050
p of Close Fit	PCLOSE >.05	.001	.466
Adjusted GFI	AGFI >.92	.916	.939
Tucker-Lewis Index	TLI >.92	.893	.935
Comparative Fit Index	CFI >.92	.920	.951

a. *summarized from Hair et al. 2013*

b. *modified by adding a covariance line between the error terms of the past behavior and intention*

674 **Table 4. SEM test results of the modified model and multiple group analysis of users of different channels based on the modified model**

Proposed causal paths			Test results interpretation	Model 2 (N=690) std. β	p	Miller (N=369) std. β	p	Local collector (N=201) std. β	p	Cooperative (N=120) std. β	p	MGA path comparison between the three channels X² (df=2)	p
Past behavior	→ Trust	H1a	Supported	.309	***	.187	.025	.252	.032	.321	.022	.75	.689 NS
Trust	→ Attitude	H1b	Partly supported	.324	***	.366	***	.311	***	.079	.351	13.53	.012
Past behavior	→ Attitude	H1c	Supported	.432	***	.341	***	.390	.008	.799	***	11.69	***
Attitude	→ Intention	H1d	Partly supported	.192	***	.231	***	.192	.155	.224	***	6.83	.003
Subjective norm	→ Past behavior	H2a	Supported	.398	***	.368	***	.303	***	.250	.032	1.46	.482 NS
Subjective norm	→ Intention	H2b	Partly supported	.359	***	.294	***	.338	.004	.160	.209	3.26	.196 NS
Economic goal	→ Past behavior	H3a	Partly supported	.226	***	.353	***	.159	.568	.328	.151	.99	.609 NS
Economic goal	→ Intention	H3b	Partly supported	.051	.462	.142	.724	.090	.552	.479	***	9.91	.012
Transaction condition	→ Past behavior	H4a	Supported	.476	***	.398	***	.319	***	.341	.041	.975	.614 NS
Transaction condition	→ Intention	H4b	Partly supported	.298	***	.256	***	.286	.016	.330	.669	4.38	.112 NS
				R^2									
Past behavior				.750		.690		.356		.651		X²=92.338 (df=36) ***	
Intention				.482		.414		.486		.748			

675 *** $p < .001$;   Coefficients are shaded if $p > .050$;

676 NS: the path weight is not significantly different across the three channel user groups with the significance probability being higher than .05.

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