

THE IMPACT OF SELECTED ELEMENTS OF E-COMMERCE TO E-SHOP RECOMMENDATION

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Abstract: The objective of the study is to evaluate the importance of linking the purchasing process variables (delivery, e-shop, communication) in terms of e-commerce and the willingness of customers to recommend the purchase in the given e-shop. Within the research, a total of 3796 e-commerce subjects were analysed in the Czech Republic and Slovakia. We primarily analysed the impact of variable ratings e.g. satisfaction with the delivery time, total delivery, delivery days, communication and clarity of the willingness to recommend e-shops. The certification of the e-shop's credibility was also taken into account. The research showed that variables (satisfaction with delivery time, communication evaluation and clarity assessment) have a significant impact on the willingness to recommend. For the analysis, we used a descriptive analysis. To infer the effect size certification to the other variables, η^2 was used, where we found medium and high effect. Certification also emerged when analysing the homogeneity of the recommendation, where the differences between Kruskal-Wallis tests were found in the different categories of certification. The difference in all cases was also revealed by the Dunn test in pairwise comparison using the Benjamini-Hochberg method. Finally, the panel effect regression analysis was used. The greatest impact was found in the communication, followed by the delivery and the clarity of e-shops. E-shop management should focus on certification (trustworthiness), because customers take this into account. They also take the shipping time into account. Website awareness should be as obvious as communication. Seller communication impacts on most of the elements analysed.

Key words: e-commerce, recommendation, delivery, website

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Introduction

Digital technologies have become an important part of the lives of people of all generations. This is reflected in different areas, such as human communication, which has swiftly succumbed to electronic progress or a way of shopping that we can now consider to be much more sophisticated (Budiman et al., 2018; Frankovský et al., 2018). Only few innovations in human history include as many

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benefits as e-commerce. These benefits are constantly showing more and more and it is no wonder if some say the e-commerce revolution is as profound as the change that accompanied the industrial revolution (Turban et al., 2008). A number of authors note that e-commerce offers a simple way of accessing companies and individuals and at the same time at very low costs performs everyday business transactions (Bhasker, 2013; Chaffey, 2009; Watson et al., 2009). Modern marketing deals with customer satisfaction (Mou and Jason, 2017; Bacik et al., 2017; Jarvenpaa et al., 2000). Satisfaction can be expressed in a number of ways, but the degree of recommendation that we are going to work on here is, of course, one of the most reliable. Efforts to manage CRM management should therefore not be shifted to the second track or to e-commerce. The objective of the research is to evaluate the significance and the degree of interconnection of selected variables expressing the quality of the purchasing process in terms of e-commerce and the willingness of the customers to recommend the purchase in the given e-shop.

Theoretical Background

Positive consumer behaviour is currently one of the cornerstones of long-term business success (Czarniewski, 2014; Schiffman and Kanuk, 2004), whose key source is the good reputation of the company (Tat Keh et al, 2009; Bucko et al., 2017; Bucko and Kakalejčík 2018). Nowadays, due to the development of the Internet and e-commerce, called online reputation (Bakos and Dellarocas, 2011; Virglerova et al., 2014) while being extremely important in the exchange of online markets, it can influence via successful seller quality signals less informed customers (Bertarelli, 2014; Čorba and Nastišin, 2016). Online reviews have become an important source of information to enable consumers to seek detailed and reliable information by sharing their own experiences (Gretzel and Yoo, 2008). Thakur (2018) explains that customer engagement in writing reviews should be taken into account by management (creating an environment and motivating customers) as it is a very important element of Internet marketing. Lackermair et al. (2013) consider online reviews to be very popular tools to support consumers' purchasing decisions. According to them, many online stores offer quantitative ratings, text reviews or a combination of both. Nowadays, these tools are considered to be an integral part of online purchasing. While in 2016, the number of online reviewers comparing to personal recommendations grew by 10% compared to the previous year, the level of those who do not trust consumer reviews, on the contrary, dropped rapidly from 20% to just four percent. In addition, 27% of the respondents admitted in 2016 that they trust online reviews if they believe they are authentic (Statista, 2017), and 70% of the customers read reviews or ratings before making a final purchase (Kent, 2013). However, online rating consists of positive, neutral or negative transaction valuation; buyers can also evaluate specific aspects such as item quality, seller satisfaction, delivery time and charge handling (Bertarelli, 2014; Bacik and Gburova, 2016). In a very specific view, it can be argued that the reviews are not unified, the customers

considerably perceive the psychological and sociological characteristics of the review as well as the type of review depending on the product (Park, 2018), and thus e-shop management should also consider this fact. It is possible to state that reputation and goodwill are extremely important for the organization's work (Yaman, 2018; Gotsi and Wilason, 2001), for example, in the field of financial management (Kliestik et al., 2018), fashion (Štefko and Steffek, 2018) and in the field of internet advertising (Czuba, 2016; Bačík et al., 2016). Customer satisfaction in e-commerce is influenced by a lot of factors, such as the customer's gender characteristics (Koval'ová et al., 2017), archetype (Strachon et al., 2017), or the e-shop in the product type (Vilcekova and Starchon, 2017), even the size, quality and the description of the product (Necula et al., 2018). In this context there is a question whether these attributes act transsituationally or they are situationally affected (Baumgartner and Frankovský, 2004). The authors discuss the issue of transport (Weltevreden, 2008; Liao et al., 2011; Štefko et al., 2015; Mu-Chen et al., 2014), the e-shop itself (Lin, 2007; Elhamali and Palaniappan, 2017; Vijay et al., 2019) and customer communication (Kazmi et al., 2016; Mero, 2018) and emphasize the importance of these elements. The role of management in the case of customer value increases and improves the most prominent components (it can be assumed that they are also related to other latent components that are not primarily managed by management models). As stated in the study published in this area under Indian e-commerce terms, delivery time and website awareness play a key role in determining overall customer satisfaction (Unni et al., 2015). Quality or more precisely overall satisfaction with the delivery of the product within the limits of online trading has been reviewed by several authors, highlighting the impact of e-commerce deliveries focusing on agricultural products (Fecke et al., 2018). People shop online to save time (Rahman et al., 2018). In addition to delivery or distributing quality, it is also advisable to focus on the overall management of e-shops and customer relationships. The information bullet of e-shops in relation to customer satisfaction is an essential component that should be handled by management (Markopoulos et al., 2016). A very important role in the issue of customer satisfaction in the e-commerce process also plays a role in the website design as well as in the clarity of the website (Masinova and Svandova, 2014) or the communication (Hussain et al., 2018) and the subsequent recommendation.

Methodology

The objective of the research is to evaluate the significance and the degree of interconnection of selected variables expressing the quality of the purchasing process in terms of e-commerce and the willingness of the customers to recommend the purchase in the given e-shop. In order to verify the assumptions, the data of the Heuréka portal in the Czech Republic and Slovakia were used in a sample of 3894 transactions, of which 2871 (73.73%) of Czech and 1023 (26.27%) of Slovak e-shops. Few values were missing, thus only 3796 observations

(e-commerce) were processed. Independent variables (delivery, delivery time, delivery satisfaction evaluation, delivery evaluation, e-shop transparency review, communication) were included in the analysis. These variables were standardized at $<0; 1>$, where the higher value always represents a better evaluation result. The dependent variable was the willingness to recommend, expressed in percentage. In addition, the nominal trade business variable, which in the analysis played the role of the panel variable (moderating variable), also entered the analysis. Original variables (non-standardized):

- *Delivery time (DT_norm)* – the evaluation of perceived satisfaction with the time of delivery of the goods converted to specific e-shops according to the number of ratings. The variable was scanned for the ordinal scale 1-5 where one represented the minimum and five the maximum. It was therefore assessed whether the e-shop supplied the goods to the guaranteed delivery time and to what extent was the negative discrepancy between the customers perceived.
- *Quality of delivery (QD_norm)* – assessment of perceived delivery quality (overall - packaging, speed, third party services, etc.) converted to specific e-shops according to a number of ratings. The variable was determined on the scale 1-5 where one represented the minimum and five the maximum.
- *Delivery (days) (DD_norm)* – days of delivery.
- *E-shop clarity (ES_C_norm)* – clarity review (intuitive control, search, connectivity, availability of information, easy orientation in the given information, etc.) e-shop converted to specific e-shops according to a number of ratings. The variable was determined on the scale 1-5 where one represented the minimum and five the maximum.
- *Quality of communication (QC_norm)* – evaluating the quality of communication (chat, email, feedback speed, etc.) of a seller with a customer converted to specific e-shops according to a number of ratings. The variable was determined on the scale 1-5 where one represented the minimum and five the maximum.
- *Verify badge (level) (Certified)* – the three verification steps based on the N of Ratings (up to 90 days) in the nominal scale. The 'verified' level is getting those e-shops that receive a sufficient number of respondents over the last 90 days and do so in a dozen evaluations. The 'verified-gold' levels are those e-shops that receive a sufficient number of respondents over the last 90 days, with hundreds of ratings. The 'not verified' level is attributed to e-shops that have not received sufficient ratings over the last 90 days.
- *Willingness to recommend (recommended)* – evaluation in percentages, evaluation of the overall recommendations derived from the nominal dichotomous variable, whether the customer recommends an e-shop or not.

In case of each e-shop, outputs were made up of dozens to hundreds of customer reviews. The assumptions presented in the main objective based on the theory presented specify the following main hypotheses:

H1: We expect a significant impact of the satisfaction assessment with the delivery time on e-shop recommendations.

H2: We expect a significant impact of delivery quality assessment on e-shop recommendations.

H3: We expect a significant impact of delivery time on e-shop recommendations.

H4: We expect a significant impact of the assessment of the perceived e-shop clarity on e-shop recommendations.

H5: We expect a significant impact of evaluating perceived quality of communication on e-shop recommendations.

Data collection was carried out in August 2017. For the purpose of data collection, we used the automatic data collection method using a script in the programming language PHP 5.6.30, MySQL 5.7.18 databases, phpMyAdmin 4.7.0 MySQL database manager and Apache 2.4.26 web server. With the help of the above-mentioned technologies, a script was created, which identified the role within the source code on the sub-pages of the rated e-commerce entities and recorded the monitored variables within the database.

First, a descriptive analysis was used to analyse the purpose of which was to familiarize the reader with the complex variables. Subsequently, the strength of e-shop certification was analysed for the other variables via η^2 . E-shop certification will also be considered for the dependent variable (recommendation) through the non-parametric Kruskal-Wallis H test and the post-hoc Dunn test using the Benjamini-Hochberg method.

In the other analytical step, multiple linear regression analysis was used. The conditions determining the suitability of the use of this analysis were defined by Gauss Markov's theorem, which, in BLUE (linear estimation), takes into account especially the homoscedasticity and the absence of correlation of independent variables. The Breusch-Pagan LM test for cross-sectional dependence in panels and the Breusch-Pagan homoscedasticity test were used to analyse these conditions. The optimal model was based on the F test for individual effects and the Hausman Test. We consider this model a fixed effect model with Arellan's estimator.

Results

Part of the analyses declares the statistical accuracy of the calculations and analyses described in the previous section to achieve the main objective. As mentioned, a descriptive analysis of the variables is used in the first step. The following Table 1 shows the outputs.

Table 1 shows the numerical characteristics of the original variables. Analysed values (standardized) $\langle 0; 1 \rangle$ variables were entered into analyses within delivery time, quality delivery, delivery days, e-shop clarity, communication quality. These variables in the panel regression models behave independently (predictors). The dependent variable is represented by recom. (recommendation) that was not edited.

Table 1. Descriptive statistics of quantitative variables

	Recom.	Delivery Time	Quality Delivery	Delivery Days	E-shop clarity	Quality Commun.
Minimum	55.00	3.00	3.70	0.00	3.50	3.40
Maximum	100.00	5.00	5.00	8.70	5.00	5.00
Range	45.00	2.00	1.30	8.70	1.50	1.60
Medial	97.00	4.70	4.70	2.60	4.60	4.70
Mean	95.52	4.66	4.73	2.78	4.56	4.68
Std. Dev.	4.82	0.24	0.14	0.93	0.16	0.20

A qualitative variable (certified) is entered into the panel regression analysis, which has three categories: NOT verified with a number of 338 e-shops, verified with a number of 2350 e-shops and verified-gold with a number of 1108 e-shops. We assume that this variable is linked to variables appearing in regression models (this is a justified panel variable), so the strength of the effect of the certified variable to all others is declared in the following Table 2.

Table 2. Certified effect sizes

	Recom.	DT_norm	QD_norm	DD_norm	ES_C_norm	QC_norm
η	0.6626	0.4724	0.2563	0.3119	0.3870	0.5292
η^2	0.4390	0.2231	0.0657	0.0973	0.1498	0.2800

As can be seen from the previous Table 2, the several outputs of effect (η^2) are relatively strong. The strongest effect can be observed with the dependent variable (recom.) and the independent variable representing the communication quality (QC_norm). However, the effects are not negligible even with other independent variables. The Kruskal-Wallis rank sum test obtained a homogeneity of χ^2 of 726.22 and a value of $p < 2.2e-16$. Thus, at the level of significance $\alpha = 0.01$, we assume a significant difference in the willingness of the recommendation between the different levels of certification. The following Figure 1 visualizes the output.

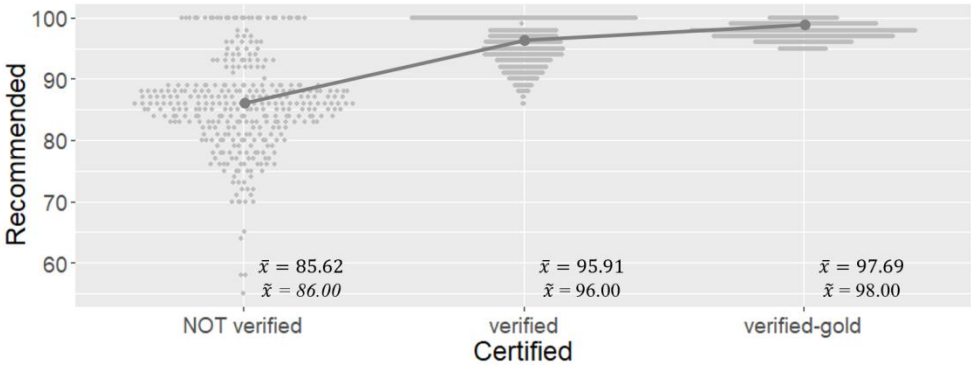


Figure 1. Recommendation rate compared to certified

As can be seen, it is possible to assume certain differences at least in the NOT verified category. The significance of the pair differences is shown in the following Table 3 Dunn test.

Table 3. Dunn test (Benjamini-Hochberg) Recommendation - Certified

Variable	mean.rank.diff	p value
verified - NOT verified	1342.075	<2e-16
verified-gold - NOT verified	1817.955	<2e-16
verified-gold - verified	475.880	<2e-16

In all three cases shown in Table 3, it is possible to talk about a significant degree of difference ($p < 2e-16$). The previous effect analysis and homogeneity analysis remind us on one thing that a trustworthy business certification is a justified panel variable (which, however, confirms the test exactly), but more importantly, it can be said that with increased certification, customers will recommend the e-shop.

When creating and selecting an optimal model for a given variable, the first step was to test whether the OLS or the Fixed factor model is more suitable, since the F test for individual effects was $< 2.2e-16$ ($F = 510.63$, $df1 = 2$, $df2 = 3788$), we think that the Fixed effect model is more appropriate. To judge the Fixed effect model and the Random effect model, the Hausman Test was used, where p was $< 2.2e-16$ ($\chi^2 = 2936.4$, $df = 5$), so the Fixed Effect model appears to be more appropriate. It is clear from this that based on the given variables; the Fixed effect model appears to be the most appropriate. In these models, collinearity was tested, where p -value = 0.09873 ($\chi^2 = 6.2805$, $df = 3$), which can be interpreted as independent of the cross-sectional dependence at $\alpha = 0.05$ independently. When evaluating heteroscedasticity, a Breusch-Pagan test was used, whose p value $< 2.2e-16$ ($BP = 1814.1$, $df = 7$) thus appeared to be significantly heteroscedastic. From the above (low p -values of cross-sectional dependence and heteroscedasticity), the Arellan method appears as the most appropriate assimilator. The outputs are shown in the Table 4.

Table 4. Output – panel regression - estimates (Arellan) DV - Recommended

Predictor	Estimate	Std. Error	t value	Pr(> t)	Sig
DT_norm	6.9490	0.1013	68.5448	<2.2e-16	***
QD_norm	-1.1027	0.7911	-1.3937	0.1635	
DD_norm	-0.0663	0.4279	-0.1551	0.8768	
ES_C_norm	4.3484	1.0643	4.0854	4.491e-05	***
QC_norm	20.2901	3.1857	6.3691	2.129e-10	***

* Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ''

H0: The dependent variable is not significantly affected by the independent variable.

H1: The dependent variable is significantly affected by the independent variable.

Based on p , in the case of QD_norm (Delivery Quality Assessment) and DD_norm (Delivery (days)), we reject the alternative statistical H1 hypothesis, thus we also reject our main H2 and H3 hypotheses. Thus, the significant impact of quality assessment and delivery time on the willingness to recommend the e-shop did not occur. In the other three cases (DT_norm, ES_C_norm, QC_norm), the p level results in lower outputs than 0.05 and even 0.01, so in these cases the alternative of H1 hypothesis will not be disputed and we are talking about a significant influence. Analogously, it is also appropriate to accept our basic H1, H4 and H5 hypotheses, the impact of the satisfaction assessment with the delivery time, the evaluation of the perceived transparency of the e-shop and the evaluation of the perceived quality of the communication on the willingness to recommend the e-shop is statistically significant. For these elements, it is worth mentioning that the estimate value is the highest in the quality of communication assessment (20.2901), followed by a delivery time rating (6.9490), and finally an e-shop transparency review (4.3484). Since these were variables in the identical scale (standardization $<0; 1>$), it is possible to assume that these outputs determine the effect that can be compared between each other. It is also appropriate to point to the positive outputs of these variables.

Results

The primary purpose of the research was to evaluate the importance and the degree of interconnection of the variables (satisfaction with delivery time, delivery satisfaction overall, delivery days, website clarity and perceived quality of communication) expressing the quality of the purchasing process under e-commerce conditions and customer willingness to recommend the given e-shop. We achieved our objective.

Five hypotheses were set in the study (H1: We expect a significant impact of the satisfaction assessment with the delivery time on e-shop recommendations. H2: We expect a significant impact of delivery quality assessment on e-shop recommendations. H3: We expect a significant impact of delivery time on e-shop recommendations. H4: We expect a significant impact of the assessment of the perceived e-shop clarity on e-shop recommendations. H5: We expect a significant impact of evaluating perceived quality of communication on e-shop recommendations.).

Based on the fixed effect panel with the certified (not verified, verified, verified-gold) panel variable, only three of them were confirmed. These were H1, H4 and H5 hypotheses. As stated in a study published under Indian e-commerce terms, delivery time and website awareness play a key role in determining overall customer satisfaction (Unni et al., 2015). The delivery time in our case was defined by three variables (satisfaction with delivery time, total delivery satisfaction and evaluation of delivery days.) Significant impact occurred only in case of the first one, and it has a significant impact. These elements are important, but a certain

amount of caution is required with the definition of a key element, particularly in the 'delivery' element. Liao et al. (2011) in their studies, points to the importance of time at Taiwan's hypermarkets. In Slovakian and Czech e-shops, in general, time as such (its evaluations) failed to impart influence. Vijay et al. (2019) in their studies confirmed the hypotheses focused on the information of the e-shop and its website. In our case, it is only possible to agree with this one, but it should be noted that the e-shop's clarity (from the information point of view) did not even reach outcomes (recommendation effect) far from communication. Further, within Indonesian setting, trust in the vendor, monetary value, and hedonic value has a significant impact on customers' intention to engage in online group buying (Hidayanto et al., 2017).

Communicating with the customer and highlighting the importance of these elements, stated by Mero (2018), where we can see very significant influence in our research. Under the terms of Slovakia, it is possible to agree with these elements, but as a key element, to which e-shops should pay the most attention, we consider the element of communication that makes the recommendation more than just clarity and delivery. This statement, of course, does not claim that the two less important elements can be underestimated.

Conclusion

Digital technology and the Internet created a new shopping system that also asks for new, more innovative approaches than it has been so far. Online marketing brings many benefits and opportunities, but also many new tasks. Small or emerging e-shops can hardly handle all of them to a sufficient extent. Tasks are, in particular, the preparation of a suitable website, the right communication channels, the practical handling of logistics.

Managerial involvement can be seen in the elements that e-shop managers should focus on. Increased attention should be paid when communicating with a customer. In this element, it is necessary to forget that communication is a dynamic process. Therefore, this element should always be managed and it should be noted that the optimization of communication is conditional on the segment as well as many other elements of communication. Simply put, other communication tools will be used for hi-tech e-shops, and other for e-shops selling furniture.

Communication tools should be broad (from phone, email, to social networking), but they should also concentrate on the customer's preferred tool (reaction time, contact hours, etc.). Other features we recommend in e-shop management are satisfaction with delivery time and satisfaction with e-shop clarity (web). These are static elements that change rapidly over time (especially e-shops). Signing contracts with logistics companies are becoming very difficult.

We should not underestimate these elements; we should set up them and check them. Satisfaction with the delivery time of the impact on the recommendation appears to be significant. Thus, managers should pay attention to the fact that selected services can fulfil what they declare, e.g. the proportion of undelivered

products in time, the proportion of lost shipments, the proportion of partially or totally impaired shipments, etc. When customers have a bad impression of the e-shop (due to lack of clarity), they usually do not buy those products. In the paper, the impact on the recommendation was examined, which may be different from the 'willingness to buy'. The previous outputs showed a significant certification effect. For managers, it might not be bad to use this trend, because customers trust certificates.

The limitations can be seen in the fact that the inputs that were analysed were from one portal, the login to this portal is voluntary and there may be minor deviations. The sample was large enough, so it is not necessary to assume that deviations were essential. Further research in these areas will be directed mainly to components of e-commerce communications in various aspects.

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WPLYW WYBRANYCH ELEMENTÓW E-COMMERCE NA REKOMENDACJĘ E-SKLEPU

Streszczenie: Celem badania jest ocena znaczenia powiązania zmiennych procesowych zakupów (dostawa, e-sklep, komunikacja) pod kątem e-commerce oraz chęć klientów do rekomendowania zakupu w danym sklepie internetowym. W ramach badania przeanalizowano łącznie 3796 podmiotów handlu elektronicznego w Czechach i na Słowacji. Autorzy poddali analizie przede wszystkim wpływ ocen zmiennych, np. zadowolenie z czasu dostawy, całkowitej dostawy, dni dostaw, komunikacji i jasności chęci polecenia e-sklepów. Uwzględniono również wiarygodność e-sklepu. Badania wykazały, że zmienne (zadowolenie z czasu dostawy, ocena komunikacji i ocena jasności) mają znaczący wpływ na chęć rekomendacji. Do analizy wykorzystano analizę opisową. W celu ustalenia wielkości efektu dla innych zmiennych, użyto η^2 , w którym znaleziono efekt średni i wysoki. Certyfikacja pojawiła się również podczas analizy jednorodności zaleceń, gdzie w różnych kategoriach certyfikacji stwierdzono różnice między testami Kruskala-Wallis. Różnica we wszystkich przypadkach została również ujawniona w teście Dunna w parach porównania przy użyciu metody Benjaminiego-Hochberga. Ostatecznie zastosowano analizę regresji efektu panelu. Największy wpływ wywarła komunikacja, a następnie dostawa i przejrzystość e-sklepów. Zarządzanie sklepem elektronicznym powinno koncentrować się na certyfikacji (wiarygodności), ponieważ klienci biorą to pod uwagę. Biorą oni również pod uwagę czas wysyłki. Świadomość witryny powinna być równie oczywista jak komunikacja. Komunikat sprzedawcy wpływa na większość analizowanych elementów.

Słowa kluczowe: e-commerce, rekomendacja, dostawa, strona internetowa

选定要素的影响E-COMMERCE到电子商店的推荐

摘要: 本研究的目的是评估将购买流程变量(交付, 电子商店, 通信)与电子商务联系起来的重要性以及客户在给定电子商店中推荐购买的意愿。在该研究中, 捷克共和国和斯洛伐克共分析了3796个电子商务科目。我们主要分析了可变评级的影响, 例满意的交货时间, 总交货, 交货日, 沟通和清晰的建议电子商店的意愿。还考虑了电子商店可信度的认证。研究表明, 变量(对交付时间的满意度, 沟通评估和清晰度评估)对建议的意愿产生重大影响。为了分析, 我们使用了描述性分析。为了推断效果大小认证对

其他变量, 使用 η^2 , 我们发现了中等和高效果。在分析建议的同质性时也出现了认证, 其中Kruskal-

Wallis测试之间的差异在不同类别的认证中被发现。所有病例的差异也通过使用Benjamini-

Hochberg方法的成对比较中的Dunn检验显示。最后, 使用面板效应回归分析。沟通中发现了最大的影响, 其次是电子商店的交付和清晰度。电子商店管理应侧重于认证(可信赖性), 因为客户将此考虑在内。他们还考虑了运输时间。网站意识应该像沟通一样明显。卖方沟通对所分析的大多数要素都有影响。

关键词:电子商务, 推荐, 交付, 网站