Investigating the Relationship between Neural Net Work and Customer Satisfaction: An empirical study on Mansoura University students using social media sites.

Abstract:

The current research aimed at Investigating the Relationship between Neural Net Work (Trust, Social influence, Perceived usefulness, Mobility, Perceived enjoyment) and Customer Satisfaction "An empirical study on Mansoura University Faculties students that deals with social media websites (Commerce , Low, Education, Arts). The researcher applied a questionnaire one sample size (413) individuals. The results found that there is a medium to strong level in terms of the relationship between the independent variable (Neural Network) and its dimensions (Trust, Social Influence, Perceived Usefulness, Mobility, Perceived Enjoyment) And the dependent variable (Customer Satisfaction).

Key words: Neural Net Work, Customer Satisfaction, Egypt

Investigating the Relationship between Neural Net Work and Customer Satisfaction

“An empirical study on Mansoura University students using social media sites”.

1. Introduction:

The globalisation and technological innovation of the 1990s compelled marketing systems to change and adapt (Chalmeta et al., 2001).

Globalisation led to the opening of markets that were inundated with international rivals and gave businesses access to previously unattainable new clients (Di Taranto, 2013).

Similar to this, technology advancement made a significant impact on those years' process structures by enabling them to handle the growing amounts of information available in businesses. The first ERP (enterprise resource planning) was created as a result of this phenomena (Spagnoletti et al., 2015).

These modifications had such a significant impact on marketing techniques that they also had an impact on the idea of marketing as a whole. Had a 1991 BusinessWeek article (Power et al., 1991) identified "perceived value" as the fundamental component of marketing strategies, the changes in firms during that time would have brought about a revolution in the way marketers operated in the following years.

According to Jao (2010), Jian (2004), Kayande et al. (2006), and others, new tools were created to assist businesses with strategic planning and to manage the standardised processes within organisations, known as decision support systems. A new category of applications, customer relationship management systems, was created by some of those apps (Gummesson, 2002) that were specifically designed with relationship marketing in mind, handling all associated elements (Iriana and Buttle, 2006).

As a result of the analytical tools that businesses had use in the next years, marketing experts started to focus on the "nature of value" (Holbrook, 1994). Now that they have the means, marketing

researchers may finally go against the notion of customer value. The majority of the constituents that make up the notion of customer value are not readily measured. The literature has thus proposed a new method to determine a customer's value to a business (Holbrook, 1994; Kumar and Reinartz, 2016; Ulaga and Chacour, 2001; Yi and Gong, 2013).

So, the current research aimed at Investigating the Relationship between Neural Net Work and Customer Satisfaction "An empirical study on Mansoura University students using social media sites".

2. Literature review and research model

Bringing in new clients is crucial for marketing managers of all stripes. But since it might cost up to five times as much to acquire new customers as it does to keep current ones, it is sometimes even more important to make sure they stick around (Bhattacherjee, 2001). Because delighted clients are more likely to be loyal and spread the word about a business, m-commerce suppliers should prioritise keeping their current clientele. (Marinkovic & Kalinic, 2017). For many customers, mobile commerce is still new, and as was already said, there aren't many research on customers' happiness with or intentions to continue using mobile commerce (Lee, Tsao, & Chang, 2015a, 2015b; Shang & Wu, 2017).

The Technology adoption Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which has been expanded into UTAUT2, are two key theories of behaviour intention in technology adoption that serve as the foundation for the research model that is being given here. Perceived usefulness is one of the fundamental elements of the Technology adoption Model (TAM) (Davis, 1989) and its variants, and it is also one of the most important determinants of adoption of mobile technology (Liu, Ben, & Zhang, 2019). Several previously known theories, such as TAM (Venkatesh, Morris, Davis, & Davis, 2003), serve as the foundation for UTAUT. It shows, among other things, that behavioral intentions and social influence—which takes into account the impact of peers on customer decisions—are predicted by performance expectation, which is the

equivalent of perceived usefulness. Finally, by adding three more factors, UTAUT was expanded to UTAUT2 (Venkatesh, Thong, & Xu, 2012). Hedonic motivation, one of the supplementary variables, measures the enjoyment one gets from utilising a certain technology. It is sometimes referred to as perceived fun or delight (Kalini´c et al., 2019a). Prior research has indicated that the three proposed variables—perceived usefulness, social impact, and perceived enjoyment—are significant predictors of customer satisfaction, despite their origins in ideas related to technological acceptance. Additionally, trust is added because, according to Chong (2013)c, it is one of the best indicators of the intention to continue with m-commerce, and mobility is a characteristic that is unique to the adoption of mobile technologies (Marinkovic & Kalinic, 2017). Despite the fact that mobile devices allow users to access mobile services almost "anywhere, anytime," mobility is a factor that is seldom taken into account in research on technology acceptability. This is a major benefit of mobile technology in a number of fields, including dermatology (Goceri, 2020), which is based on pattern recognition and effectively uses deep learning for skin lesion analysis (Goceri, 2019a; 2021). As a result, it is anticipated to have a major effect on customer satisfaction. The study model is shown in Fig. 1.

Perceived trust

The importance of mutual trust on the longevity of a partnership has been highlighted by marketing research in recent decades, and this is particularly important for the business sector. In this way, the great majority of writers have addressed this issue through trustworthiness or security, even if the idea of trust cannot be simply articulated due to its complexity (Wang & Emurian, 2005).

In several scientific fields, trust has been extensively studied from various angles (Kalini´c, Li´ebana-Cabanillas, Mun˛oz-Leiva, & Marinkovi´c, 2019c; Sharma, 2019) by looking at its cognitive and behavioural components.

Regarding the cognitive component of trust, the research currently in publication proposes three categories of beliefs: competence, kindness, and integrity, all of which have psychometric

qualities that suit the scale (McKnight, Choudhury, & Acmar, 2002; Castaneda, 2005). Furthermore, McKnight et al. (1998) and Mayer, Davis, and Schoorman (1995) include the idea of predictability, which is defined as trust's capacity to forecast actions in a variety of contexts (Mun˜oz, 2008).

"The predisposition of one party to be vulnerable to the actions of the other party based on the expectation that the other party will perform a particular action important to him or her, regardless of the ability to monitor or control the other" (Mayer et al., 1995) is another definition of trust that takes into account its behavioural component. This definition essentially refers to the willingness to adopt a specific behavioural pattern. According to Yang, Lin, Chandlrees, & Chao (2009), trust has a significant impact on the effective adoption of new technologies and services, including e-commerce.

The assurance that businesses will fulfil their commitments and pledges without deceiving or manipulating the purchasing party is what fosters trust in online marketplaces and transactions (Wu and Chen, 2005). Clients typically assume that their level of happiness will rise with each trust they place in service providers, leading to increased loyalty over time (Yeh & Li, 2009; Artigas & Barajas-Portas, 2019). Customers are therefore likely to spread good word about the businesses engaged in the business transaction (Deng, Lu, Wei, & Zhang, 2010). Kar (2020) investigated and verified the important role that trust plays in customer satisfaction with mobile payments. In their meta-analysis, the authors examined the causes and effects of trust in mobile commerce. Sarkar and colleagues (2020) discovered a substantial correlation between trust and every behavioural outcome, including attitude, user pleasure, behavioural intention, and loyalty. In her investigation on the moderating effect of gender on customer happiness with mobile payments, Hossain (2019) discovered that, for female customers, trust was a major predictor of satisfaction; however, this link was not significant for male customers. In addition, trust was found to be a significant predictor of satisfaction with mobile banking services and applications (Aguilar-Illescas, Anaya-Sanchez, Alvarez-Frias, & Molinillo, 2020; Poroma-tikul, De

Maeyer, Leelapanyalert, & Zaby, 2020; Sharma & Sharma, 2019; Susanto, Chang, & Ha, 2016).

In light of the significant effect of trust in the context of m-commerce, the following hypothesis is proposed:

H1: Trust has a positive effect on mobile commerce customer satisfaction.

Social influence

The extent to which people interpret the opinions of others who have significance for them about the suitability of utilising a specific technology or service or engaging in a certain activity, among other matters, is sometimes referred to as subjective norms. Bala and Venkatesh (2008). According to Schierz, Schilke, and Wirtz (2010), social influence is crucial during the initial phases of the creation and adoption of new technology, as many early adopters lack the necessary experience and knowledge and rely on public opinion to help them fill in the gaps. Research and confirmation of the effect of social influence on mobile phone user happiness was provided by Jahan, Rahman, Hossain, and Saiful (2019). San-Martín, Prodanova, and Jimìenez (2015) looked at how age affected the relationship between Subjective Norms and customer satisfaction when it came to mobile purchasing. San- Martín, Prodanova, and Lopez Catalan (2016) verified that Subjective Norms had a significant influence on satisfaction in the context of mobile purchasing. Furthermore, according to reports, one of the key indicators of customer satisfaction with mobile payments is social fluency (Kar, 2020).

As social influence is instrumental to customers' successful adoption of m-commerce, the following hypothesis is suggested:

H2: Social influence positively impacts customer satisfaction in mobile commerce.

Perceived usefulness

The potential user's subjective probability that utilising a specific system will improve work performance in an organisational context" is the standard definition of perceived usefulness (Davis, 1989). It has been common practice to view this characteristic as a perceived benefit.Perceived utility in an online setting typically

identifies certain technologies and services that might be helpful to achieve particular goals (Munoz-Leiva, Climent-Climent, & Li¬ebana-Cabanillas, 2017).

This is how Vijayasarathy (2004) describes it: "the extent to which the customer believes that shopping online will facilitate the comparison of offers, give access to helpful information, and enable faster purchase." Many writers consider perceived usefulness as a reliable indicator of how satisfied customers are with the new technology they are using.

Furthermore, according to Liìebana-Cabanillas et al. (2016), perceived usefulness is often regarded as the most accurate indicator of customer satisfaction with online banking services. It also has a significant impact on the degree of satisfaction with mobile websites (Zhou, 2011). Usability was proven to be a significant predictor of customer satisfaction in Islamic mobile banking by Mohd Thas Thaker (2019). According to reports, contentment with mobile branded applications (Li & Fang, 2019), mobile payments (Kar, 2020), and mobile apps for fashion sales (Aguilar-Illescas et al., 2020) was significantly antecedent to perceived utility. Furthermore, Cao (2018) and Alalwan 2020 showed that performance expectation, a UTAUT comparable to perceived usefulness in TAM, was a significant factor in determining user satisfaction with mobile learning and mobile food ordering applications.

Perceived usefulness could therefore be considered a reliable predictor of intention to use m-commerce and to frequently impact customer satisfaction. In view of these findings, the following hypothesis is put forward:

H3: Perceived usefulness has a positive impact on customer satisfaction in mobile commerce.

Mobility

Mobility, as described by Mallat, Rossi, Tuunainen, & O'o¨rni (2009), p. 58, is "the benefits of access and use of services independent of time and place," and it is a crucial factor driving the acceptability of electronic commerce (Schierz et al., 2010). Mobile technologies provide two benefits in this regard: they enhance

customer mobility, enabling "anytime, anywhere" access, and they lessen the necessity of moving around to make purchases of products or services (Mallat et al., 2009).

In the context of mobile payment services, mobility has been found by Schierz et al. (2010) to be a significant antecedent of an individual's desire to use, attitudes, and perceived utility. Kim (2010) discovered that the perceived value of mobile payment services is influenced by mobility. However, it was not possible to find a strong correlation between mobility and perceived ease of use. Mallat et al. (2009) found that customer acceptance of a certain mobile ticketing service was significantly impacted by mobility. Furthermore, the research revealed a noteworthy impact on the uptake of mobile services in contrast to perceived utility. According to Park and Kim (2013), perceived mobility has also been linked to the perception of 4G mobile services' long-term utility. In the context of m-commerce (Kalinic & Marinkovic, 2016; Liïebana-Cabanillas et al., 2017) and m-payment (Li¬ebana-Cabanillas, Marinkovic, Ramos de Luna, & Kalini´c, 2018), the impact of mobility (both direct and indirect) on customer intents was examined. In the context of m-commerce, mobility has a significant effect on satisfaction, as documented by Marinković and Kalinic (2017). Lastly, mobility was found to be a strong predictor of customer satisfaction with C2C mobile applications in fashion sales by Aguilar-Illescas et al. (2020) after their investigation and confirmation. According to Cobos (2017), users' pleasure with mobile applications bearing hotel brands was positively affected by their perception of mobility. This research assumes that mobility leads to improved intention to use and level of satisfaction. Therefore, the following hypothesis is suggested:

H4: Mobility positively influences customer satisfaction in mobile commerce.

Perceived enjoyment

The degree to which the act of utilising technology is viewed as delightful in and of itself, without regard to potential performance repercussions, is known as perceived pleasure (Manis & Choi, 2019). Perceived enjoyment in this study is characterised as "an intrinsic

motivation, as opposed to perceived usefulness, which is extrinsic motivation," in accordance with Kim & Nam (2019). Numerous studies have suggested (Armenteros, Liaw, Sa´nchez-Franco, Ferna´ndez, & Sa´nchez, 2017; Ko¨se, Morschheuser, & Hamari, 2019) that enjoyment has a positive relationship with intention to use, and many others have defined a positive relationship with satisfaction (Amoroso & Chen, 2017; Casalo, Flavia´n, & Ib´an˜ez-Sa´nchez, 2017; Cheung, Zheng, & Lee, 2015; Kim, 2010; Oghuma, Chang, Libaque-Saenz, Park, & Rho, 2015; Oghuma, Libaque-Saenz, Wong, & Chang, 2016; Natarajan et al., 2017). According to Chao (2019), in the context of mobile learning, subjective enjoyment is the most important indicator of satisfaction. According to Kalinic et al. (2019a), hedonic motivation—the UTAUT2 variable that is very comparable to perceived enjoyment—had a major effect on customers' satisfaction with mobile food ordering apps (Alalwan, 2020).

In this sense, perceived enjoyment significantly affects the adoption of mobile commerce as well as its continuance intention. Therefore, the following hypothesis is put forward:

H5: Perceived enjoyment positively impacts customer satisfaction in mobile commerce.

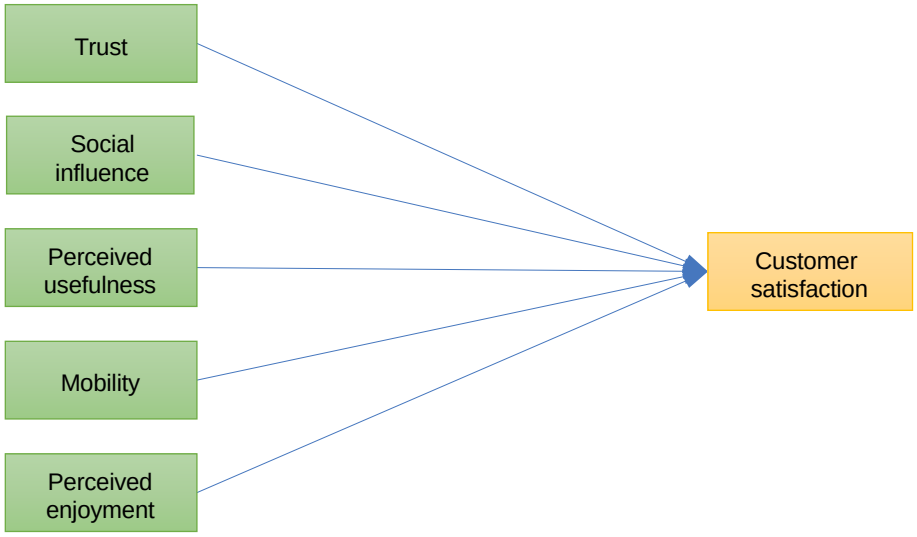

Fig. 1. The Research Model.

3.Research methodology:

3.1 The Research Approach:

The research design is considered as the framework or blueprint for conducting the marketing research project, explaining the procedures necessary for obtaining the information needed to structure or solve marketing research problems (Malhotra, 2007). Research design can be classified into exploratory or conclusive. Exploratory research is used to develop initial hunches or insights, provide direction for any further research needed and to identify specific objectives or data needed to be addressed through additional research. (Malhotra, 2007).

Exploratory research is used to get deep understanding on the research question mentioned in chapter 1, to get deeper understanding of leaders' view on the implementation of their organization's internal marketing. The uses of this exploratory research are (Malhotra, 2007):

- Formulating or defining the research problem more precisely
- Identifying alternative courses of action
- Developing the research hypotheses
- Isolating key variables and relationships for further examination
- Gaining insights for developing an approach to the problem

According to Malhotra (2007), descriptive research can be used to:

- Describe the characteristics of relevant groups, such as customers, salespeople, organizations, or market areas.
- Estimate the percentage of units in a specified population exhibiting a certain behavior.
- Determine the perceptions of product characteristics.
- Determine the degree to which marketing variables are associated.
- Make specific predictions.

Therefore, and based on the above discussion, the researcher will relay on the exploratory research design and will use the descriptive approach by collecting and analyzing quantitative data,

and extracting results from it, in the light of the hypotheses of the research.

3.2 The research method:

3.2.1 Types of data required and sources for obtaining it:

The data of the research is obtained from the foreign references through researches, journals, articles, thesis, conferences, and seminars that dealt with the variables of the research, enabling the researcher to establish concepts and prepare the theoretical framework of the research, and also includes the Social Media websites of Mansoura University students, and the reports, statistics and indicators available on Mansoura University website.

The researcher will rely on the following methods to complete this research:

3.2.1.1Theoretical Research:

It includes access to foreign references of books, journals, research and theses, which dealt with the subject of neural network and customer satisfaction, enabling the researcher to prepare the theoretical framework for the research. As well as access to the records, periodicals and statistics of the community under research.

3.2.1.2Field study:

This will be done by collecting and analyzing the primary data from Mansoura University students using social media sites so that the researcher can test the validity of the research hypotheses. According to the following approach:

3.2.2 Society and research sample.

3.2.2.1 Research Population:

The population of this research includes all Mansoura University students using social media sites which are (170855) sample.

3.2.2.1 The Sample of the Research:

3.2.2.1.1 Type of the sample:

The researcher relied on Systematic random sampling, because of the following reasons: Firstly, the existence of a large degree of

homogeneity among the Community of the Research. Secondly, and regarding the characteristics to be studied, which focus on the presence or absence of a framework for the community of the research.

3.2.2.1.2 Size of the sample:

The sample size to be used by the researcher in this research is 413 individuals. According to Bazra'a (1996), if the research population exceeds 100,000, the sample size should be 384 individuals.

3.2.2.1.3 Methods of the Sampling:

In view of the difficulty in obtaining the names of Community of the Research, the second case of systematic sampling was used which is the absence of the Community of the Research, and to achieve randomness in selection, the steps for selecting the samples were as follows:

- 6 weeks has been chosen for gathering the data of the research, starting from the first of February 2024 until the first of March 2024.
- The number of data collection days has been chosen to be four days per week. This procedure has been applied over a period of six weeks (representing one month and half).

The researcher made a selection time of 15 minutes, i.e., collecting one survey list every 15 minutes and the time taken to collect data was (5) hours per day until the completion of the required sampling.

3.2.3 Primary data collection tool

The primary data has been collected using the questionnaire which directed to the target sample. The questionnaire is divided into two main parts: the first part relates to the dimensions of Neural Network and the second part relates to the Customer satisfaction.

3.2.4 Measurement of research variables:

Neural Network (Independent Variable):

The researcher will rely on the following dimensions of Neural Network :

- Trust
- Social influence
- Perceived usefulness
- Mobility
- Perceived enjoyment

The researcher continued to choose these dimensions on the following literature: (Trust: (5 sentences) Chong, Chan, & Ooi, 2012; Social influence: Chong et al., 2012; Chan & Chong, 2012; Mobility: Kim et al., 2009), while perceived usefulness, perceived enjoyment and satisfaction were each measured by three items (Chan & Chong, 2012)

Customer satisfaction (dependent variable):

The researcher will rely on this variable on the one dimension variable according to (Kalinić et al., 2021) with (10) sentences.

3.2.5 Statistical analysis Methods:

The researcher will use the following statistical methods:

3.2.5.1 The Alpha Cronbach coefficient: It is used to calculate the stability and honesty factors, in order to examine the reliability of the results of the field research in generalizing the results.

3.2.5.2 Pearson correlation coefficient: It is used to know the strength and type of correlation between research variables.

3.3 Research limitations:

The limitation of the research divided into two types: Human limitations and time limitation described as follows:

3.3.1 Human limitations: This research focuses on taking the point of view of Mansoura University students using social media sites.

3.3.2 Time limitations: The data of the field research was collected from first of February 2024 until the first of March 2024.

4. Results

4.1 Validity and reliability of questionnaire list variables:

The Cronbach's Alpha test was used to test the reliability of measures of all dimensions and variables of the study. Which reaches (0.80) is considered to have an excellent level of Validity and reliability, which indicates a high degree of reliability on the measures used, and subjective honesty can be calculated mathematically through the square root of the reliability coefficient and the data of Table No. (1) indicate the values of Self-Validity and reliability Parameters for the Questionnaire List.

Table (1)
The values of Self-Validity and reliability Parameters for the Questionnaire List

Dimension / variable	The value of the alpha coefficient	Self-Validity coefficient
Trust	**0.762**	**0.873**
Social Influence	**0.827**	**0.909**
Perceived Usefulness	**0.870**	**0.933**
Mobility	**0.753**	**0.868**
Perceived Enjoyment	**0.793**	**0.891**
Neural Network	**0.927**	**0.963**
Customer Satisfaction	**0.940**	**0.970**

Source : Prepared by the researcher according to statistical analysis results

From the previous table, it is clear that:

The values of the alpha reliability coefficients for the

dimensions of the independent variable (Neural Network) ranged between 0.753 as a minimum and 0.870 as a maximum. The values of the self-validity coefficients ranged between (0.868 and 0.933).

• The alpha coefficient of the independent variable (Neural Network) is high and indicates a high degree of reliability and validity, where the value of the reliability coefficient was (0.927) and the self-validity coefficient (0.963).

• The alpha coefficient of the dependent variable (Customer Satisfaction) was high, indicating a high degree of reliability and validity, as the value of the reliability coefficient was (0.940) and the self-validity coefficient (0.970).

From the above, we conclude that the validity and reliability coefficients are high for the dimensions and variables of the study, and this indicates a high degree of reliability and validity, which indicates a high degree of reliability on the measures used later in the statistical analysis.

4.2 Descriptive statistical analysis of the study variables:

This part includes a descriptive analysis of the study sample according to the Mansoura University Faculties that the study sample deals with social media websites, and according to demographic characteristics (gender, place of residence, monthly income, age).

Table No. (2) Displays the distribution of the study sample according to the Mansoura University Faculties students that deals with social media websites.

Table (2)
Distribution of the study sample according to Mansoura University Faculties students that deals with social media websites

Faculties	No. of Sample	Percentages	Order
Commerce	**141**	**%34.1**	**1**
Low	**91**	**%22**	**3**
Education	**57**	**%13.8**	**4**
Arts	**124**	**%30**	**2**

Source : Prepared by the researcher according to statistical analysis results

From Table (2) it becomes clear that:

- Faculty of Commerce comes first in terms of the numbers of Mansoura University Faculties students that deals with social media websites .
- Faculty of Arts come in second place in terms of the number of Mansoura University Faculties students that deals with social media websites.
- Faculty of low comes in third place in terms of the number of Mansoura University Faculties students that deals with social media websites.
- Faculty of Education comes in fourth place in terms of the number of Mansoura University Faculties students that deals with social media websites.

This can be illustrated in Figure (1).

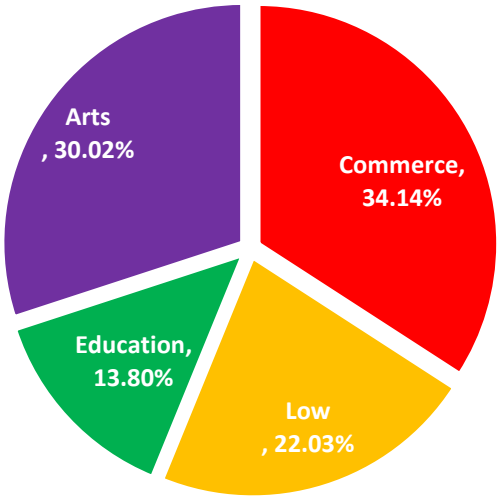

Fig. (4/1)
Mansoura University Faculties students according to the study sample
Source : Prepared by the researcher according to statistical analysis results

Table (3) presents the descriptive analysis of the study sample according to the demographic characteristic

Table (3)

Results of the descriptive analysis of the study sample according to demographic characteristics

No.	Demographic characteristics	Sample	Percentage	Rank
Gender				
1	Male	263	%63.7	1
2	Female	150	%36.3	2
Total		413	100%	-
Place of Residence				
1	Urban	283	68.5	1
2	countryside	130	31.5	2
Total		413	100%	-
Monthly income:				
1	Less than 3,000 pounds	58	14%	4
2	3,000 - less than 6,000 pounds	135	32.7%	2
3	6,000 - less than 9,000 pounds	156	37.8%	1
4	9000 pounds or more	64	15.5%	3
Total		413	100%	-
Age				
1	Less than 18 years old	85	20.6%	3
2	18- Less than 23 years old	203	49.2%	1
3	23 - less than 28 years old	99	24%	2
4	28 years and over	26	6.3%	4
Total		413	100%	-

Source : Prepared by the researcher according to statistical analysis results

It is clear from Table No. (3) that:

- The number of males is higher than the number of females for those dealing with social media websites students in Mansoura University.
- The number of dealers with social media websites students in Mansoura University are higher in urban areas than in the countryside, according to the study method.
- The monthly income category from 6000 to less than 9000 pounds is the highest for the monthly income of those dealing with social media websites students in Mansoura University, followed by the income group from 3000 to less than 6000 pounds.
- The age group from 18 to less than 23 is the highest for the age of social media websites students in Mansoura University, followed by the age group from 23 to less than 28.

Results of descriptive analysis of study dimensions and variables:

The following is a descriptive analysis of the variables and dimensions of the study, by calculating the mean and standard deviation of the variables and dimensions of the study. The degree of approval was determined based on the following equation:

$$\textbf{Class length} = \frac{\text{Highest value - the lowest value}}{\text{The number of levels}} = \frac{1 - 5}{3} = 1.33$$

Thus, the low approval score is from 2.33: 1, the average approval score is from 2.34: 3.67, and the high approval score is from 5: 3.68.

This descriptive analysis includes a presentation of the results of the opinions of the study sample on the dimensions and variables of the study. Table No. (4/4) shows the arithmetic averages and standard deviations and is arranged according to importance and degree of agreement with the study dimensions.

Table (4)

Descriptive analysis of the study's dimensions and variables

Dimension / variable	The arithmetic mean	standard deviation	Sorted by the mean	Degree of approval
Trust	3.466	0.716	5	Medium
Social Influence	4.051	0.691	1	High
Perceived Usefulness	3.859	0.746	2	High
Mobility	3.769	0.682	3	High
Perceived Enjoyment	3.543	0.759	4	Medium
Neural Network	3.746	0.600	---	High
Customer Satisfaction	3.644	0.601	---	Medium

Source : Prepared by the researcher according to statistical analysis results

According to the study sample, it appears from Table (4) that:

A. In relation to the dimensions of the independent variable Neural Network.

• The dimension Social Influence came higher in terms of the calculation mean, the amount of which was (4.051), and thus the degree of approval of the study sample is high in relation to the five Likert scale.

• The study sample tends in general to accept in terms of dimension, focusing on Perceived Usefulness, where the arithmetic mean was (3.859), and thus the degree of approval is high relative to the five Likert scale.

• The study sample tends in general to accept in terms of the Mobility dimension, as the arithmetic mean was (3.769), and thus the degree of approval is high relative to the five Likert scale.

B. Regarding the dimensions of the dependent variable Customer Satisfaction.

• The study sample tends in general to accept in terms of the dimension of Perceived Enjoyment, as the arithmetic mean was (3.543), and thus the degree of approval was medium relative to the five Likert scale.

• The study sample tends in general to accept in terms of the dimension of Trust, as the arithmetic mean was (3.466), and thus the degree of approval was medium relative to the five Likert scale.

C. Regarding the independent variable, Neural Network, and the dependent variable, Customer Satisfaction.

• The study sample tends in general to acceptance in terms of the independent variable, Neural Network, where the arithmetic mean was (3.746), and thus the degree of approval is high for the five Likert scale.

• The study sample tends in general to accept in terms of the dependent variable Customer Satisfaction, where the arithmetic mean was (3.644), and thus the degree of approval is medium relative to the five Likert scale.

4.3 examining the study hypotheses:

In order to discuss the results of the statistical analysis related to testing the hypotheses of the study, the researcher divided this analysis in to:

> "There is a statistically significant correlation relationship between the dimensions of research variables (the dimensions of Neural Network and Customer Satisfaction)"

To test the validity of this hypothesis, the researcher conducted a statistical analysis using the Pearson correlation coefficient to

determine the strength and direction of the relationship between the independent variable (Neural Network) and its dimensions (Trust, Social Influence, Perceived Usefulness, Mobility, Perceived Enjoyment) And the dependent variable (CUSTOMER SATISFACTION), and this is evident in Table (5)

Table. (5)

Results of correlation transactions between Neural Network and Customer Satisfaction

Dimension / variable	Trust	Social Influence	Perceived Usefulness	Mobility	Perceived Enjoyment	Neural Network	Customer Satisfaction
Trust	1						
Social Influence	0.666**	1					
Perceived Usefulness	0.736**	0.514**	1				
Mobility	0.727**	0.448**	0.529**	1			
Perceived Enjoyment	0.525**	0.546**	0.861**	0.665**	1		
Neural Network	0.504**	0.335**	0.439**	0.418**	0.466**	1	
Customer Satisfaction	0.835**	0.554**	0.721**	0.666**	0.720**	0.845**	1

*** Statistically significant at a level of significance less than 0.05**

**** Statistically significant at a significance level less than 0.001**

Source : Prepared by the researcher according to statistical analysis results

The correlation coefficients shown in Table (5) indicate:

• The existence of a strong positive significant correlation relationship between the independent variable, Neural Network and the dependent variable, Customer Satisfaction, where the value of the correlation coefficient was (0.845), which is a statistically significant value (0.01).

• There is a positive significant correlation between the dimension "Trust " and the dependent variable "Customer Satisfaction" .The correlation relationship came in strong with the dimensions (Perceived Usefulness, Mobility) respectively, where the values of correlation coefficients reached (0.736, 0.727), and medium with the dimensions (Social Influence, Perceived Enjoyment) respectively, as The values of the correlation coefficients were (0.666, 0.525). The values of correlation coefficients are statistically significant at (0.01) level.

• There is a positive significant correlation between the dimension "Social Influence" and the dependent variable "Customer Satisfaction". The correlation relationship was moderate with the dimensions (Perceived Usefulness, Mobility, Perceived Enjoyment), respectively, as the values of correlation coefficients were (0.514. 0.448, 0.546). The values of correlation coefficients are statistically significant at (0.01) level.

• There is a positive significant correlation between the dimension " Perceived Usefulness " and the dependent variable "Customer Satisfaction". The correlation relationship came in strong with the dimension (Perceived Enjoyment), where the values of correlation coefficients reached (0.861), and medium with the dimension (Mobility), as the values of correlation coefficients reached (0.529). The values of correlation coefficients are statistically significant at (0.01) level.

• There is a positive significant correlation between the dimension " Mobility" and the dimensions of the dependent variable "Customer Satisfaction". The correlation relationship was moderate with the dimension (Perceived Enjoyment), , with the values of correlation coefficient (0.665). The values of correlation coefficients are statistically significant at (0.01) level.

• There is a positive significant correlation between the dimension " Perceived Enjoyment " and the dimensions of the dependent variable "Customer Satisfaction". The correlation relationship was moderate, where the values of correlation coefficients were (0.466). The values of correlation coefficients are statistically significant at (0.01) level.

• There is a positive significant correlation between the dimensions of the independent variable “Trust, Social Influence, Perceived Usefulness, Mobility, Perceived Enjoyment” and the dependent variable “Customer Satisfaction”. The correlation relationship was strong with the dimensions (Trust, Perceived Usefulness, Perceived Enjoyment) respectively, with the values of correlation coefficients (0.835, 0.721, 0.720), and medium with the dimensions (Social Influence, Mobility), respectively, with the values of correlation coefficients (0.554, 0.666). The values of correlation coefficients are statistically significant at (0.01) level.

From the above, the researcher believes that the previous results express the presence of a medium to strong level in terms of the relationship between the independent variable (Neural Network) and its dimensions (Trust, Social Influence, Perceived Usefulness, Mobility, Perceived Enjoyment) And the dependent variable (Customer Satisfaction).

Conclusion, limitations and avenues for future research

The study presents a simple, yet powerful behavioral model which has identified the most significant antecedents of customer satisfaction. By employing two-stage analysis, the study proved that ANN models have higher predictive power than linear. In addition, the study pre- sented a step-by-step procedure of setting up an ANN model in the technology acceptance context. Nevertheless, this research has several limitations. The study was conducted in a single time period, with pre- dominantly young customers, in a country where m-commerce is still not widely used. The study was completed at the level of the total sample, but some future research could include the investigation of moderating effects of gender, age and user experience. Also, the research model contained a limited number of potential predictors. More com- plex future models could include additional variables such as privacy, security, ease of use or customer participation.

In addition to these, two other limitations are apparent. Firstly, only a multi-layer perceptron was tested as a neural network model. Since there are many other types of neural networks, behavioral models based on other types of ANNs could be tested and compared. Secondly, due to the limitations of the software used in ANN modeling, only three, albeit the most important, types of activation function were tested (identity, hyperbolic tangent and sigmoid). Since there are several other well- known and widely-used types of activation function, it would also be useful to test and compare the models with those activation functions implemented in hidden and output layers. Finally, the influence of ANN training parameters such as batch size or optimization method on training speed and ANN model accuracy should be investigated.

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دراسة العلاقة بين الشبكات العصبية ورضا العميل

"دراسة ميدانية على طلاب جامعة المنصورة مستخدمي مواقع التواصل الاجتماعي"

ملخص البحث

يهدف البحث الحالي إلى دراسة العلاقة بين الشبكات العصبية (الثقة، التأثير الاجتماعي، المنفعة المدركة، التنقل، الاستمتاع المدرك) ورضا العميل "دراسة تطبيقية على طلاب كليات جامعة المنصورة الذين يتعاملون مع مواقع التواصل الاجتماعي (التجارة، القانون، التربية، الآداب). وطبقت الباحثة قائمة الاستقصاء على عينة البحث والتي بلغت (٤١٣) مفردة . وقد توصلت النتائج إلى وجود مستوى متوسط إلى قوي من حيث العلاقة بين المتغير المستقل (الشبكات العصبية) وأبعادها (الثقة، التأثير الاجتماعي، المنفعة المدركة، التنقل، الاستمتاع المدرك) والمتغير التابع (رضا العملاء).

الكلمات المفتاحية : الشبكات العصبية ، رضا العميل