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Distributing data in Virtual-reality: factors influencing purchase intention of cutting tools

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Abstract

Purpose: Virtual reality is a unique technology to distribute data and demonstrates user's understanding towards complex products. The objective of this research is to investigate the impact of virtual reality on real world purchase intention of automotive cutting tools in Thailand's exhibitions. Hence, the research framework was constructed by telepresence, perception narrative, authenticity, trustworthiness, functional value, aesthetics, and purchase intention. **Research design, data and methodology:** Samples were collected from 500 visitors who participated in the selected top two metalworking exhibitions. Mix sampling approach is applied by using non-probability sampling methods of purposive or judgmental sampling, quota sampling, and convenience sampling method, respectively to reach target samples. Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM) were used to analyze and confirm goodness-of-fit of the model and hypothesis testing. **Results:** The results indicate that authenticity, functional value, and trustworthiness induced higher experiential value towards purchase intention. Those variables are stimulated by telepresence and perception narrative towards VR experience. **Conclusions:** Consumer's purchase intention towards VR experience on engineering cutting tools rely on consumer's sense of authenticity, trustworthiness, and functional value. Hence, marketing practitioners in automotive companies are encouraged to develop VR which focusing on significant factors to enhance consumers purchase intention.

Keywords : Virtual Reality, Data distribution, Automotive industry, Cutting tools, Purchase intention

JEL Classification Code : M10, M31, L61, L62, O30

1. Introduction

Automotive industry is a sector that continuously seeks innovative products or materials to develop and improve manufacturing processes (Lhalloubi & Ibnchahid, 2020).

Various technologies are leveraged, which virtual reality or VR became one of the well-known technologies that manufacturers used for data distribution and demonstrating advanced solutions for automotive clients. VR is an innovative way to showcase a product, portray its benefits and leave a memorable impression (Lee, 2020). More specifically, data distribution is heterogeneous. Different users can carry out different product's perception (Brown, Julier, Baillot, & Livingston, 2003). Similarly, Guttentag (2010) supports that different individuals will define authenticity differently. Hence, being able to provide adequate and authentic product data is a key driver for commercial use of VR in marketing applications, it creates an incredible opportunity for marketers to advertise their products perception accurately and brands innovatively. Kang, Shin, and Ponto (2020) has concluded that virtual

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reality is key to offer customers an immersive experience that impacts a certain level of their personal experience.

Thailand is in the second rank of top export automotive in Asia and the automotive industry has contributed to 12 percent of Thai GDP (Suraraksa & Shin, 2019). In automotive industry, metal machining are the main appliance. Cutting tools are one of the key components in metal machining that engineers are required to use for metal-shaping or remove material (Stephenson & Agapiou, 2018). Leading automotive company commonly applied VR in manufacturing process. Therefore, manufacturers in the automotive industry highly contribute to purchase intention of cutting tools. Experiential marketing of virtual reality rose high purchase intention (Hung, Su, & Zhuang, 2016). Thailand's exhibition industry was a major mechanism to drive the country's economy and industries (Lertkornkitja, Jittithavorn, & Madhyamapurush, 2021). Zimmer (2008) stated that since 1990, virtual reality was adopted in automotive exhibition as product demonstration. Nowadays VR marketing became trending in various exhibitions especially in machine and tools manufacturers are adopting VR technology and using it as a focal point for their booth presentation. However, empirical studies based on

exhibition visitor's data have not yet explored how immersive experience can impact purchase intention in field of engineering products toward the marketing strategy. Given the clear gap exist in the area, this research can help marketing practitioners to implement data distribution in virtual reality and understand all relative factors that impact on real world purchase intention of automotive cutting tools in Thailand's exhibitions.

2. Literature Review

2.1. Telepresence

Peng and Ke (2015) referred the presence theory which comprises of two concepts. The first concept is telepresence, presence, spatial presence, or physical presence and second concept is social presence. A theoretical approach of presence theory was introduced by a researcher from the dissimilarity between spatial presence experience and involvement experience (Regenbrecht, Schubert, & Friedmann, 1998; Regenbrecht & Schubert, 2002). Mollen and Wilson (2010) conceptualized telepresence as an individual's psychological state of being there within a virtual world. Interestingly, authenticity and trustworthiness are relative to telepresence.

Falconer (2013) found that telepresence robots can stimulate communication practices as the robots can give

authenticity. Authenticity in telepresence can foster the user's experience. Hence, the retailers should pay attention to the genuine three-dimensional (3D) product presentation to portray sufficient information on product features (Algharabat & Dennis, 2010).

Trust can be assured, strengthened and mediated by telepresence (Pettit, 2004). Vespa (2005) advocated that the robotic telepresence in hospital can built trust in medical treatment. Heller (2010) asserted that telepresence in term of online virtual meeting raise mutual trust and team spirit.

2.2. Perception Narrative

Narrative theory proposed by Chatman (1978) consists of two main elements. First is a story of events which is related to characters, settings, and people that formulate the narrative content. Second is a discourse or how the narrative is being expressed and communicated. Applying interactive technology can endorse the relationship and interaction with customers through narrative experience. At the same time, it can increase the confidence level of customers as the simulation would provoke the customer's personal needs with information (Lee, Park, & Jin, 2006). Therefore, narrative theorists study how to motivate people by the content, experience, and vice versa.

The narrative of perception is a persuasion effect that allows consumers to fully understand the product through a chronological narrative structure of beginning, middle, and end (Fiske, 1993). Supported with the study of Aylett and Louchar (2003), VR should approach and build on process of the story and it is important to give the freedom to explore the 3D virtual environment and ability to make own choices when participating.

In virtual reality, visual aesthetics can be highly impacted with sufficient level of narrative experience rather than the complex virtual environment (Lee et al., 2006). By using the concept of narrative experience in designing the virtual shopping experience, experiential value of aesthetics was derived and earned higher values than the experiences received from presence and media richness (Huang & Hsu Liu, 2014; Vongurai, 2021).

2.3. Authenticity

Algharabat and Dennis (2010) described that authentic 3D products or virtual objects is created from a computer-mediated environment. The authenticity of 3D products or virtual objects is based on the resemblance with reality, the interaction, and colors. Supported with the study of Lamb, Lin, and Firestone (2020) that increasing the level of authenticity of 3D objects and environment can raise understand of complex concept. Authenticity includes how the consumer perceived the narrative, reality, specialty and

unique experiences from the products and services (Gilmore & Pine, 2007).

2.4. Trustworthiness

Peng and Ke (2015) described that based on consumers' perception of trustworthiness in accepting 3D virtual prototypes depends on three principles which are ability, benevolence, and integrity. In the virtual environment, trust is one of the factors that considered for consumer's engagement as virtual environment can create diversified social activities (Junglas, Johnson, Steel, Abraham, & Loughlin, 2007; Garrouch & Timoulali, 2020).

Users perceived trust on 3D product presentation when the graphics interaction and visual control are high (Algharabat, 2014). Supported by a study of Peng and Ke (2015) that focusing on the impact of perceived authenticity towards consumers' trust in the 3D virtual world. The authenticity and credibility determine the level of trustworthiness.

2.5. Functional Value

Based on theory of consumption value, customer value is multiple, independent and may vary depending on the circumstances. Customer value can be described as their perceived preferences on attributes and functionalities of a product (Sweeny & Soutar, 2001). Zeithaml (1988) conceptualized functional value as the consumer's overall assessment of the product utility based on perceptions of what is received and what is given.

There are many empirical studies that found a relationship between the functional value and its influenced trust based on customer value theory. The functional value is relatively determined by the quality of the product, and effect on both perceived trust and cost (Curvelo, Watanabe, & Alfinito, 2019). Park (2013) has concluded that brand trust and brand attitudes are strongly influenced by functional value and emotional value.

Toufani, Stanton, and Chikweche (2017) have investigated the relationship of aesthetic and functional value. The finding was aesthetic is positively influenced by the consumers' perceived functional value. Wang and Hsu (2019) supported their finding that functional value significantly impacted the interface and object-form aesthetics. In a study of 3D visual art, it points out that the public art has the aesthetic value and functional value for lighting up the city (Jasmi & Mohamad, 2016).

2.6. Aesthetics

Aesthetic is the appearance of image, body, and

environment that foster visual attractions (Holbrook, 1994; Mano & Oliver, 1993). It is the sense and interpretation of that ones have on the arts (Blackburn, 2005), which can be idealized from its visual, color, texture, and virtual reality (Mathwick, Malhotra, & Rigdon, 2001). Aesthetic is not limited to the visual appearance, but also the taste and physical touch (Swilley, 2012). Hence, cognitive and emotional responses of a consumer can also be enhanced by aesthetics (Wang, Cruthirds, Axinn, & Guo, 2013). A fine design of chronological event and causality of aesthetic visual appearance would naturally build persuasive experience to the consumers (Montoya-Weiss, Voss, & Grewal, 2003).

2.7. Purchase Intention

In virtual reality context, purchase intention is the likelihood of consumer to generate transactions in either online or offline platforms (Peng & Ke, 2015; Natalya, Lee, & Cho, 2020). For industrial exhibition context, the greater purchase intention of participants, the greater cost efficiency in hosting the exhibition. Hence, understanding the roots of consumers' purchase intention is crucial. A research was conducted to study the relationship between virtual reality experience which contains of authenticity, trustworthiness, functional value and aesthetics towards consumer's purchase intention. Each variable is further clarified as below:

Authenticity: Peng and Ke (2015) affirmed that users' authenticity perceptions on 3D virtual prototypes and environment have influences on buying intention of real-world objects. Similarly, the relationship of purchase intention and authentic design was confirmed positive in virtual gaming (Wu & Hsu, 2018).

Trustworthiness: The study of Algharabat and Zamil (2013) concluded that quality 3D information and system have significantly impact on trust and intention to purchase of online retailers. The users' trustworthiness in the 3D virtual prototypes and environment significantly impact consumers' intention to purchase real-world objects (Peng & Ke, 2015).

Functional value: The reliable functional value is a key driver for consumers' purchase intention towards a product (Husic-Mehmedovic, Arslanagic-Kalajdzic, Kadic-Maglajlic, & Vajnberger, 2017). Supported by Wen and Noor (2015) that functionality of a hybrid car can attract and enhance purchase intention.

Aesthetics: Afzali and Ahmed (2016) and Toufani et al. (2017) stated that aesthetic design has positive influence on consumers' purchase intention. Likewise, Chitturi (2018) posited that embedding aesthetic into a product design can enhance its value that consumers are willing to pay for it.

3. Research Methods and Materials

3.1. Research Framework and Hypotheses

Four theoretical frameworks were studied to formulate the research's conceptual framework presented in Figure 1. First, the consumer trust in 3D virtual worlds and its impact on real world purchase intention developed by Peng and Ke (2015). Secondly, a theoretical framework developed by Huang and Hsu Liu (2014) who examined

the extent to which presence, media richness, and narrative experience yield the highest experiential value in augmented-reality interactive technology (ARIT). The third research model was developed by Toufani et al. (2017) who studied the appreciation of the product's aesthetics on purchase intention through different dimensions of perceived value drawn from the product's aesthetics. The last research model was the evaluation of functional value and trust effects toward purchase intention (Watanabe, Alfinito, Curvelo, & Hamza, 2020).

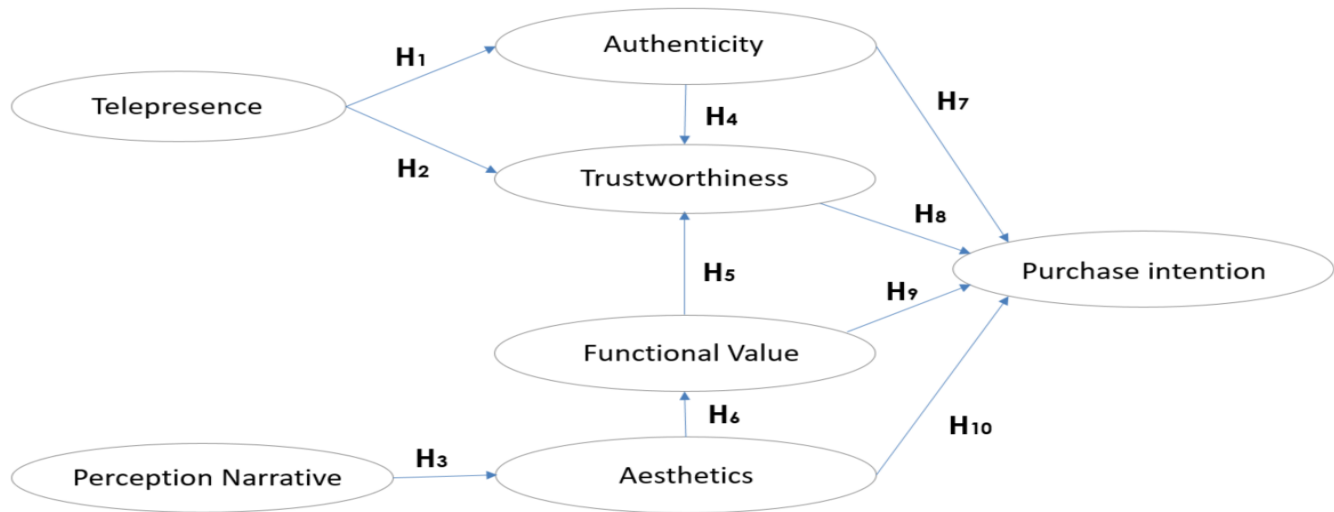


Figure 1: Conceptual Framework

The conceptual framework is formulated to propose a study of consumers' purchase intention based on their experience in 3D virtual worlds. Initiated with two factors of telepresence (TP) and perception narrative (NA) to understand the environment and information quality in spatial world of VR cutting tools. Next, researchers investigate how authenticity (AU), trustworthiness (TR), functional value (FV) and aesthetic (AE) of virtual product associated with consumer's experience in a 3D virtual world. Then, researcher used experimental data to test the theoretical model, discuss the empirical results and provide managerial implications for businesses to enhance consumers' real-world purchase intention (PI) of cutting tools in Thailand's automotive industry. As a result, this study proposes the following hypotheses:

H1: The consumers' sense of telepresence positively impacts their sense of authenticity on virtual reality experience towards cutting tools.

H2: The consumers' sense of telepresence positively impacts their perception of trustworthiness on virtual reality experience towards cutting tools.

H3: The consumers' perception of narrative positively impacts their sense of aesthetics on virtual reality experience towards cutting tools.

H4: The consumers' sense of authenticity positively impacts their sense of trustworthiness on virtual reality experience towards cutting tools.

H5: The consumers' perception of functional value positively impacts their sense of trustworthiness on virtual reality experience towards cutting tools.

H6: The consumers' sense of aesthetic positively impacts their perception of functional value on virtual reality experience towards cutting tools.

H7: The consumers' sense of authenticity positively impacts their purchase intention on virtual reality experience towards cutting tools.

H8: The consumers' sense of trustworthiness positively impacts their purchase intention on virtual reality experience towards cutting tools.

H9: The consumers' perception of functional value positively impacts their purchase intention on virtual reality experience towards cutting tools.

H10: The consumers' sense of aesthetic positively impacts

their purchase intention on virtual reality experience towards cutting tools.

3.2. Methodology

The research has adopted quantitative method and collected data from questionnaire distribution. Questionnaires were distributed to respondents on-site of two major metalworking exhibitions in Thailand and distributed online from the collected name card of exhibition visitors. The target population is exhibition visitors who work in automotive and auto part supply chain and have experience in virtual reality. The questionnaires consist of four parts. The first part was screening questions to reach the target respondents. The second part was questions designed to measure virtual reality experience based on 6 independent variables. Each variable is measured by using the five-point Likert scale which ranged from “strongly disagree” (1) to “strongly agree” (5). The third part was questions designed to measure the dependent variable of purchase intention and the final part was the questionnaires aimed to investigate demographic factor of the respondents.

3.3. Population and Sample Size

The target population is exhibition visitors who work in automotive and auto part supply chain and have experience in virtual reality of cutting tools. Target respondents may have experienced VR in the exhibition and/or before or after the exhibition. After index of item-objective congruence (IOC) test, researchers continue to optimize the sample size for Structural Equation Models (SEM). Most scholars agree on a large sample size, which specifically more than 300 sample size is satisfied (Comrey & Lee, 2013; Tabachnick & Fidell, 2013). After the screening of respondents, researchers finally decide to use 500 qualified respondents in this study to ensure reliability for data analysis.

3.4. Sampling Technique

Mix sampling approach is adopted as a primary sampling procedure by selecting two or more sampling methods of non-probability sampling (Chauvet, 2015; Haegele & Hodge, 2015) in order to reach target population. Researchers have firstly chosen non-probability sampling of purposive or judgmental sampling to judgmentally select top two metal working exhibitions in Thailand; Metalex, the first biggest exhibitions with more than 3,134 companies exhibitors and followed by Intermach (Sakvanichkul & Jaroenwisan 2020). Secondly, researchers adopted non-probability sampling method of quota

sampling technique to proportionate sample size of each exhibition based on the available data of visitors and shares in automotive industry. This technique is to assure that sample size is represented in the correct proportions (Etikan & Bala, 2017). The proportion of sample size is shown in table 1. Due to availability of latest exhibition fact report for number of visitors and proportion of visitors who are expertise in automotive working field, researchers have utilized a complete data set as of 2019 to calculate visitors from metal working exhibitions who work in automotive and auto part supply chain.

Table 1: Number of Visitors and Questionnaires Distribution

Exhibition	Metalex	Intermach
Total numbers of visitors	100,475	38,595
Automotive industry proportion	29%	29%
Visitor in automotive field	29,137	11,193
Sampling proportion	72%	28%
Number of questionnaires (Total = 500 respondents)	360	140

The third and fourth step in sampling procedures were the application of purposive and convenience sampling by non-probability sampling method to select and screen the respondents. This research has adopted nonprobability convenience sampling as sampling techniques to understand consumer buying behavior of digital product in trade fair (Gera & Fatta, 2020). The data screening helps the researcher to ensure that respondents meet the target group defined in this study.

The questionnaires were distributed on-site for both selected exhibitions of Metalex on 18 to 21 November 2020 and Intermach on 23 to 26 September 2020. Questionnaires were further distributed online via e-mail from the collected exhibition visitors' name card.

4. Results and Discussion

4.1. Demographic Factors

The demographic information of respondents is summarized in table 2. The collected data consists of 500 valid respondents, from which 57.4 percent (287) were males, and 46.2 percent (213) were females. The respondents' age was mainly ranged between 30 to 39 years old by 35.6 percent, followed by 40 to 49 years old at 30.6 percent. For monthly income level, the highest range was at under 30,000 THB per month by 38.2 percent, and respondents' occupation was mainly employee with the percentage of 45.4 percent.

Table 2: Demographic Profile

Demographic and general Data (N=500)		Frequency	Percentage
Gender	Male	287	57.4%
	Female	213	46.2%
Age	Less than 20 years old	12	2.4%
	20 to 29 years old	105	21%
	30 to 39 years old	178	35.6%
	40 to 49 years old	153	30.6%
	50 to 59 years old	44	8.8%
	Above 60 years old	18	1.6%
Income per month	Below THB 30,000	191	38.2%
	THB 30,001-60,000	168	33.6%
	THB 60,001-90,000	91	18.2%
	THB 90,001-120,000	37	7.4%
	Above THB 120,000	13	2.6%
Occupation	Intern student	33	6.6%
	Employee	227	45.4%
	Management	134	26.8%
	Entrepreneur	35	7%
	Government	56	11.2%
	Freelance	13	3%

4.2. Confirmatory Factor Analysis (CFA)

CFA has applied in order to investigate the degree of crucial relationship between variables prior to analyzing the

measurement model with structural equation model (SEM). CFA is an analysis tool to reject or confirm the measurement model as reflected by Ramlall (2016). Referring to the result in table 3, analysis values are all acceptable. Hair, Black, Babin, Anderson, and Tatham (2006) dilated the significance of factor loading for each variable item in order to validate the goodness of fit. The cut-off point of factor loading is higher than 0.50 and p-value is lower than 0.05. According to Hair, Hollingsworth, Randolph, and Chong (2017), Composite Reliability or CR value should be between 0 and 1, and the precise acceptable value of CR should be at 0.7 and above. Cronbach's Alpha is recommended to be 0.70 or higher to be accepted (Dikko, 2016). Average variance extracted (AVE) value of each construct at level above 0.5 is acceptable (Hair, Anderson, Babin, & Black, 2010).

Table 4 illustrates the square root of AVEs which advocates that all latent determinant values were higher than the absolute value of the correlations. The model fit in CFA is tested by CMIN/DF, GFI, AGFI, NFI, CFI, TLI, RMSEA and RMR as shown in table 5. All indicators confirmed the goodness of fit in convergent and discriminant validity comparing with the criteria of acceptable values. Therefore, researchers affirmed that it is accepted to perform the validity of subsequent structural model estimation

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Telepresence (TP)	Peng and Ke (2015)	4	0.836	0.710 – 0.767	0.837	0.563
Perception Narrative (NA)	Huang and Hsu Liu (2014)	4	0.814	0.687 – 0.780	0.819	0.531
Authenticity (AU)	Peng and Ke (2015)	3	0.779	0.701 – 0.760	0.780	0.541
Trustworthiness (TR)	Peng and Ke (2015)	4	0.810	0.702 – 0.733	0.810	0.516
Functional Value (FV)	Toufani et. al. (2017)	6	0.864	0.680 – 0.743	0.864	0.514
Aesthetics (AE)	Huang and Hsu Liu (2014)	5	0.839	0.682 – 0.760	0.839	0.510
Purchase Intention (PI)	Peng and Ke (2015)	3	0.807	0.759 – 0.772	0.809	0.586

Note: CR = Composite Reliability, AVE = Average Variance Extracted

Table 4: Discriminant Validity

Variables	Factor Correlations						
	TP	NA	AU	TR	FV	AE	PI
TP	0.750						
NA	0.725	0.729					
AU	0.671	0.651	0.736				
TR	0.682	0.667	0.656	0.717			
FV	0.713	0.699	0.671	0.715	0.718		
AE	0.681	0.686	0.534	0.655	0.655	0.714	
PI	0.642	0.590	0.693	0.711	0.712	0.583	0.766

Note: The diagonally listed value is the AVE square roots of the variables

Table 5: Goodness of Fit

Index	Acceptable Values	Values
CMIN/DF	< 3.00 (Schreiber, Stage, King, Nora & Barlow, 2006)	1.736
GFI	≥ 0.90 (Hooper, Coughlan & Mullen, 2008)	0.920
AGFI	≥ 0.90 (Schermelele-engel, Moosbrugger & Müller, 2003)	0.902
NFI	≥ 0.90 (Kaplan, 2000)	0.926
CFI	≥ 0.95 (Bentler, 1990)	0.967
TLI	≥ 0.90 (Ramlall, 2017)	0.962
RMSEA	< 0.05 (Browne & Cudeck, 1993)	0.031
RMR	< 0.05 (Schermelele-engel et al., 2003)	0.038

Remark: CMIN/DF = the ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI, normalized fit index, TLI = Tucker-Lewis index, CFI = comparative fit index, RMSEA = root mean square error of approximation, and RMR = root mean square residual

4.3. Structural Equation Model (SEM)

The researchers have adopted SEM for testing the relationship between observed variables and latent variables in order to adjust and verify the goodness of fit of model (Ramlall, 2017). In Table 5, a fit model is benchmarked with the criteria of acceptable value of 3 for Chi-square/degrees-of-freedom (CMIN/DF) ratio. GFI should be higher than 0.9 as recommended by Hooper et al. (2008) and higher than 0.95 of CFI (Bentler, 1990). After running SEMs and modifying the model by using SPSS AMOS version 26, the goodness-of-fit index is CMIN/DF = 1.795, GFI = 0.919, AGFI = 0.901, NFI = 0.923, CFI = 0.964, TLI = 0.959, RMSEA = 0.04, RMR = 0.034, accordingly.

4.4. Research Hypothesis Testing Result

The significant relationship of each variable in the research model was assessed from its regression weights and R^2 variances. The model showed the variance of consumer's experiential value in organism phase which indicated that data of telepresence had fitted with authenticity (71 percent), authenticity and function value data fitted with trustworthiness (81 percent) and aesthetics data fitted with functional value (91 percent). Moreover, all data of authenticity, trustworthiness, functional value and aesthetics fitted towards purchase intention of cutting tools (79 percent), as shown in Figure 2.

The result from Table 6 displayed that all hypotheses were supported with a significance at $p = 0.05$, except for H2 and H10 that were not supported. Highest influential factor is perception narrative, which has significantly influence on aesthetics ($\beta = 0.955$). Next, when considering at sense of trustworthiness, functional value has the strongest impact toward experiential value in term of trustworthiness ($\beta = 0.514$), followed by authenticities ($\beta = 0.296$). Moreover, aesthetics has a strong impact on

functional value ($\beta = 0.890$) and telepresence has a significant influence on authenticity ($\beta = 0.843$). In term of purchase intention, the degree of significant influence level was explained by this ranking, authenticity showed the most significant impact ($\beta = 0.410$), followed by functional value ($\beta = 0.405$) and trustworthiness ($\beta = 0.385$), respectively.

Table 6: Hypothesis Result of the Structural Model

Hypothesis	Path	Standardized Path Coefficient (β)	T-Value	Tests Result
H1	AU \leftarrow TP	0.843	13.906*	Supported
H2	TR \leftarrow TP	0.163	1.418	Not Supported
H3	AE \leftarrow NA	0.955	12.843*	Supported
H4	TR \leftarrow AU	0.296	3.283*	Supported
H5	TR \leftarrow FV	0.514	6.283*	Supported
H6	FV \leftarrow AE	0.890	12.218*	Supported
H7	PI \leftarrow AU	0.410	4.618*	Supported
H8	PI \leftarrow TR	0.385	3.334*	Supported
H9	PI \leftarrow FV	0.405	3.201*	Supported
H10	PI \leftarrow AE	-0.246	-1.850	Not Supported

Note: * $p < 0.05$

The result from table 6 and figure 2 both can be explained that, in perception of telepresence, H1 indicates the supportive of hypothesis from its significant factor influence of authenticity with the standard coefficient value of 0.843. As mentioned by Algharabat (2018) that 3D authenticity is one of the main variables of telepresence. Conversely, H2 has no causal relationship between telepresence and trustworthiness which resulted in the standard coefficient value of 0.163 in this structural pathway. Both results contradicted with the previous study

of Peng and Ke (2015), which has outlined that telepresence has influence on trustworthiness but not related to authenticity. Moreover, H3 illustrated significant impact of perception narrative towards aesthetics as the

standard coefficient value of 0.955. Supported by the finding of Huang and Hsu Liu (2014), the narrative design and experience effectively stimulate active consumer behaviors such as aesthetics.

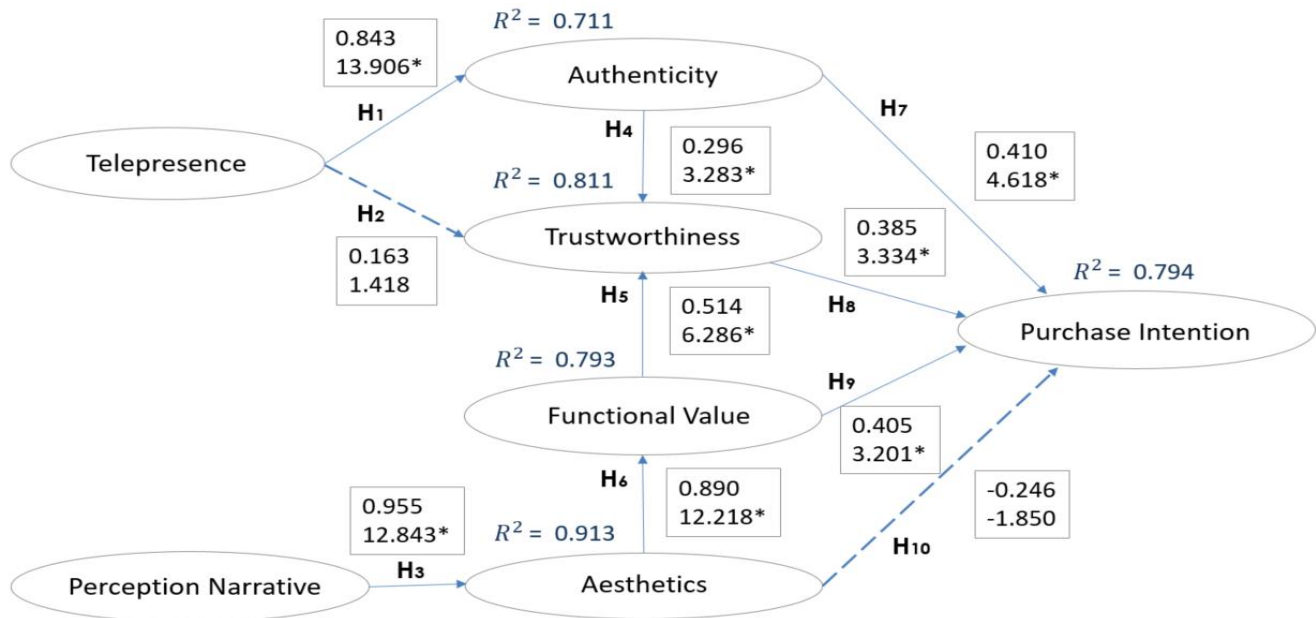


Figure 2: The Results of Structural Model

Furthermore, in trustworthiness relationship, H4 shows positively impact on authenticity with standard coefficient value of 0.296, which is supported by the prior study of Percy and Rossiter (1992) who examined the relationship between authenticity and purchase intention. Authenticity and trustworthiness are well-known concept in marketing research. Followed by H5, functional value impact represents at standard coefficient value of 0.514. Even though telepresence does not directly support trustworthiness, trustworthiness can be instead impacted through the connecting path of authenticity in H1 and H4. Thus, in line with the study of Ou, Pavlou, and Davison (2014), the authenticity can act as a mediator in relating sense of social presence and perception of trustworthiness in the 3D virtual world. From H6, the result supports the hypothesis from its significant influence of aesthetics on functional value with coefficient value of 0.89, which indicates that the better aesthetic design, the greater benefits perceived by consumer (Brunner, Jungen, & Esch, 2016).

Last four hypotheses were proposed to examine the relationship of consumer experience towards purchase intention of cutting tools. Analysis outcome has further indicated that H7 shows the significant impact between authenticity and purchase intention with standard coefficient value of 0.410. As supported by the study of 3D

product presentation by Algharabat (2018) who asserted that 3D authenticity to enhance user engagement and lead to consumer purchase intention.

H8 illustrates causal relationship between trustworthiness and purchase intention provided with standard coefficient value of 0.385. The positive influence of consumers' trust on their purchase intention can be supported in various studies (Suh, Ahn, Lee, & Pedersen, 2015). Also, consistent with the study of Algharabat and Zamil (2013) that trustworthiness earned from the 3D information and system has significantly impact on intention to purchase.

Consequently, there are statistically significant impact at H9 between perceptions of functional value and purchase intention with standard coefficient value of 0.405. The finding is consistent with the study of Husic-Mehmedovic et al. (2017) and Sritanakorn and Nuangjammong (2021) that the attribute and functionality of product can trigger consumers' purchase intention.

H10 has no significant influence of aesthetics on consumer purchase intention on cutting tools as the standard coefficient value displayed -0.246 in this structural pathway. Wang and Hsu (2019) also concluded that aesthetics does not influence purchase intention for both interface and object aesthetic, whereas the study of Kirillova and Chan (2018) on visual appearance design

found that there is an influence between aesthetic and purchase intention.

In the immersion world of virtual reality, the results indicated that consumer's experiential value in terms of authenticity, trustworthiness, and functional value influence purchase intention. The finding of this study is similar to the study of consumers' purchase intention in the real-world objects or services after they have experienced the 3D virtual prototypes (Peng & Ke, 2015). Analysis results of standard coefficient value indicated that sense of authenticity highly defines consumer perception and experience value towards purchase intention of cutting tools, followed by functional value and trustworthiness, respectively. Whereas perception of aesthetics had no significant influence towards purchase intention.

5. Conclusions and Recommendation

5.1. Conclusion

The research has focused on investigating the casual relationship of virtual reality determinants that impact on real world purchase intention of automotive cutting tools in Thailand's exhibitions. In order to distribute optimize data base on user's immersive experience design, the conceptual framework and hypotheses were proposed based on narrative theory, presence theory and theory of consumption in order to determine factors of telepresence, perception narrative, authenticity, trustworthiness, functional value and aesthetics towards purchase intention. Data has been collected from the target respondents via online and offline channels and analyzed by using Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM) to confirm the validity, model fit, and hypothesis testing.

The results have described the following findings. Firstly, in virtual reality, telepresence advocates a direct significant influence on authenticity, and indirect influence on trustworthiness through authenticity. It implies that the authenticity of automotive cutting tools experienced in 3D virtual reality can earn consumer's trust. Virtual reality allows a precise illustration of product dimension and its genuine. Hence, consumer's trustworthiness is stimulated directly or indirectly through authenticity and telepresence (Algharabat, 2018; Peng & Ke, 2015).

Secondly, the VR designers are required to present the automotive cutting tools in a well chronological narrative structure for aesthetic attraction, which would in turn builds persuasive experience and distributes accurate information to the exhibition visitors (Montoya-Weiss et al., 2003).

Thirdly, aesthetic in VR is positively associated with the visitors' perception on functional value of cutting tools, and in turn can create trustworthiness in the product. Automotive cutting tool is a product that has complex dimension, grade, and application (Stephenson & Agapiou, 2018). Therefore, providing sufficient attributes and functionalities of cutting tool through the sense of aesthetics in VR can help the visitors to assess the product utility, quality and weigh its cost and benefit (Karjalainen & Snelders, 2010).

In emphasis, three determinants of authenticity, functional value, and trustworthiness explicitly depicted strong influences toward purchase intention of automotive cutting tools, which can be supported by the studies of Algharabat and Zamil (2013) and Peng and Ke (2015). Whereas aesthetics has no significant influence towards the purchase intention. It indicates that exhibition visitors appraised the benefits and genuine of automotive cuttings tool rather than the beauty of product design or presentation.

In conclusion, in context of data distribution, marketing practitioners require to optimize the adequate and accurate data of product's attribute and its application. The structure of chronological framework for the product presentation should be finely designed with prior to authentic visual appearance in order to build consumer's trust and distribute all key messages and factors as intended which resulted in positive influence on consumers' purchase intention.

5.2. Recommendation

In business perspective, exhibition is a stage that gives marketers an incredible opportunity to demonstrate the product and interact with the visitors in order to build persuasive experience. Especially with VR technology that allows the business to illustrate and convince the genuine attributes and functionalities of the product. Therefore, it is crucial for the manufacturers, distributors, or retailers of cutting tools, and metalworking exhibitors to understand the factors that can influence the visitor's purchase intention and focus when developing the chronological framework for the product presentation, data distribution and marketing strategies.

VR as the data distribution media has the potential to showcase the precise product information, complexity of automotive cutting tools and portray its design and benefits. It is perfect for exhibition visitors who have limitation on testing actual engineering products and limited time in paying visits to each booth. Therefore, the business should consider designing the VR in the way that can attract visitor's attention and ensure the product usage and functionalities are clearly and concisely demonstrated.

In the sense of aesthetics, the feature design and content should not be complicated otherwise it can possibly lead visitors to confusion and losing interest in the product. The outcomes of this study have further showed that with VR, authenticity, functional value, and trustworthiness significant influence the purchase intention of automotive cutting tools in the exhibitions. Therefore, the manufacturers, distributors, or retailers of cutting tools in metalworking exhibitions must ensure that their product presentation and interactions with visitors can truly deliver the genuine attributes and functionalities of the products. This can allow the visitors to assess the product utility, quality and weigh its cost and benefit in order to build purchase intention. Consumers are willing to understand the functionality of cutting tools as it can save manufacturing time in testing metal-shaping or stimulate cutting path on computer aided manufacturing (CAM) software. The presentation or telepresence of the product's authenticity is as important as product's functionality to create trustworthiness from the consumers. Practically, aesthetic visual design can build persuasive experience to consumers during visit and experience in 3D virtual worlds.

5.3. Limitation and Further Study

This research is solely focusing on visitors of top two exhibitions out of sixteen metalworking exhibitions in Thailand. Hence, a study on different scope of exhibitions may presents different outcome. For instance, a different visitors' background, size, and industry. Also, the population of this study focuses on Thailand. The extended study in foreign country or virtual exhibition can be further studied to investigate customer experience and purchase intention. Moreover, the result of this study might be applicable for some field of machining area that able to adopt virtual reality in operation of cutting process such as machine tools builder, clamping system, coolant system and so on.

Furthermore, the future design of VR world in terms of interaction between user and interface, according to social presence theory (Biocca, 1997; Heeter, 1992), can be enhanced and extended to study in alternative variables that related to customer experience, perceive value and purchase intention such as social presence, and media richness. In addition, as digital virtualization of technology has been continuously improved, a study on different technology such as augmented reality, mixed reality, and extended reality can be interestingly investigated in the future of study (Ludlow, 2015).

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