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A Comparative Analysis of UTAUT and UTAUT 2 in M-Commerce and M-Banking

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Abstract— **Background:** The debate over the superiority between UTAUT and UTAUT 2 has driven the development of UTAUT 3. However, this latest model is still not the best solution, as several variables remain less influential. **Objective:** This study aims to determine which UTAUT model is superior in technology acceptance, particularly for m-commerce and m-banking. **Methods:** Multiple linear regression was used to determine the direction and magnitude of the influence of independent variables on the dependent variable, analyzing key factors affecting the adoption of mobile banking and m-commerce by comparing UTAUT and UTAUT 2. **Results:** In m-commerce, UTAUT highlights behavioral intention and facilitating conditions, while UTAUT 2 adds habit and price value as key influencing factors. **Conclusion:** For m-banking, both models are equally effective, but UTAUT 2 is superior due to the strong influence of habit. In m-commerce, UTAUT 2 is also preferable, as price value significantly affects behavioral intention.
Keywords—UTAUT; M-Banking; M-Commerce

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I. INTRODUCTION

The maturation of digital technology in recent years has driven the growth of the entrepreneurial ecosystem, while also supporting the emergence and growth of new businesses. In response to this dynamic, companies are increasingly focusing on developing technologies that can drive the evolution of their business ecosystems.[1] However, the rapid advancement of technology also presents new challenges for experts in maintaining creativity and innovation.[2] Technological innovation has significantly contributed to the growth of m-banking and m-commerce, where both services provide convenience and ease, enabling users to conduct financial transactions and make purchases through mobile devices[3]. M-commerce, as Among the most rapidly developing e-commerce categories worldwide [4], allows access to e-commerce via mobile phones.[5] It is closely linked to shopping transactions, which frequently rely on m-banking to facilitate financial transactions.[6] M-banking represents an evolution in banking services[7], offering simplified transaction capabilities through mobile phones.[8] Both m-commerce and m-banking signify a progression in the provision of financial and shopping transaction services. [9][10]

M-commerce and m-banking are two sectors experiencing significant and rapid growth[11]. These services offer convenience and ease[12], enabling users to conduct financial transactions and make purchases solely through mobile devices[13]. However, the adoption of this technology does not always proceed smoothly.[14] Hence, the necessity of a theoretical model arises to explain the factors that influence users' intentions and behaviors in adopting m-commerce and m-banking services[15]. UTAUT is a commonly used model for understanding technology adoption.[2] This model integrates various relevant theories into a single framework to predict technology usage intentions and behaviors. In 2012, UTAUT was expanded into UTAUT 2 by incorporating additional variables that are more specific to individual and consumer contexts.[16]

UTAUT, introduced by Venkatesh et all. 2003 is a theoretical framework used to analyze factors that influence technology adoption and usage[17]. UTAUT was developed by synthesizing eight existing acceptance of technology theori, such in TRA, TAM, and TPB[18]. The model comprises four key components: PE, EE, SI, and FC. As well, UTAUT Embraces four moderating factors—gender, experience, voluntariness of use and age voluntariness of use that affect Interrelation between these variables and aspiration or behavior to use technologies[19]

In 2012, UTAUT was expanded into UTAUT 2 by Xu, Venkatesh, and Tong to better Reflect the context of individual or consumen use[20][13]. UTAUT 2 retains the core components of UTAUT while encompassing new three constructs: habit, price value and hedonic motivation. Furthermore, in UTAUT 2, the moderating factor of voluntariness of use is no longer considered, as technology usage in consumer contexts tends to be more voluntary[21]. UTAUT 2 aims to

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broaden the scope of the model by incorporating aspects such as the enjoyment of using technology, the perceived cost-to-value ratio of the technology, and users' tendency to engage with technology automatically.[22] In UTAUT 2, the factors from UTAUT are mediated by the behavioral intention variable and directly influence technology usage.[23] This model is often used to understand consumer behavior in adopting technologies [24] in sectors among others M-banking, M-commerce, and other digital applications.[25] UTAUT 2 adds elements such as habit, price value, and hedonic motivation, which not present first UTAUT, With this, provide a more Exhaustive familiarity with technology usage at individual level.[26]

To analyze model of UTAUT (fig 1) and UTAUT 2 (Fig 2), a commonly use statistical approach is PLS. PLS-SEM is an effective statistical method for analyzing relationships between variables and for models with multiple latent variables[27]. This method is employed to examine structural relationships among variables and assess predictive strength the existing constructs[28]. Context of UTAUT, PLS-SEM enables researcher to validate how FC, EE, PE, and SI affect the mindfulness to used technology, as well as how facilitating conditions and habit influence actual usage.[29]

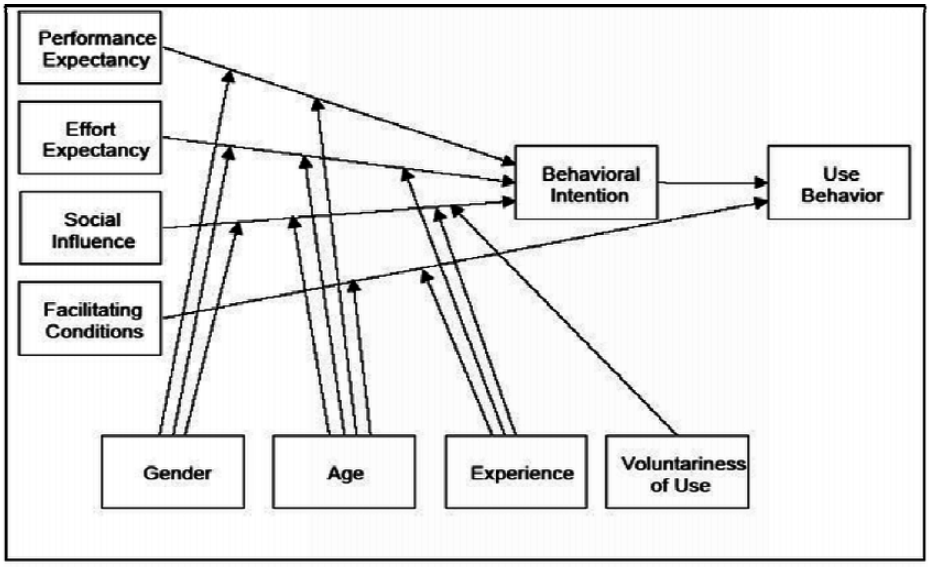

Fig 1. UTAUT MODEL

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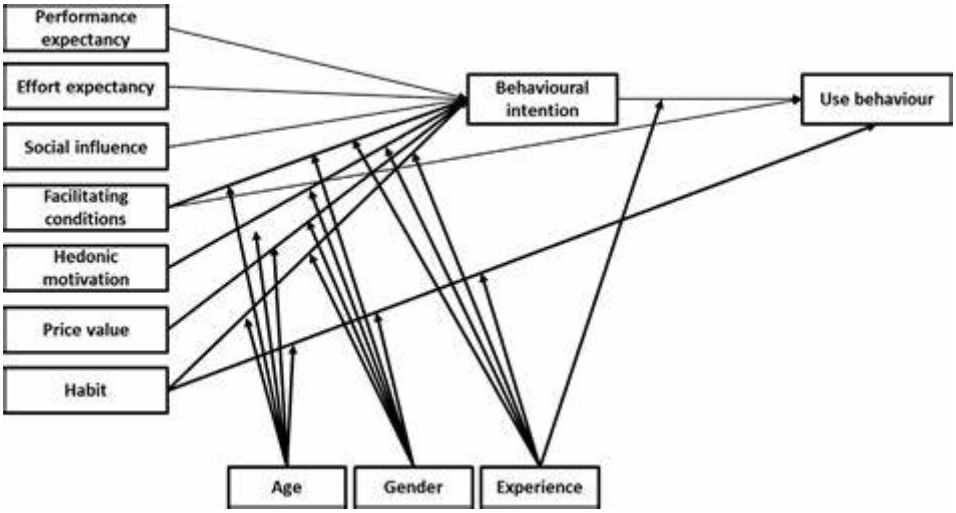

Fig 2. UTAUT 2 MODEL

PLS-SEM is distinguished by its ability to address the complexity and multicollinearity often found in social research data[28]. This method allows the simulant analysis of relationships among dependent and independent variables, providing a more comprehensive picture of the interactions among constructs.[30] With this approach, researchers can determine the relative contributions of each variable in influencing users' intentions and behaviors while also evaluating the Justifiability and Predictability of the constructs utilized in model.[31] Additionally, PLS-SEM offers flexibility in determining sample size, making it an ideal choice for research with limited samples[32]. Use of PLS-SEM in analysis of UTAUT and UTAUT 2 not only enhances predictive accuracy but also strengthens the understanding of the dynamics of technology adoption behavior in various contexts.[33]

PLS-SEM of method is ideal to analyzing technology adoption, with is m-banking and m-commerce, that's ability to handle complex structural models, evaluate interrelation between variable comprehensively[34]. It is Highly effective when dealing with skewed data or small sample sets, as it maximizes explained variance in dependent variables[35].[36] PLS-SEM can assess direct, mediating, and moderating effects, making it highly relevant for studying the influence of UTAUT and UTAUT 2 factor such in facilitating conditions, PE, SI, and Export Expectancy habit at user behavior and intention [37]. This method valuable empirical insights to effective development strategies in technology, marketing, and service delivery in these digital domains.[38]. Population and sample measurement in research using the Lemeshow formula.[15] This formula is used to calculate the minimum number of samples required in a study, especially when the population size is very large or even unknown[39]. This formula also estimates proportions, such as the percentage of people using mobile banking, the percentage of individuals with diabetes, and others[40]. In addition, it is used to achieve a specific confidence level and margin of error [41][42].

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II. RESEARCH METHOD

Current Research utilizes of numerical method in probe as critical elements influencing in uptake at mobile banking and mobile commerce technologies, and conducts a comparative analysis of the most effective models between UTAUT and UTAUT 2 as outlined below (Fig 3):

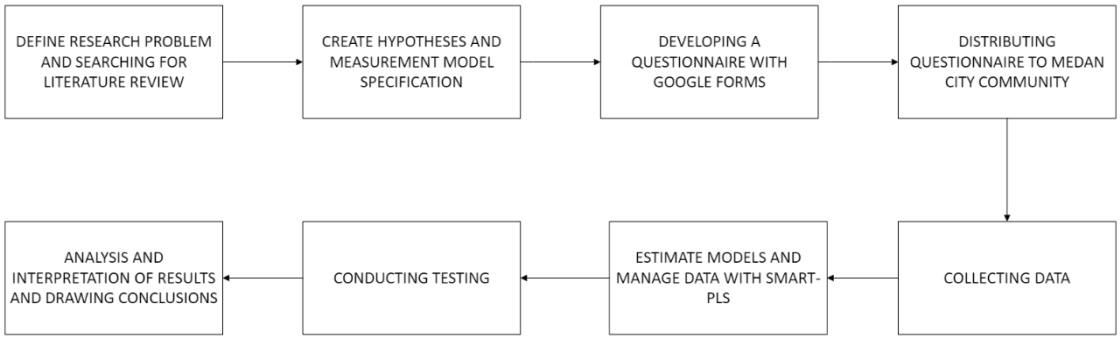

Fig 3. Diagram of Research

This researcher used questionnaire as a instrument of research 20 indicator (table 1) to measure every variable of UTAUT model. Measurement made use a five-point scale of Likert (1 = Vehemently against, 2 = Mildly against, 3 = Unsure, 4 = Advocate, 5 = Firmly advocate). Get selection at the five-point scale is based on commonly used Likert scale.

Table 1. Measurement Indicator Variables

The Variable	Indicator of measurement
PE	**PE_1**: I feel that using M-Banking / M-commerce is quite simple and easy to understand.
	PE2: Using M-Banking / M-commerce does not require much energy or effort.
EE	**EE1**: Using M-Banking / M-commerce feels easy and doesn't require much effort
	EE2: I can quickly and easily learn how use M-Banking or M-commerce.
SI	**SI1**: I feel encouraged use M-Banking or M-commerce because many people around me also use it.
	SI2: I receive support and recommendations from others use M-Banking or M-commerce.
FC	**FC1**: I feel that my campus environment supports the use of M-Banking or M-commerce.
	FC2: I feel have adequate devices use M-Banking or M-commerce.
HM	**HM1**: I'm feeling happy if use M-commerce / M-Banking.
	HM2: I'm feeling satisfied when use M-commerce / M-Banking
PV	**PV1**: I feel that the cost of using M-Banking / M-commerce is worth the benefits I receive
	PV2: I feel that the price offered for using M-Banking / M-commerce is very affordable

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The Variable	Indicator of measurement
H	**H1**: I am accustomed to using M-Banking / M-commerce in my daily activities.
	H2: Using M-Banking / M-commerce Has seamlessly blended into my daily habits
BI	**BI1**: I'm planning to continue use M-Banking / M-commerce for a long time.
	BI2: I want use M-Banking or M-commerce part of my daily activities.
	BI3: I intend to use M-Banking / M-commerce regularly.
UB	**UB1**: I feel that M-Banking / M-commerce helps me complete tasks more quickly.
	UB2: I feel that using M-Banking / M-commerce can save time and effort.
	UB3: I recommend using M-Banking / M-commerce to others.

That population in this study were m-commerce and m-banking users in city of Medan. Selection of research location was based increase in internet usage in North Sumatra, especially the city of Medan. Collection of Data carried Executed via a web-based survey on Google Forms, adopting a deliberate non-probability sampling technique as outlined Is typically used in empirical studies where participants are selected to align with is research focus. This technique was preferred due to the researcher's objective to Enlist participants who corresponded to the following parameters: (1) domiciled in area of Medan City (2) have experience use m-commerce or m-banking as a payment method for 3 years, (3) female or male, (4) have age range 17-64 year, (5) use m-commerce / m-banking voluntarily, and (6) use m-commerce or m-banking least of once a month. From the online questionnaires distributed, a total of 430 responses were obtained, of which 420 were considered invalid as they did not meet the participant requirements set. Therefore, from the 415 valid data, 415 respondent data were selected as the research samples. The obtained sample size corresponds with the sample size determination using the Lemeshow formula. The selected information was then analyzed using PLS-SEM software to evaluate reliability, reproducibility, theoretical postulations, and hypothesis testing. The computed results will be presented in the following section in table format to aid in comprehension and interpretation

II. RESEARCH METHOD

3.1 Respondent Demographic

Totally of 420 questionnaire response was success collect from respondent domiciled at Medan city. Largest number of respondents came from Medan city, As the least amount of respondents came from Medan Deli area. Based on the age of M-banking or M-commerce users, the highest was 17-25 years old and the lowest was over 55 years old. Based on how long they

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have used M-banking or M-commerce, the highest is 1-3 years and the lowest is 3-6 months. Regarding knowledge about. The characteristics of respondents in more detail at Table 2

Table 2. Respondent's Demographic

Category	Description	Total	Precentage
Residence	M.Amplas	30	7,1%
	M.Area	27	6,4%
	West Medan	18	4,3%
	M.Baru	5	1,2%
	M.Belawan	3	0,7%
	M.Deli	20	4,8%
	M.Denai	18	4,3%
	M.Helvetia	37	8,8%
	M.Johor	16	3,8%
	Medan Kota	79	18,8%
	Medan Labuhan	13	3,1%
	M.Maimun	2	0,5%
	M.Marelan	12	2,9%
	M.Perjuangan	21	5%
	M.Petisah	13	3,1%
	M.Polonia	0	0%
	M.Selayang	13	3,1%
	M.Sunggal	23	5,5%
	M.Tembung	37	8,8%
	M.Timur	26	6,2%
	M.Tuntungan	7	1,7%
Age	17 - 25	377	89,8%
	25 – 40	30	7,1%
	40 – 55	8	1,9%
	<55	5	1,2%
Long of Usage	>1 Timeframes	46	11,1%
	3 – 6 Timeframes	22	5,3%
	6 Timeframes – 1 Epochs	76	18,3%
	1- 3 Epochs	154	37,1%
	<3 Epochs	117	28,2%

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3.2 Measurement Model

Measurement model Two kinds of indicators are identified, namely reflective or formative types. At this measurement stage there (Fig 4-Fig 7) are three aspects that must be measured, namely by conducting validity test of convergent, a validity test of discriminant and also a test of reliability.

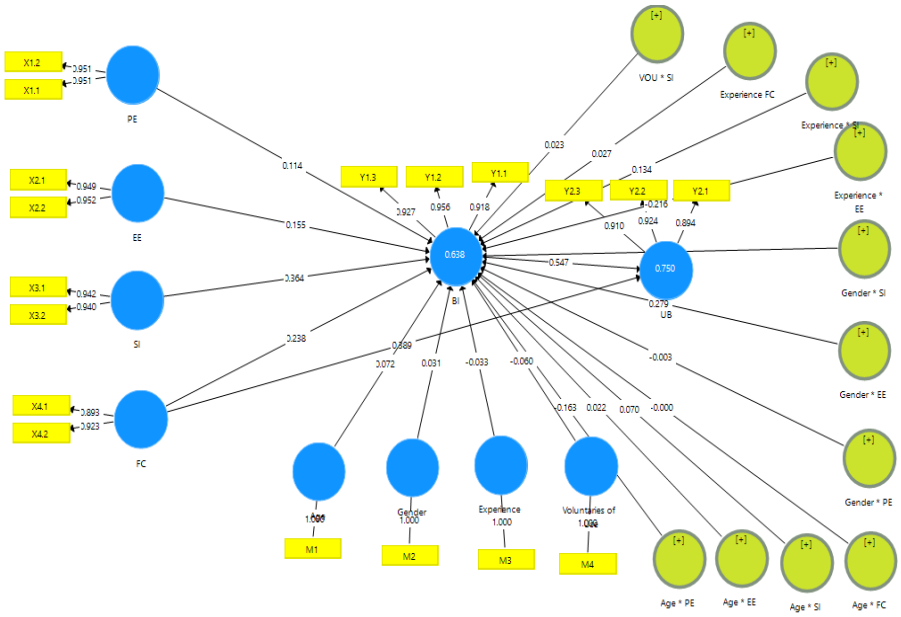

Fig 4. Flow Diagram After Executing M-Commerce UTAUT

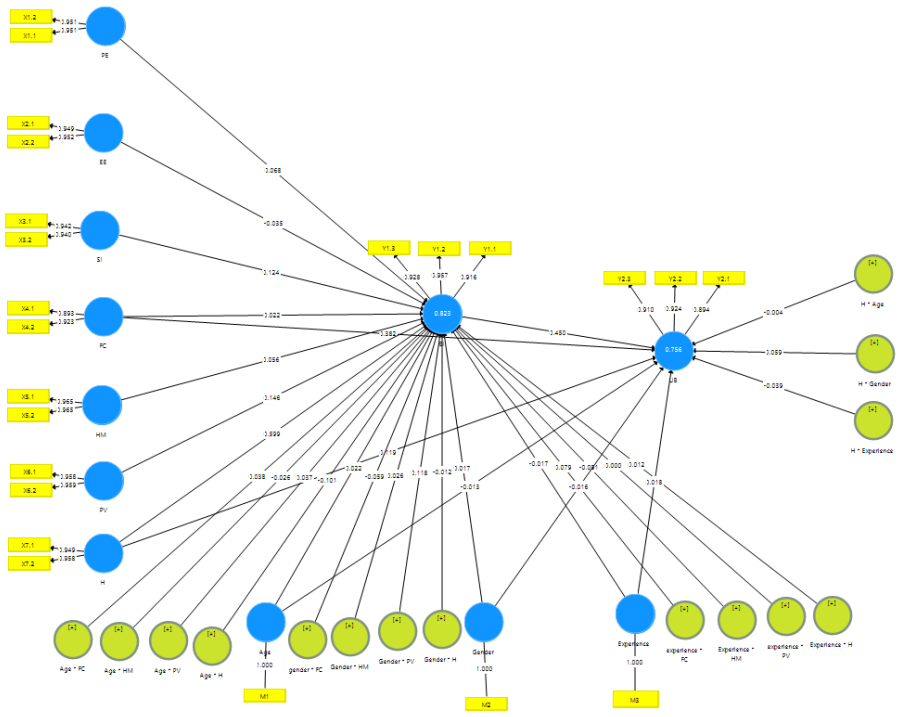

Fig 5. Flow Diagram After Executing M-Commerce UTAUT 2

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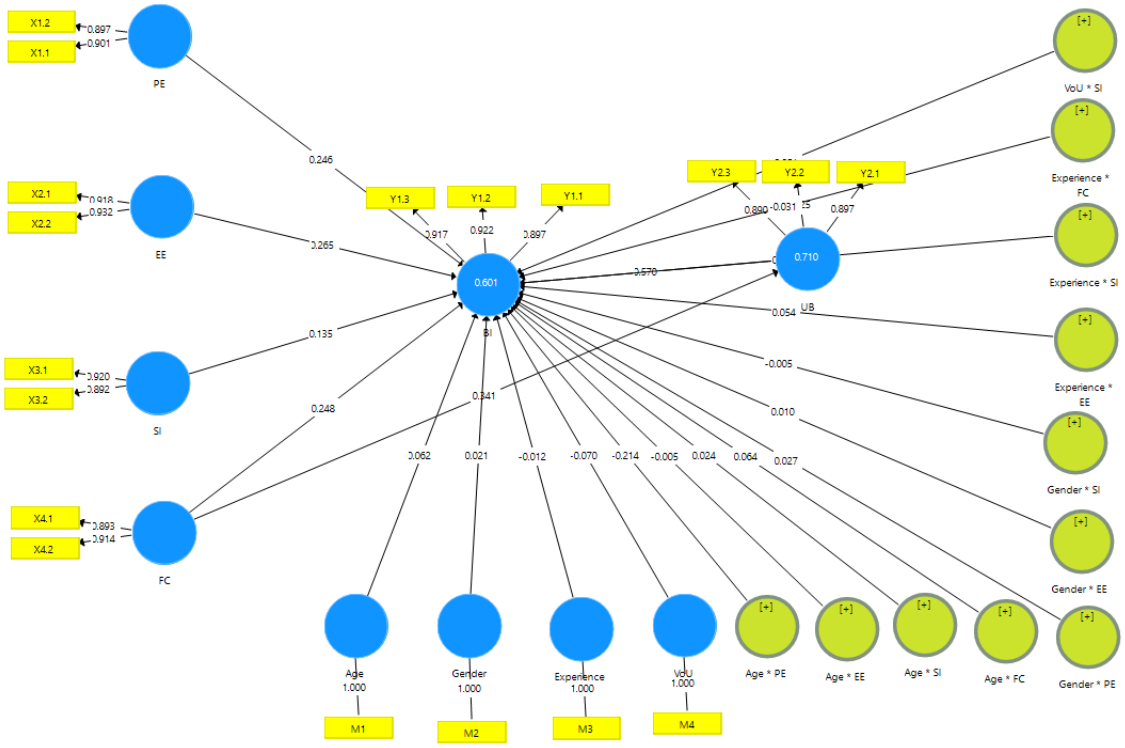

Fig 6. Flow Diagram After Executing M-Banking UTAUT

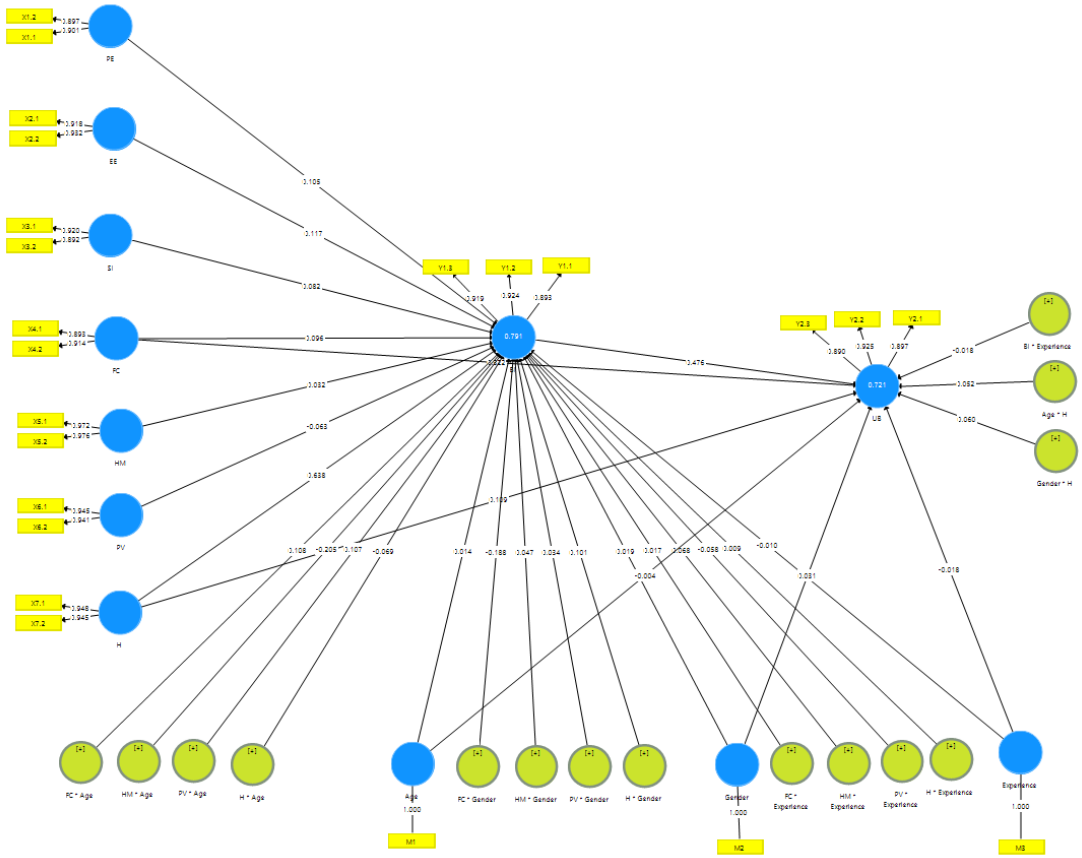

Fig 7. Flow Diagram After Executing M-Banking UTAUT 2

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The path diagram in the Figure above uses the SmartPLS Application. Based on the Figure above, the loading factor outcomes indicate that all indicators possess a loading factor value exceeding 0.70. Therefore, it can be inferred that All indicators exhibit the necessary conditions for convergent validity.

3.3 Structural Model

Structural Model is assessed through R-Square(R^2) as variable of dependent's, Stone-Geisser Q-square test, and by analyzing The statistical relevance of the path coefficient. A variable is considered to have a significant impact If value of T-Statistics exceeds the threshold 1.96 and a P-Value is < 0.05 [3]. Following is M-Banking UTAUT model, as illustrated in the figure below:

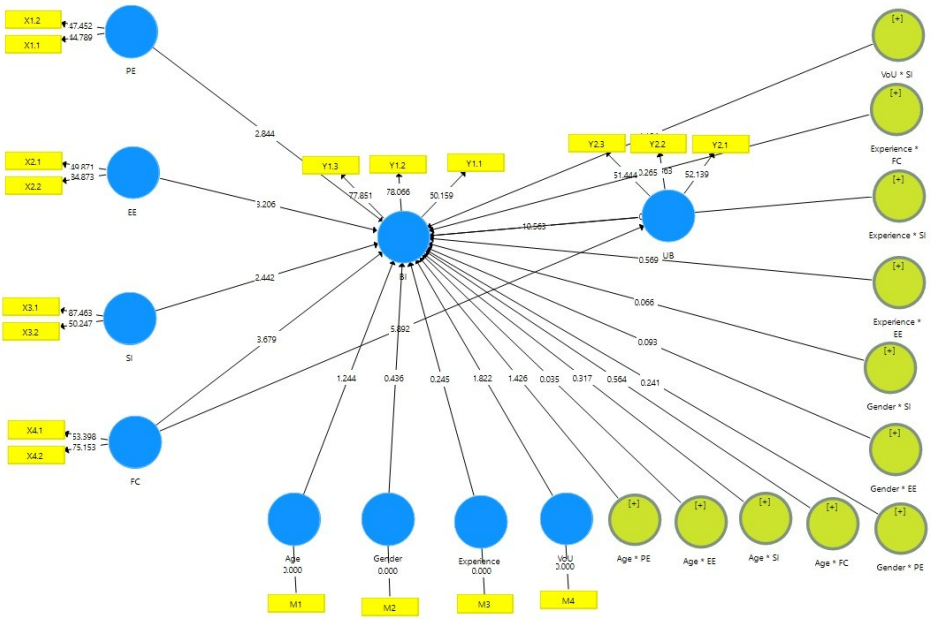

Fig 8. Path Diagram M-Commerce UTAUT (Bootstraping)

The subsequent table outlines the path diagram results, where the results determine the variables received (Fig 8,table 3):

Table 1. Path diagram results M-Commerce UTAUT

Relationship Between Variable	*Observed Sample*(O)	*Mean(M)*	*Standard Deviation(STDEV)*	*T-Statictics*	*P - Values*
(BI -> UB)	0,570	0,569	0,052	10,927	0,000
(EE->BI)	0,265	0,256	0,081	3,281	0,001
(FC->BI)	0,248	0,248	0,068	3,647	0,000
(FC->UB)	0,341	0,342	0,057	6,006	0,000
(PE ->BI)	0,246	0,258	0,087	2,840	0,005
(SI -> BI)	0,135	0,135	0,056	2,435	0,015

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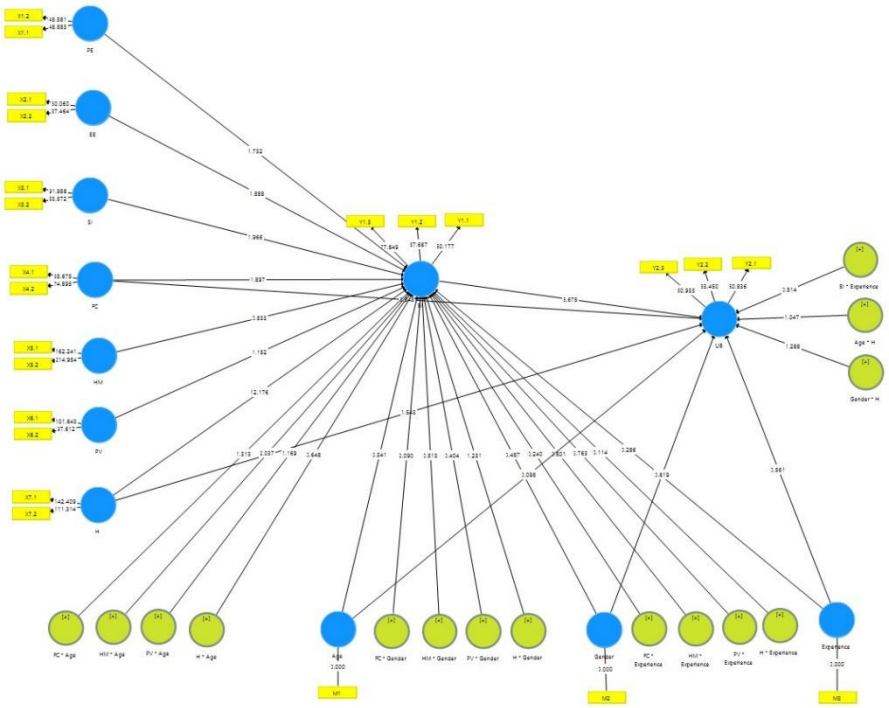

Fig 1. Path Diagram M-Commerce UTAUT 2 (Bootstrapping)

The subsequent table outlines the path diagram results, where results determine the variables received (Fig 9, table 4):

Table 2. Path diagram results M-Commerce UTAUT 2

Relationship Between Variables	*Observed Sample's*(O)	*Mean's(M)*	*Standard Deviation's(STDEV)*	*T-Statictics*	*P - Values*
(BI->UB)	0,476	0,477	0,068	7,052	0,000
(EE->BI)	0,117	0,101	0,063	1,866	0,063
(FC -> BI)	0,096	0,090	0,050	1,920	0,055
(FC -> UB)	0,322	0,324	0,057	5,649	0,000
(H -> BI)	0,638	0,642	0,050	12,741	0,000
(PE -> BI)	0,105	0,103	0,063	1,684	0,093
(SI -> BI)	0,082	0,084	0,042	1,955	0,051

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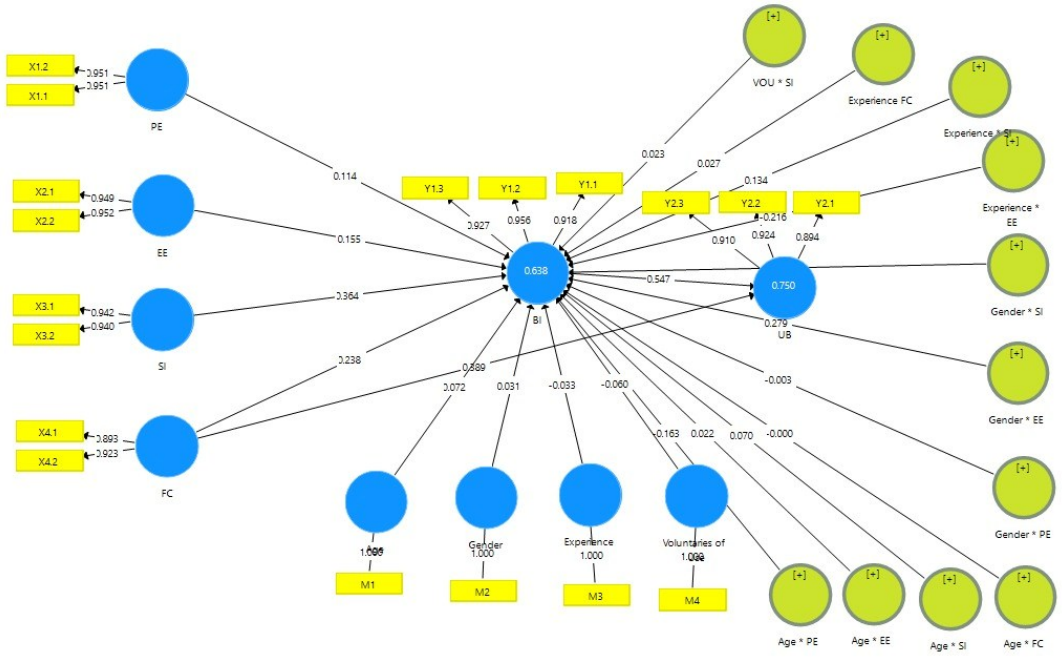

Fig 2. Path Diagram M-Banking UTAUT (Bootstrapping)

The subsequent table outlines the path diagram results, where the results determine the variables received (Fig 10, Table 5):

Table 3. Path Diagram Results M-Banking UTAUT

Relationship Between Variables	*Observed Sample's*(O)	*Mean's(M)*	*Standard Deviation's(STDEV)*	*T-Statictics*	*P - Values*
(BI->UB)	0,547	0,547	0,056	9,718	0,000
(FC ->BI)	0,238	0,262	0,088	2,712	0,007
(FC ->UB)	0,389	0,388	0,059	6,604	0,000
(SI_ ->BI)	0,364	0,367	0,068	5,371	0,000

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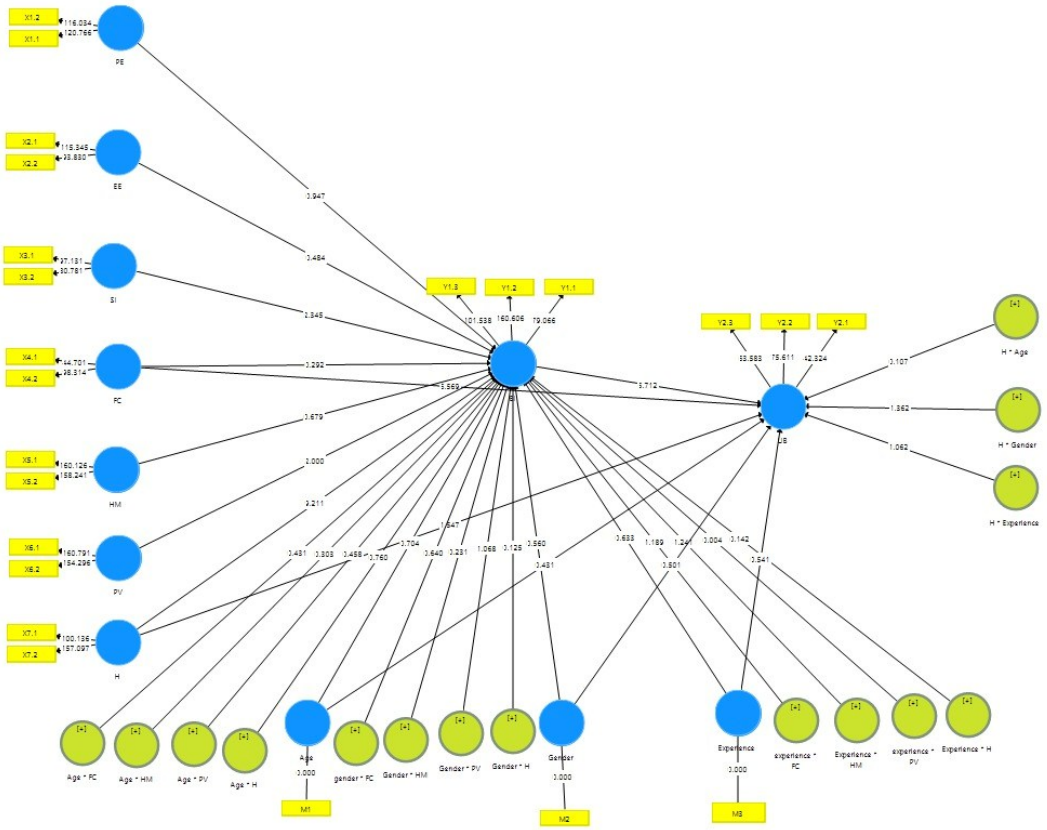

Figure 3. Path Diagram M-Banking UTAUT 2(Bootstraping)

The subsequent table outlines the path diagram results, where the results determine the variables received (fig 11, table 6):

Table 4. Path diagram results M-Banking UTAUT 2

Relationship Between Variables	*Observed Sample's*(O)	*Mean's(M)*	*Standard Deviation's(STDEV)*	*T-Statictics*	*P - Values*
(BI->UB)	0,450	0,450	0,077	5,867	0,000
(FC -> UB)	0,382	0,380	0,059	6,494	0,000
(H -> BI)	0,599	0,606	0,063	9,533	0,000
(PV->BI)	0,146	0,146	0,071	2,043	0,042
(SI->BI)	0,124	0,128	0,052	2,365	0,018

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Table 6. Path diagram results M-Banking UTAUT 2

Relationship Between Variables	*Observed Sample's*(O)	*Mean's(M)*	*Standard Deviation's(STDEV)*	*T-Statictics*	*P - Values*
(FC -> UB)	0,382	0,380	0,059	6,494	0,000
(H -> BI)	0,599	0,606	0,063	9,533	0,000
(PV->BI)	0,146	0,146	0,071	2,043	0,042
(SI->BI)	0,124	0,128	0,052	2,365	0,018
(FC -> UB)	0,382	0,380	0,059	6,494	0,000

3.4 Discusion

Based on the research conducted on UTAUT 1 and UTAUT 2 in M-banking and M-commerce, several conclusions were drawn. In M-banking using the UTAUT 1 model, the variables that influence behavior include: behavioral intention affecting use behavior, effort expectancy affecting behavioral intention, facilitating conditions affecting both behavioral intention and use behavior, performance expectancy influencing behavioral intention, social influence affecting behavioral intention, and voluntariness of use moderating social influence and behavioral intention. In the case of M-banking using the UTAUT 2 model, the influencing variables include: behavioral intention affecting use behavior, effort expectancy influencing behavioral intention, facilitating conditions impacting both behavioral intention and use behavior, habit affecting behavioral intention, performance expectancy influencing behavioral intention, social influence affecting behavioral intention, gender moderating the relationship between facilitating conditions and behavioral intention, and age moderating the relationship between hedonic motivation and behavioral intention.

For M-commerce, using the UTAUT 1 model, the key variables include: behavioral intention affecting use behavior, facilitating conditions influencing both behavioral intention and use behavior, social influence affecting behavioral intention, and experience moderating the relationship between effort expectancy and use behavior. In M-commerce using the UTAUT 2 model, the influencing variables are: behavioral intention affecting use behavior, facilitating conditions impacting use behavior, habit influencing behavioral intention, social influence affecting behavioral intention, and price value affecting behavioral intention

IV. CONCLUSION

As evidenced by the research completed conducted on UTAUT and UTAUT 2 on M-banking and M-commerce, the conclusions obtained. In M-banking using the UTAUT model, the influencing variables include behavioral ittention influencing use behavior, Effort Expectacy influencing behavioral ittention, facilitating condition influencing behavioral ittention,

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facilitating condition influencing use behavior, Performance Expectancy influencing behavioral ittention, Social Influence influencing behavioral ittention. In M-banking using the UTAUT 2 model, the influencing variables include behavioral ittention influencing use behavior, Effort Expectacy influencing behavioral ittention, facilitating condition influencing behavioral ittention, facilitating condition influencing use behavior, habit influencing behavioral ittention, performance expectancy influencing behavioral ittention, social influence influencing behavioral ittention.

In M-commerce using the UTAUT model, the influencing variables include behavioral ittention influencing use behavior, facilitating condition influencing behavioral ittention, facilitating condition influencing use behavior, Social Influence influencing behavioral ittention. In M-commerce use UTAUT 2 frameworks, the variables that drive outcomes include behavioral intention affecting usage behavior, facilitating conditions impacting usage behavior, and habit shaping behavioral intention, Social Influence influencing behavioral intention, price value influencing behavioral intention.

Building Considering the previous explanation, It is evident that for at M-Banking application, the UTAUT and UTAUT 2 models are equally accurate and effective, but in UTAUT 2 it is known that HABIT is one of the variables that greatly influences so that UTAUT 2 is more superior. While for the M-commerce application, the UTAUT and UTAUT 2 models are equally accurate and effective, but in UTAUT 2 it is known that Price Value is one of the variables that greatly influences so that UTAUT 2 is more superior. For future researchers, they could compare the performance of UTAUT 2 with UTAUT 3. Another suggestion is to compare other applications with the performance of UTAUT and UTAUT 2 so that the results of this study can serve as a reference.

Author Contributions: *Tri Wulandari Ginting:* Concept, Original Draft, Writing Review & Editing, Supervisions: Formulated the idea & objectives of the study, wrote the initial draft, reviewed & revised the article, and supervised the research activities. *Joy Nasten Sinaga:* Writing Review & Editings, Curation of data, Formal Analysis: Reviewed & revised the article, maintained the research data, analyzed and synthesized the research data.

All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest: There is no conflict of interest in this research from any party.

Data Availability: The data corroborating the results of this study are accessible https://drive.google.com/drive/folders/1yY7NYcS_DKc3-pgslpOAWaR6V7vng8XV?usp=sharing

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