# Identification of Purchasing Factors for Neucentrix Data Center in Telkom Kalimantan with UTAUT 2 Modification

Satria Adi S. Wijaya[1,2*], Bustanul Arifin Noer[3]

## ABSTRACT

*The world's population growth is driving the increase in global internet bandwidth. The data center is the core infrastructure supporting the digital information growth trend. Telkom has a data center that provides carrier-neutral colocation services under the NeuCentrIX brand. Despite the intense competition among data center businesses and low rack occupancy levels in Telkom Kalimantan, NeuCentrIX has yet to become the market leader in Indonesia. This study aims to analyze the suitability of factors that affect the purchase of NeuCentrIX in Telkom Kalimantan using a modified UTAUT 2 model consisting of the variables of performance expectancy, effort expectancy, social influence, facilitating conditions, and price value while removing the variables of hedonic motivation and habit and adding the variable of brand equity. A structural research model is constructed based on these variables regarding purchase intention, and six hypotheses are obtained and will be tested. The research data collection through questionnaires was conducted directly with the respondents. The data processing of questionnaire results utilized the PLS-SEM method and SmartPLS 3.2.9 software. The results of this research indicated that out of the six hypotheses, only one was accepted, that brand equity influences purchase intention, while the other five hypotheses were rejected. The positive contribution of brand equity to purchase intention was 30.1%. These analysis results can be utilized as recommendations for companies and suggestions for further research.*

**KEYWORDS:** Purchase Factors, Data Center, NeuCentrIX, Colocation, UTAUT 2, PLS-SEM

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[1] PT Telkom Indonesia, Balikpapan, Indonesia
[2] Technomarketing, Interdisciplinary School of Management and Technology, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
[3] Department of Business Management, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
*Corresponding author: satria.asw@gmail.com

## 1. INTRODUCTION

The United Nations (UN) predicts that the world's population will be 7.8 billion people in 2020 and will reach 8.5 billion by 2030 (Geng, 2021) Along with population growth, global internet bandwidth has increased by 28% in 2022. The total international bandwidth has reached 997 TBps. The development of international internet bandwidth primarily reflects internet traffic (TeleGeography, 2022).

Based on the latest survey by the Indonesian Internet Service Providers Association (APJII), the internet user penetration rate reached 77.02% or approximately 210,026,769 individuals out of the total population of 272,682,600 in Indonesia (APJII, 2022). Data center businesses can leverage the number of internet users surpassing 210 million in 2021 to support the digital transformation process as one of the pillars of digital infrastructure alongside telecommunications networks.

The global data center industry exceeded US$55 billion in size in 2020. The global data center industry is predicted to grow with a Compound Annual Growth Rate (CAGR) of 15% between 2021-2027, driven by increased digitization in the manufacturing, retail, and healthcare sectors. The Asia-Pacific region dominated more than 35% of the market share in 2020 (Figure 1)
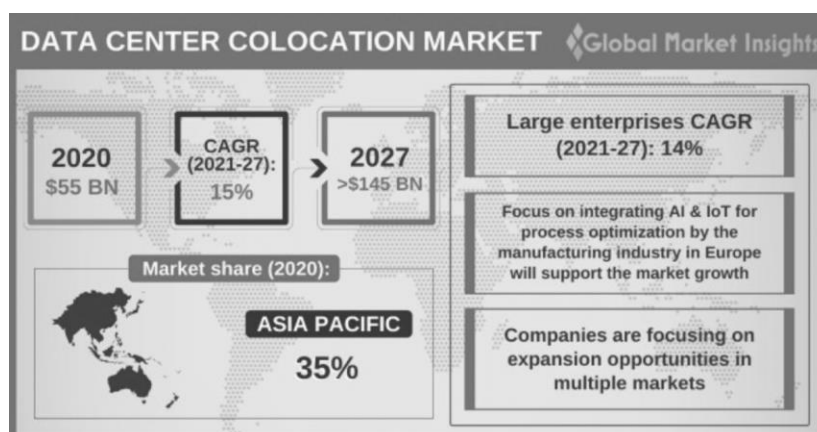


Source: Wadhwani & Gankar, (2021)

**FIGURE 1.** Infographic: Global Data Center Colocation Market

NeuCentrIX is a one-stop service that provides solutions for customers needing reliable colocation and connectivity services. NeuCentrIX is positioned to serve the Internet community, including Internet service providers (ISPs), content providers, hosting providers, web servers, mail servers, and other Internet applications. NeuCentrIX is a single-brand data center service provided by Telkom. It is the evolution of the Star-DC, CNDC (Carrier Neutral Data Center), and Retrofit STO products (Telkom, 2020).

Government regulations, through Government Regulation (PP) of the Republic of Indonesia number 71 of 2019 regarding the Implementation of Electronic Systems and Transactions, Chapter 20 Paragraph 3 stipulates that electronic system providers, both in the public and private sectors, are required to manage, process, and or store electronic

systems and electronic data outside the territory of Indonesia if storage technology is not available domestically (PP RI, 2019). The freedom for electronic system providers to choose the location for data storage may affect the revenue potential of data center providers in Indonesia, including NeuCentrIX.

The addition of data center providers in Indonesia, both domestic and international, has increased competition in the data center business. Currently, NeuCentrIX holds a market size of only 16% in Indonesia. Particularly in Kalimantan, the rack occupancy rate in NeuCentrIX is still low, ranging from 27-56%. Research on data center purchasing factors is needed to enhance sales and establish NeuCentrIX as the market leader in Indonesia.

The research utilizes the UTAUT 2 method, which will be modified to identify factors that influence the purchase of NeuCentrIX to increase market size in the data center business in Indonesia. This study is expected to provide insights for the company in formulating appropriate marketing and sales strategies for NeuCentrIX, tailored to the needs of potential customers, to enhance its market position in the colocation data center services in Indonesia.

## 2. LITERATURE REVIEW

Various theoretical models developed from psychological and sociological theories have been adopted to analyze the factors influencing the acceptance and implementation of information systems and information technology. Venkatesh et al. proposed the Unified Theory of Acceptance and Use of Technology (UTAUT) as one of the most popular theories in information systems and information technology. UTAUT is a stable model in which the variance in predicting behavioral intention and use of technology reaches 56% and 40%, respectively (Venkatesh et al., 2003).

In 2012, Venkatesh et al. proposed the development of UTAUT into UTAUT 2. The UTAUT 2 model is a theory of technology acceptance and adoption in the customer context, whereas the previous UTAUT model was focused on technology use in the organizational context. UTAUT 2 outperforms UTAUT in terms of variance in predicting behavioral intention and use of technology. In UTAUT 2, the variance in predicting behavioral intention is 74%, and the use of technology is 52% (Duarte & Pinho, 2019)

UTAUT is a model that combines theories of human behavior (Kim et al., 2016) and aims to predict user acceptance of technology, including hardware and software. Although UTAUT has been widely used in research related to software, it is also utilized in studies investigating the adoption and use of hardware technologies such as cloud storage (Cao et al., 2014), intelligent elevators (Chu et al., 2022) and other digital devices.

Overall, UTAUT provides a robust and widely accepted framework for researchers to explore user acceptance and usage behavior of various technologies. This study utilizes a modified version of UTAUT 2, incorporating the latest technology acceptance and usage model, which has been tested and validated in previous research.

**Data Center**

A data center is a facility that can accommodate a large amount of computing resources to collect, store, share, manage, and distribute data in large volumes. Data centers consist of facility elements (space, power, and cooling) and IT infrastructure elements (servers, storage, and networking) based on business needs. Data center sizes vary, ranging from micro-scale with a few servers to large-scale ones that can accommodate thousands of racks configured with thousands of servers (Wu & Buyya, 2015).

**NeuCentrIX**

NeuCentrIX (2023) is a neutral data center operator ecosystem that offers colocation, internet exchange, and connectivity services. NeuCentrIX is a wholesale data center with a business model where providers can lease space, racks, and power and operate various facilities to one or more customers. The products offered by NeuCentrIX can be categorized into three types of services: NeuCentrIX colocation, NeuCentrIX internet exchange (NCIX), and NeuCentrIX connect.

**UTAUT 2**

In the UTAUT model, three primary constructs directly determine behavioral intention. These constructs are performance expectancy, effort expectancy, and social influence. Behavioral intention and facilitating conditions determine the use behavior for information systems. Additionally, several moderator variables exist, including gender, age, experience, and voluntariness of use. Venkatesh et al. (2012) proposed expanding the UTAUT model and creating the UTAUT 2 development. The UTAUT 2 model aims to identify three new constructs in research on the acceptance and use of information technology, modify some existing relationships in the UTAUT model, and introduce new relationship patterns. The seven constructs include the four constructs from the original UTAUT model: performance expectancy, effort expectancy, social influence, and facilitating conditions, as well as three new constructs, namely hedonic motivation, price value, and habit.

**Brand Equity**

As Aaker (1991) defined, brand equity is a set of brand-related assets and liabilities associated with the brand, its name, and symbols that add or subtract value provided by a product or service to a company and or its customers. Brand equity can be defined from both customer and company perspectives as a multidimensional concept with four main dimensions: brand awareness, brand associations, perceived quality, and brand loyalty. Aaker (1991) reported a significant positive relationship between brand equity and purchase intention.

**Purchase Intention**

Purchase intention refers to the choice or plan to purchase a product or acquire a service. It refers to the customer's desire to buy a specific product from a particular brand.

Engel et al. (1995) divided purchase intention into three categories: unplanned, partially, and thoroughly planned.

**Partial Least Squares Structural Equation Model (PLS-SEM)**

The PLS-SEM method can be used to conduct research with three simultaneous activities: checking the validity and reliability of data, testing the relationships and influences between latent variables (path analysis), and predicting a good model (Hair, 2006). PLS-SEM is used to develop theory in exploratory research and is helpful for researchers to obtain latent variable scores for predictive purposes by examining relationships or influences between constructs.

PLS-SEM can be applied to small sample sizes and does not require the assumption of normal data distribution. Additionally, PLS-SEM allows for many indicators, with a maximum of 1000. Constructs can be in the form of reflective or formative models (Hair et al., 2014) According to Sarstedt et al. (2017), there are several steps involved in conducting analysis using PLS-SEM, including specifying the structural model (inner model) and measurement model (outer model), data collection and inspection, estimating the path analysis model, evaluating the structural and measurement models, drawing conclusions and interpreting the results.

## 3. METHODS

The research was conducted to test hypotheses using a method designed according to the variables under investigation. The study aims to obtain accurate results after identifying and formulating the problem and completing a literature review.

**Data Collection**

This study used a population of employees from 45 companies that have utilized NeuCentrIX services in Telkom Kalimantan, with a breakdown of 22 local ISPs, 18 national ISPs, 3 private companies, and 2 local government agencies. The total number of employees in these companies is unknown. The sampling technique employed was purposive sampling, which is a non-probability sampling method where samples are selected based on specific characteristic considerations (Sugiyono, 2013)

The sample characteristics include job positions within the companies: owners/executives, marketing and sales, and technical operations. These respondents were selected based on their contributions as decision-making units (DMUs) in purchasing NeuCentrIX services. The respondents' experience with NeuCentrIX services was divided into <1 year, 1-3 years, and >3 years. The questionnaires were distributed using personally administered questionnaires, either directly or with the assistance of a surveyor. The researcher provided necessary explanations regarding the academic research objectives to the respondents as primary data sources. The surveyor used was the Account Manager External (AMEX), who serves as the liaison between the company and customers and is responsible for meeting customer needs and building good relationships.

The questionnaires were distributed through surveyors to reach respondents outside of Balikpapan. Two Account Managers External (AMEX) assisted in the research. The surveyors were provided with explanations about the academic research objectives to ensure the objectivity of data collection from the respondents.

The respondents could fill out the research questionnaires through a Google Form. The questionnaires utilized a multiple-choice model with a Likert scale consisting of 5 answer alternatives, which are as follows:

1 = Strongly disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly agree

## Structural Model dan Research Hypotheses

This research adopts a theoretical framework based on the findings of previous literature reviews and studies, employing quantitative analysis using primary data. The preliminary data from the questionnaire responses will be processed through several stages, including frequency distribution, descriptive analysis, classical assumption testing, and PLS-SEM testing and analysis. Through this process, the author can generate ideas for investigating and further examining a specific problem in the form of a structural model.
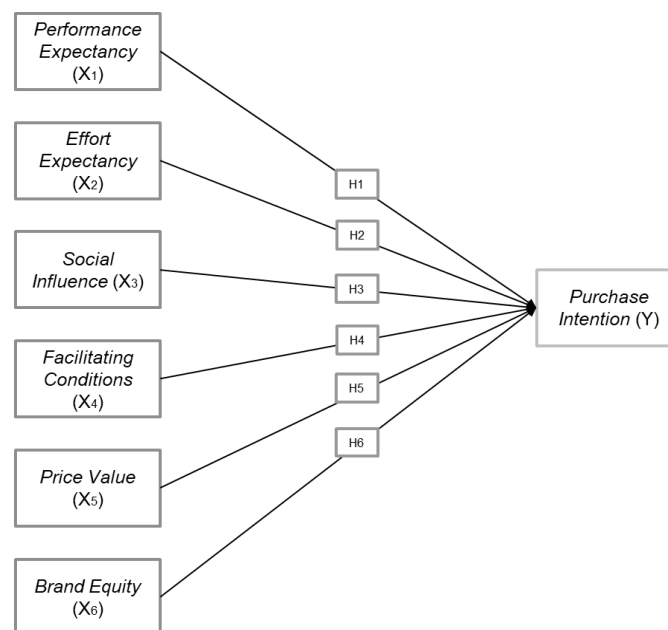


**FIGURE 2.** Research Structural Model

The structural model is a model that describes the relationships among constructs (latent variables), both exogenous (independent variables) and endogenous (dependent variables). The proposed structural model of the research includes seven variables:

Performance Expectancy (X1), Effort Expectancy (X2), Social Influence (X3), Facilitating Conditions (X4), Price Value (X5), Brand Equity (X6), and Purchase Intention (Y), as shown in Figure 2. Based on Figure 2, the hypotheses to be tested in the research are as follows:

H1: Performance Expectancy (X1) impacts Purchase Intention (Y).

H2: Effort Expectancy (X2) impacts Purchase Intention (Y).

H3: Social Influence (X3) impacts Purchase Intention (Y).

H4: Facilitating Conditions (X4) impact Purchase Intention (Y).

H5: Price Value (X5) impacts Purchase Intention (Y).

H6: Brand Equity (X6) impacts Purchase Intention (Y).

## 4. RESULTS

The respondents of this research are employees of companies associated with NeuCentrIX services in Telkom Kalimantan. The total number of respondents gathered successfully is 94 respondents, surpassing the initial target of 80 respondents. The research achieved a response rate of 69.62%, indicating that out of 135 questionnaire recipients, 94 respondents completed the survey. A demographic analysis of the respondents was conducted to understand the general characteristics and profiles based on gender, job positions in the company, and duration of using NeuCentrIX services. The following are the results of the demographic analysis of the respondents:

1. The number of male respondents is 80 (85%), while the number of female respondents is 14 (15%).
2. The number of respondents in the owner/executive position is 22 (24%), the number of respondents in the marketing and sales position is 20 (21%), and the number of respondents in the technical operational position is 52 (55%).
3. The number of respondents in the category of using NeuCentrIX services for <1 year is 25 (27%), the number of respondents in the category of using NeuCentrIX services for 1-3 years is 49 (52%), and the number of respondents in the category of using NeuCentrIX services for > 3 years is 20 (21%).

The testing phase of the outer model to assess the validity of the indicators forming latent variables (constructs) will be conducted through convergent validity and discriminant validity. Furthermore, Cronbach's Alpha and Composite Reliability (CR) values will be utilized for reliability testing.

Convergent validity testing is conducted by examining the loading factors of each indicator. It can be considered valid if loading factors are >0.60 for explanatory research in each indicator and the average variance extracted (AVE) for each construct is >0.50. The results of the convergent validity test can be seen in Table 1.

**TABLE 1.** Convergent Validity Test

| Construct | Indicator | Loading Factor | AVE | Explanation |
|---|---|---|---|---|
| | PE1 | 0.797 | | Valid |
| *Performance Expectancy* (PE) | PE2 | 0.890 | 0.728 | Valid |

| Construct | Indicator | Loading Factor | AVE | Explanation |
|---|---|---|---|---|
| | PE3 | 0.849 | | Valid |
| | PE4 | 0.872 | | Valid |
| | EE1 | 0.895 | | Valid |
| | EE2 | 0.902 | | Valid |
| *Effort Expectancy* (EE) | EE3 | 0.920 | 0.812 | Valid |
| | EE4 | 0.887 | | Valid |
| | SI1 | 0.917 | | Valid |
| | SI2 | 0.823 | | Valid |
| *Social Influence* (SI) | SI3 | 0.901 | 0.776 | Valid |
| | FC1 | 0.797 | | Valid |
| | FC2 | 0.799 | | Valid |
| *Facilitating Conditions* (FC) | FC3 | 0.795 | 0.633 | Valid |
| | FC4 | 0.791 | | Valid |
| | PV1 | 0.918 | | Valid |
| | PV2 | 0.926 | | Valid |
| *Price Value* (PV) | PV3 | 0.929 | 0.854 | Valid |
| | BE1 | 0.674 | | Valid |
| | BE2 | 0.796 | | Valid |
| *Brand Equity* (BE) | BE3 | 0.733 | 0.602 | Valid |
| | BE4 | 0.884 | | Valid |
| | PI1 | 0.875 | | Valid |
| | PI2 | 0.918 | | Valid |
| *Purchase Intention* (PI) | PI3 | 0.839 | 0.771 | Valid |

Table 1 shows that the loading factors of each indicator are >0.60, and the AVE values for each construct are >0.50, indicating that all indicators pass the convergent validity test and can be considered valid. Valid indicators have a positive correlation with their respective latent variables. Indicators must correlate with their latent variables to effectively explain a latent variable.

Discriminant validity testing compares the square root of AVE values for each construct with the correlations between other latent constructs (Fornell-Larcker Criterion) or the HTMT ratio. The model has sufficient discriminant validity if the square root of AVE values for each construct is greater than the correlations between constructs or the HTMT ratio is <0.9.

Based on the analysis results in Table 2, it can be observed that the Fornell-Larcker Criterion test indicates that all constructs have the square root of AVE values greater than the correlations with other latent constructs. For example, the square root of the AVE value for the PV construct is 0.924, which is greater than the correlation between PV and SI (0.678). Therefore, it can be concluded that the model satisfies the discriminant validity testing based on the results of the Fornell-Larcker Criterion test.

**TABLE 2.** Fornell-Larcker Criterion Test

| | BE | EE | FC | PE | PI | PV | SI |
|---|---|---|---|---|---|---|---|
| **BE** | 0.776 | | | | | | |
| **EE** | 0.692 | 0.901 | | | | | |
| **FC** | 0.610 | 0.716 | 0.795 | | | | |

|     | BE | EE | FC | PE | PI | PV | SI |
|-----|-----|-----|-----|-----|-----|-----|-----|
| PE | 0.505 | 0.640 | 0.661 | 0.853 | | | |
| PI | 0.620 | 0.533 | 0.598 | 0.573 | 0.878 | | |
| PV | 0.641 | 0.583 | 0.565 | 0.617 | 0.614 | 0.924 | |
| SI | 0.568 | 0.521 | 0.555 | 0.655 | 0.537 | 0.678 | 0.881 |

Reliability testing can be conducted by examining Cronbach's Alpha and Composite Reliability (CR) values. For explanatory research, the tested model can be considered reliable if Cronbach's Alpha and CR values for each construct are >0.6. Reliability indicates that the indicators used in the research align with the actual conditions of the research object.

**TABLE 3.** Reliability Test

| Construct | Cronbach's Alpha | Composite Reliability (CR) | Explanation |
|-----------|------------------|----------------------------|-------------|
| PE | 0.874 | 0.914 | Reliable |
| EE | 0.923 | 0.945 | Reliable |
| SI | 0.857 | 0.912 | Reliable |
| FC | 0.807 | 0.873 | Reliable |
| PV | 0.915 | 0.946 | Reliable |
| BE | 0.776 | 0.857 | Reliable |
| PI | 0.851 | 0.910 | Reliable |

Based on the analysis results in Table 3, the values of Cronbach's Alpha and CR for each construct are above 0.6, indicating that all constructs have met the required reliability. Among all constructs, EE obtains the highest Cronbach's Alpha value of 0.923, while BE obtains the lowest value of 0.776. After passing the reliability test in the measurement model evaluation (outer model) and getting good-quality results, the next step is to evaluate the structural model (inner model).

The inner model testing phase examines a research model's relationships between latent variables (constructs). The evaluation includes determining the values of the Coefficient of Determination ($R^2$) and Effect Size ($f^2$) to assess the influence between constructs. Furthermore, the value of Cross-validated Redundancy ($Q^2$) is determined to evaluate the level of accuracy of the model's predictive relevance to specific constructs. Subsequently, the Path Coefficients of the research model are assessed to measure the significance level of the Path Coefficients and test the validity of a hypothesis, whether it is accepted or rejected.

Based on the analysis results, the R-Square ($R^2$) value for the dependent variable Purchase Intention (PI) is 0.522 or 52.2%. This value indicates that the variance in the dependent variable Purchase Intention (PI) is moderately influenced by the independent variables Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Price Value (PV), and Brand Equity (BE) by 52.2%. In comparison, the remaining 47.8% is influenced by other variables outside the research model being studied.

The criteria for F-square ($f^2$) values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively (Ghozali, 2021). The Effect Size (f2) test results are shown in Table 4. The Cross-validated redundancy ($Q^2$) test using Blindfolding yielded a value of 0.354. This result means that the Purchase Intention (PI) construct has a strong level of predictive relevance because the $Q^2$ value is greater than 0.35. The $Q^2$ value in the research is greater than 0, indicating that each variable's construct is suitable or can be used to measure the research model.

**TABLE 4.** Effect Size Test

| Relationship between Latent Variables | F-Square | Explanation |
|---|---|---|
| PE -> PI | 0.027 | Small Effect |
| EE -> PI | 0.006 | No Effect |
| SI -> PI | 0.000 | No Effect |
| FC -> PI | 0.041 | Small Effect |
| PV -> PI | 0.043 | Small Effect |
| BE -> PI | 0.078 | Small Effect |

Standardized Root Mean Square Residual (SRMR) is a goodness-of-fit measure for PLS-SEM that can avoid model specification errors, while the Normed Fit Index (NFI) is used as an additional measure of fit for the proposed model. An SRMR value of < 0.10 or < 0.08 is considered acceptable, and the NFI value ranges from 0 to 1, with higher values indicating a better fit (Ghozali, 2021). Based on the analysis results, the SRMR value is 0.085, indicating that the model has an SRMR value < 0.1, suggesting a good fit for the study. The NFI value is also 0.714, indicating a model fit of 71.4%.

The last step in testing the inner model is to measure the significance level of the Path Coefficients. The Path Coefficient values range from +1 to -1, with values approaching +1 indicating a more substantial (positive) relationship between the latent variables and values coming -1 telling a weaker (negative) relationship between the latent variables. The results of the Path Coefficient test are shown in Table 5.

**TABLE 5.** Testing Path Coefficients and Research Hypotheses using Bootstrapping

| Relationship between Latent Variables | Path Coefficient | T-Statistics | P-values | Hypotheses | Conclusion | Explanation |
|---|---|---|---|---|---|---|
| PE -> PI | 0.182 | 1.471 | 0.142 | H1 | Rejected | Not significant |
| EE -> PI | -0.090 | 0.526 | 0.599 | H2 | Rejected | Not significant |
| SI -> PI | 0.020 | 0.159 | 0.874 | H3 | Rejected | Not significant |
| FC -> PI | 0.222 | 1.372 | 0.171 | H4 | Rejected | Not significant |
| PV -> PI | 0.222 | 1.572 | 0.117 | H5 | Rejected | Not significant |
| BE -> PI | 0.301 | 2.040 | 0.042 | H6 | Accepted | Significant |

Table 5 shows that only the latent variable Brand Equity (BE) significantly affects Purchase Intention (PI). The significant positive contribution of brand equity to purchase intention is 30.1%. This finding is consistent with previous research by Aaker (1991), which reported a meaningful positive relationship between brand equity and purchase intention.

Other latent variables such as Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Price Value (PV) do not have a significant effect on Purchase Intention (PI). After conducting the Path Coefficient test, the next step is to perform hypothesis testing to determine the significance of a hypothesis.

The significance level (alpha, α) used in the study was 5%. If the P-value <0.05 (alpha) or the T-value >1.96 (T-table), the research hypothesis can be considered accepted. Conversely, if the P-value >0.05 (alpha) or the T-value <1.96 (T-table), the research hypothesis can be considered rejected (Ghozali, 2021). Since the P-value is <0.05 (alpha) and the T-statistic is >1.96 (T-table), and the Path Coefficient is positively signed, it can be concluded that brand equity has a positive and significant effect on purchase intention. Thus Hypothesis 6 is accepted.

## 5. CONCLUSIONS

The modified UTAUT 2 model in this study excludes the constructs of hedonic motivation and habit while retaining the main constructs of UTAUT 2, namely performance expectancy, effort expectancy, social influence, facilitating conditions, price value, and adding the construct of brand equity is a suitable model for identifying the purchase intention of NeuCentrIX with a fit rate of 71.4%.

This research consisted of 6 research hypotheses. After data processing and analysis, it was found that 1 research hypothesis was accepted, while 5 research hypotheses were rejected. The research findings indicated that the factor influencing the purchase intention variable is brand equity, while elements such as performance expectancy, effort expectancy, social influence, facilitating conditions, and price value do not significantly impact the purchase intention variable.

The managerial implications of this research are that companies need to develop flexible marketing and sales strategies for data centers aligned with potential customers' needs. One alternative method that can be implemented is using the Marketing 5.0 approach to enhance the brand equity of NeuCentrIX, focusing on four key dimensions: brand awareness through content marketing, brand associations through human-centric marketing, improving perceived quality, and building brand loyalty through omnichannel marketing.

Due to the limitations in the number of samples or respondents in this research, future studies are expected to increase the sample size or the number of respondents and expand the geographical scope beyond Kalimantan to obtain more accurate and comprehensive results. In addition, future research is expected to include additional independent variables to discover new relevant factors related to purchase intention in a different research model.

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