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# Assessment of virtual kitchen use intention among Kenyan restaurants: A quantitative research using utaut model

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## ABSTRACT

Restaurants contribute significantly to economic diversification by creating jobs and generating revenue. While restaurants in Kenya largely focus on the dine-in experience, the growing demand for dine-out consumption, fueled by the proliferation of online food delivery platforms, necessitates the implementation of a new restaurant business model known as virtual kitchen. This study, therefore, applied modified UTAUT2 theory to assess licensed restaurants' intentions to use virtual kitchens in Kenya. The study hypothesis is that performance expectancy, effort expectancy, facilitating conditions, and price value have a significant effect on licensed restaurants' intention to use virtual kitchens in Kenya. The study used a quantitative

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research approach and correlational research design to survey 149 managers/owners of licensed restaurants in Kenya. The regression analysis results show that performance expectancy, effort expectancy, facilitating conditions, and price value all have a significant effect on the intention to use virtual kitchens. The study not only adds to the existing body of knowledge debate on virtual kitchens by providing informative insights on its adoption in Kenya, but it also contributes to industry practice.

**Keywords:** UTAUT theory, Virtual kitchens, Licensed restaurants, Kenya



## 1. INTRODUCTION

Technology advancements are emerging as a critical factor in shaping the economies of various countries (Işık, 2011), including Kenya, through the adoption of innovative products and business models that adapt to consumer needs (Dakduk, Van der Woude & Alarcon Nieto, 2023). Although digital transformation is a worldwide phenomenon, new technologies and innovations are not as widely used as they should be (Dakduk et al., 2023). As a result, various theoretical foundations and models, including diffusion of innovation (DOI), technology acceptance model (TAM), and the unified theory of acceptance and use of technology (UTAUT), have been applied to better understand technology adoption (Salahshour, Nilashi & Mohamed, 2018). Among the numerous theories in this context, UTAUT has been widely used as a theoretical framework in research on technology adoption (Dakduk et al., 2023; Kuttimani et al., 2018). Despite its popularity, however, there are emergent discrepancies in study contexts and samples regarding technology adoption by various organizations including restaurants.

The restaurant industry makes up about 27.4% of all enterprises in the hospitality industry, with over 32,000 businesses accounting for 170,790 jobs worldwide (Gouveia, 2021; Martín-Martín, Maya García & Romero, 2022). The restaurant industry in Kenya operates on two

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business models. The first is the dine-in, in which consumers seeking meal service visit a restaurant (Pyanikova et al., 2020). While the dine-in concept has been successful for decades, technological advancements, changes in consumer trends, and the effects of the COVID-19 epidemic necessitate a change in the business operating model (Dogru, Mody, Hanks, Suess, Işık & Sozen, 2023) . Many restaurants worldwide have resorted to an alternative business model: the dine-out (Choudhary, 2019; Gouveia, 2021; Martín-Martín et al., 2022; Pyanikova *et al.*, 2020) by embracing innovative business models that include online food delivery (OFD) (Hong, Choi & Joung, 2023).

As a result, OFD has grown, resulting in the establishment of a global market worth that will be more than $220 billion by 2025 (Ahuja, Chandra, Lord and Peens, 2021; Lavu, 2023). Despite the demand for dine-out representing a large increase in the restaurant business worldwide, most restaurants in Kenya are characterized by the traditional dine-in restaurant layout that fails to meet this demand (Kairu, 2021). Furthermore, when targeting both dine-in and off-premise clients, dine-in restaurants may face a meal supply shortage, especially when operating at full capacity (Gouveia, 2021; Cai et al., 2022). In Kenya, the emergence of OFD as a dominant force occurred in 2019, mostly facilitated by platform-to-consumer delivery such as Glovo, Jumia Food, Uber Eats, and Bolt Food (Kairu, 2022). This has resulted in a significant increase in the demand for OFD services in Kenya (Kairu, 2022) with the development of a novel restaurant business model referred to as virtual kitchen emerging (Cai, Leung & Chi, 2022; Christopher, 2020).

A virtual kitchen, also called ghost, cyber, cloud, commissary, or dark kitchen is a back office concept that has been introduced in the restaurant industry to enhance dine-out capabilities by optimizing OFD services (Cai et al., 2022; Choudhary, 2019; Christopher, 2020; Gouveia, 2021; Kulshreshtha & Sharma, 2022; Lee, 2020). Virtual kitchens are thus food operations that

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are set up for delivery-only meals and do not have physical storefronts or dining areas (Cai et al., 2022; Christopher, 2020; Hakim et al., 2022; Hakim et al., 2023; Lee, 2020). The adoption of virtual kitchens would benefit restaurateurs by significantly lowering operational costs (Kulshreshtha and Sharma, 2022), increasing productivity, and improving efficiency (Gouveia, 2021; Lee, 2020; Vu et al., 2023). As a result, various restaurant chains worldwide, as well as OFD platforms such as Uber Eats, DoorDash, and GrubHub, are increasingly embracing this concept (Cai et al., 2022; Dyachenko, 2022; Lee, 2020). This phenomenon is thus expected to become a mainstay market, resulting in a $1.5 trillion business by 2050 (Euromonitor, 2021).

Because virtual kitchens are still a new concept in Kenya (Kairu, 2022), it is important to understand the factors that influence their adoption. As a result, this study investigates the factors that influence the intention to use virtual kitchens among licensed restaurants in Kenya. The study used the UTAUT2 theory to determine the effects of performance expectancy, effort expectancy, facilitating conditions, and price value on the intention of licensed restaurants in Kenya to use virtual kitchens.

## 2. LITERATURE REVIEW

### *2.1 Unified Theory of Acceptance and Use of Technology (UTAUT)*

UTAUT model was developed by combining various existing theories and models that were established to help understand technology adoption. The aim was to develop a more comprehensive technology acceptance model, that explains intentions towards accepting technology and uses behavior. Performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), behavioral intention (BI), and user behavior (UB) are the six main constructs in the original UTAUT paradigm. The UTAUT model also includes four moderating variables namely age, gender, experience, and voluntariness (Venkatesh et al., 2003). UTAUT was later expanded to UTAUT2 by incorporating additional predictor

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constructs such as hedonic motivation (HM), price value (PV), and habit; and dropping voluntariness as a moderator (Venkatesh, Thong & Xu, 2012) (see Figure 1).

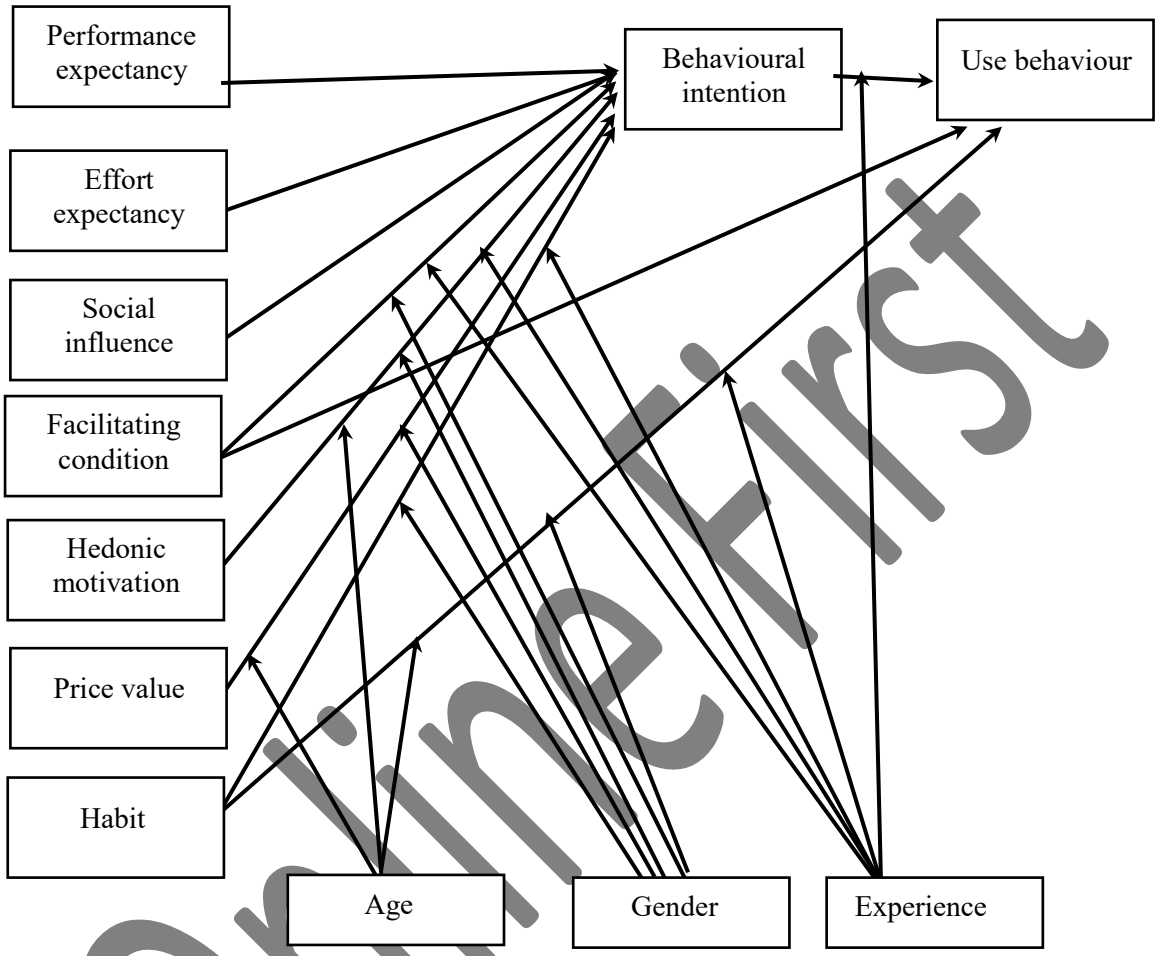


Figure 1: UTAUT 2 Model (Venkatesh et al., 2012)



### *2.2 Virtual Kitchen Adoption*

A virtual kitchen is a commercial food operation that focuses solely on meal delivery and has no physical dining areas or storefronts (Ahuja et al., 2021; Cai et al., 2022; Kulshreshtha & Sharma, 2022; Lee, 2020). The adoption of virtual kitchens is thus the incorporation of this business model into current restaurant operations. Several studies (e.g., Cai et al., 2022; Dyachenko, 2022; Gouveia, 2021; Hakim et al., 2022; Hakim et al., 2023; Kulshreshtha and

Sharma 2022; Ongkasuwan et al., 2022; Vu et al., 2023) have been dedicated to understanding this phenomenon due to its proliferation in various countries and the perceived benefits derived from its adoption.

Despite the significant potential benefits of the virtual kitchen business model (Kulshreshtha and Sharma, 2022; Cai et al., 2022), research on this phenomenon has been skewed toward the demand side (e.g., Cai et al., 2022; Hong et al., 2023; Kulshreshtha & Sharma 2022; Ongkasuwan at al., 2022), with little research delving into the supply side of virtual kitchens. From a demand perspective, previous research has focused on the acceptance and preference for virtual kitchens by customers (Dyachenko, 2022; Hakim et al., 2022; Kulshreshtha & Sharma, 2022; Ongkasuwan et al., 2022). For example, Ongkasuwan et al. (2022) discovered that PE, EE, SI and PV significantly predicted purchase decisions from online service providers in Thailand, China, and the US. While this study is indicative of determinants to use virtual kitchens and their partnerships, the study mainly focused on customers and not directly on adopters of virtual kitchens.

From the supply perspective, the prospects of virtual kitchens and OFD have been examined in various contexts including the US, Indian, UK, Indonesian, Italian, Polish, Portuguese, and Brazilian markets (Choudhary, 2019; Gouveia, 2021; Hakim et al., 2022; Hakim et al., 2023; Vu et al., 2023). Hakim et al. (2023) for instance used data mining and thematic content analysis to investigate the types and characteristics of virtual kitchens in Limeira, So Paulo, and Campinas, Brazil. Their study categorized virtual kitchen models as shell-type (hub), independent virtual kitchen, virtual kitchen in a standard restaurant, franchise, and home-based virtual kitchen.

Few of these studies (e.g., Choudhary, 2019; Gouveia, 2021; Vu et al., 2023) have also attempted to investigate restaurant managers/owners' intentions to adopt virtual kitchens. Vu et

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al. (2023) used a knowledge-based view of the firms to survey restaurant managers/owners in examining the prospects, challenges, success factors, and future developments of virtual kitchen adoption. Gouveia (2021) used, modified UTAUT to examine virtual kitchen adoption in Portugal. The results of this study indicated that PE and PV significantly predicted virtual kitchen adoption, while EE and FC conditions did not. Given that this was a case study conducted in Portugal, Gouveia's findings would have limited application in other research contexts such as Kenya. Choudhary (2019) through a descriptive case study concluded that virtual kitchen adoption in India is influenced by both internal (e.g., operations, service, logistics, etc.) and external factors (e.g., customer preference, competition, technology, etc.). Choudhary's study, as a descriptive study, fails to show how the identified factors influence the intention to use virtual kitchens.

### *2.3 Application of UTAUT in the Restaurant Industry*

Over the past five years, several studies (e.g., Gouveia, 2021; Khalilzadeh, Ozturk & Bilgihan, 2017; Lee, Sung, & Jeon, 2019; Okumus, Bilgihan & Ozturk, 2018; Palau-Saumell, Forgas-Coll, Sánchez-García & Robres, 2019) have applied the UTAUT model to understand technology system use within the restaurant industry in various settings. Gouveia (2021), for instance, applied modified UTAUT to assess adoption of virtual kitchen in Portugal. Palau-Saumell et al. (2019) and Lee et al. (2019) used modified UTAUT-2 to investigate mobile app usage among Spanish restaurant customers and OFDs in Korea, respectively. Furthermore, Okumus et al. (2018) used UTAUT to assess the acceptance of Smartphone diet apps among restaurant customers in the US, whereas Khalilzadeh et al. (2017) used extended UTAUT to investigate the use of NFC-based mobile payment in the US. These are summarized in Table 1 below.

Despite the popularity of the UTAUT theory in technology adoption research, its application is concentrated in research conducted in developed economies of Europe, Asia, and the US (Dakduk et al., 2023; Salahshour et al., 2018). According to the findings of these studies, PE and SI are the dominant predictors of intention to adopt a technology (Dakduk et al., 2023; Venkatesh et al., 2012).

Table 1: Application of UTAUT models in the hospitality and tourism context

| Author(s) | Research Context | Sample | Model | Statistical Method | UTAUT Variables |
|---|---|---|---|---|---|
| Gouveia, 2021 | VIRTUAL KITCHENs adoption, Portugal | N = 55 | Modified UTAUT | PLS-SEM | PE, EE, FC, PV |
| Palau-Saumell *et al.*, 2019 | Mobile apps used in Spanish restaurants | N = 1200 | Modified UTAUT-2 | SEM & CFA | PE, EE, FC, SI, HM, Habit |
| Lee *et al.*, 2019 | OFDs, Korea | N = 340 | Modified UTAUT-2 | CFA & SEM | PE, EE, FC, SI, HM, Habit, PV |
| Okumus *et al.*, 2018 | Acceptance of Smartphone diet apps, USA | N = 395 | UTAUT | PLS-SEM | PE, SI & EE |
| Khalilzadeh *et al.*, 2017 | NFC-based Mobile payment, USA | N = 412 | Extended UTAUT | SEM | SI, EE, FC, HM, PE, BI |

Contrary to this notion, Karulkar et al. (2021) considered EE and FC as the most dominant UTAUT constructs in predicting OFD use intentions. Studies (e.g., Capri, 2021; Gouveia, 2021; Karulkar et al., 2021; Ongkasuwan et al., 2022) that have used UTAUT in examining virtual kitchen adoption in various contexts are also scanty, with conflicting results reported. The current study, therefore, uses modified UTAUT2 to explain the intention of licensed restaurants in Kenya to use virtual kitchens, where the concept is still gaining traction.

### *2.4 The Research Model and Hypotheses*

As already indicated, virtual kitchen adoption in Kenya is still a new concept that restaurateurs are exploring as an alternative business model for optimizing off-premise food and beverage

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consumption via OFDs. The intention to use a technology such as a virtual kitchen is influenced by a variety of organizational factors. UTAUT2 is a widely accepted theory that provides a framework for the factors that influence technology adoption intention.

The current study, while informed by the UTAUT2 model as a theoretical foundation, focuses on the intention to use virtual kitchens by restaurants in Kenya, and thus only four main predictor constructs were considered: PE, EE, FC, and PV. It excludes other predictor constructs such as SI, HM, habit, and moderators, which are thought to influence technology adoption at the consumer level (Venkatesh et al., 2012). Figure 2 shows the research model that guided the current study. According to Venkatesh et al. (2012), performance expectancy in this context refers to the perceived benefits that Kenyan restaurateurs believe they will obtain from using virtual kitchens. Based on this, the study hypothesizes that Kenyan licensed restaurants' intention to use virtual kitchens is significantly influenced by performance expectations.

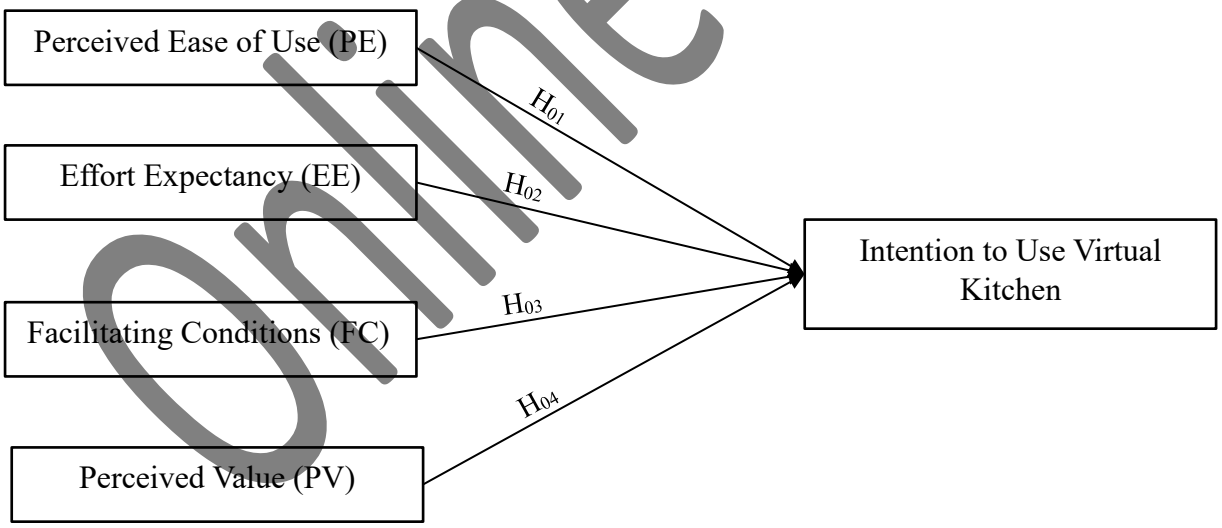


Figure 2. Research Model. Source: Adapted from Venkatesh et al. (2012)

While Kenya's technological infrastructure is not as advanced as that of other developed economies, restaurateurs in Kenya expect virtual kitchen adoption to be simple, as defined by

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Venkatesh et al. (2012). The study further hypothesized that effort expectancy has a significant effect on licensed restaurants' intention to use virtual kitchens in Kenya. Similarly, as a new technology, restaurateurs in Kenya anticipate that virtual kitchens will require the necessary facilities and support systems before they can be implemented. According to the UTAUT2 model by Venkatesh et al. (2012) and the preceding studies, the current study hypothesized that facilitating conditions have a significant effect on Kenyan licensed restaurants' intention to use virtual kitchen. Finally, price value is the cost incurred by restaurateurs in the adoption of virtual kitchens (Kuttimani et al., 2018; Venkatesh et al., 2012). Adoption of virtual kitchens in Kenya would necessitate investments in both support systems and technology. On this basis, the current study contends that price value has a significant impact on licensed Kenyan restaurants' intentions to use virtual kitchens.

## 3. RESEARCH METHODS

### *3.1 Research Approach and Design*

This study applied a quantitative research method in which the data was collected using surveys.

### *3.2 Population and Sample*

The study targeted the managers/owners of all the 149 licensed restaurants classified as class B facilities in Kenya (Tourism Regulatory Authority [TRA], 2022). TRA is mandated in classifying and licensing hospitality facilities in Kenya. In terms of licensing, the facilities are divided into classes A through H, with restaurants falling into class B (TRA, 2022). Managers/owners of these restaurants were chosen because they are in charge of investment decisions and thus were better placed to provide the needed information for this study.

### *3.3 Data Collection*

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Self-administered questionnaires were personally distributed to 149 restaurant managers/ owners via the drop-and-pick method with the help of ten trained research assistants. Data collection took place over two months between January and March 2023. In line with Beatty and Willis (2007), the questionnaire for the current study was pre-tested with other non-licensed restaurants representing 10% of the study sample, i.e., 15 restaurant managers/owners drawn randomly across the country.

### *3.4 Variable Measurement*

The main variables investigated in this study were the virtual kitchen adoption determinants (as independent variables) and virtual kitchen use intention (as the dependent variable). Four constructs namely PE, EE, FC and PV from UTAUT2 (Venkatesh et al., 2012) were used to operationalize the independent variables. PE, FC and PV were further operationalized using four measurements, while three items were used for EE. Virtual kitchen use intention was operationalized using three measurement items. The scale for the measurement items was adapted from Gouveia (2021) by bringing the Kenyan perspectives into the context. Respondents rated their level of agreement with the measurement items regarding their intentions to use a virtual kitchen on a five-point Likert scale. The Likert scale ranged from 1 (strongly disagree) to 5 (strongly agree).

### *3.5 Validity and Reliability*

Content validity index (CVI) was used to assess content validity in line with Polit, Beck and Owen (2007) and Zamanzadeh et al. (2015) procedures. The questionnaire was distributed to seven hospitality industry experts, who used a three-point Likert scale to rate its suitability. A score of three indicated item's suitability. The pre-test responses revealed no significant deviations among the respondents with a CVI value of > 0.796 suggesting a good content validity (Polit et al., 2007; Zamanzadeh et al., 2015). Furthermore, exploratory factor analysis

(EFA) was used to determine construct validity. Cronbach's alpha was used to assess the instrument's internal consistency, with a value greater than 0.7 considered satisfactory.

### *3.6 Data Analysis*

The collected data were analyzed using both descriptive and multiple regression analyses in SPSS version 26. Given the non-complex nature of the proposed research model, multiple regression analysis was used to test the research hypotheses. Before performing multiple linear regression analysis, descriptive statistics were used to examine and evaluate the data and gain insights into the demographic characteristics of the study sample. The data was then subjected to multiple regression analysis, with the dependent variable being 'intention to use virtual kitchens' (INT) and the independent variables being PE, EE, FC, and PV. The means of the measurement items were computed in SPSS to arrive at a single construct in each case. For example, the four PE measurement items would result in a single construct called PE, and so on.

## 4. RESULTS AND DISCUSSIONS

### *4.1 Rate of Response, Reliability and Validity*

The distribution of all surveys yielded a 100% response, thereby guaranteeing a comprehensive data set for the study. The reliability test results in SPSS show that the measurement items used to evaluate the constructs of PE, EE, FC, PV, and INT had strong internal consistency, as evidenced by Cronbach's alpha coefficients ranging from .914 to .952 (see Table 2).

Table 2: Reliability results

| Key Variables | Cronbach's Alpha | No. of items |
|---|---|---|
| Performance Expectancy (PE) | .952 | 4 |
| Effort Expectancy (EE) | .914 | 3 |
| Facilitating Conditions (FC) | .935 | 4 |
| Price Value (PV) | .934 | 4 |

| | | |
|---|---|---|
| Intention to Use Virtual Kitchen | .926 | 3 |

The EFA conducted using principal component analysis (PCA) and varimax rotation yielded a five-factor solution accounting for 85.96% of the variance, with the factor loadings ranging between .750 and .878 (see Table 3). The Kaiser-Meyer-Olkin Measure value of .880 indicated that the sample was adequate for the analysis.



Table 3: Construct validity results through the rotated component matrix

| | Component | | | | |
|---|---|---|---|---|---|
| **Variables** | **PE** | **FC** | **PV** | **INT** | **EE** |
| EE1 | | | | | .820 |
| EE2 | | | | | .832 |
| EE3 | | | | | .831 |
| FC1 | | .852 | | | |
| FC2 | | .831 | | | |
| FC3 | | .840 | | | |
| FC4 | | .826 | | | |
| PE1 | .793 | | | | |
| PE2 | .878 | | | | |
| PE3 | .829 | | | | |
| PE4 | .845 | | | | |
| PV1 | | | .750 | | |
| PV2 | | | .856 | | |
| PV3 | | | .841 | | |
| PV4 | | | .858 | | |
| INT1 | | | | .877 | |
| INT2 | | | | .818 | |
| INT3 | | | | .869 | |
| % of Variance | 19.041% | 18.995% | 18.681% | 14.792% | 14.452% |
| | | | 85.960% | | |

*Note:*
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .880 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 2744.645 |
| | df | 153 |
| | Sig. | .000 |

### *4.2 Demographic Profile of Respondents and Restaurant Categories*

The demographic characteristics of the respondents are shown in Table 4. According to the table, the sample consisted primarily of people aged 40-49 years (40.3%), followed by people aged 30-39 years (27.5%). In terms of gender, the majority (67.8%) of the respondents were male. The majority of respondents (38.9%) had between 5 and 10 years of food and beverage-related work experience, with the fewest (8.7%) having more than 20 years. Most (65.1%) of the respondents were restaurant managers, with 57.7% of the respondents having attained a diploma education level.

Table 4: Demographic profile of respondents and restaurants

| **Profile** | **Freq** | **%** | **Profile** | **Freq** | **%** |
|---|---|---|---|---|---|
| ***Age*** | | | ***Education Level*** | | |
| 20 – 29 Years | 13 | 8.7 | Diploma | 86 | 57.7 |
| 30 – 39 Years | 41 | 27.5 | Undergraduate | 63 | 42.3 |
| 40 – 49 Years | 60 | 40.3 | Total | 149 | 100.0 |
| 50 – 59 Years | 22 | 14.8 | | | |
| 60 Plus Years | 13 | 8.7 | ***Take Away Services*** | | |
| **Total** | **149** | **100.0** | Yes | 117 | 78.5 |
| | | | No | 32 | 21.5 |
| ***Gender*** | | | **Total** | **149** | **100.0** |
| Male | 101 | 67.8 | | | |
| Female | 48 | 32.2 | ***Take Away Intentions*** | | |
| **Total** | **149** | **100.0** | N/A | 117 | 78.5 |
| | | | Yes | 32 | 21.5 |
| ***Experience*** | | | **Total** | **149** | **100.0** |
| < 5 Years | 34 | 22.8 | | | |
| 5 – 10 Years | 58 | 38.9 | ***Meal Preparation*** | | |
| 11 – 20 Years | 44 | 29.5 | On-Premise | 143 | 96.0 |

| | | | | | |
|---|---|---|---|---|---|
| > 20 Years | 13 | 8.7 | Off-Site | 6 | 4.0 |
| **Total** | **149** | **100.0** | **Total** | **149** | **100.0** |
| | | | | | |
| ***Position*** | | | | | |
| Restaurant Manager | 97 | 65.1 | | | |
| Restaurant Owner | 3 | 2.0 | | | |
| Manager and Owner | 49 | 32.9 | | | |
| **Total** | **149** | **100.0** | | | |

The majority (78.5%) of the respondents reported that their restaurant provided takeaway, with the remaining 21.5% indicating intentions to provide takeaway services. Most of the respondents (96%) also stated that their restaurant's meal preparation was done on the premises.

### *4.3 Determinants of Virtual Kitchen Adoption*

The multiple linear regression analysis results (see Tables 5, 6, and 7) show that all predictors, namely PE, EE, FC, and PV, had significant effects on the intention to use virtual kitchens ($F[4, 144] = 20.662$, $p. < 01$, $R^2 = .365$). This means that the four predictors account for 36.5% of the variance in licensed restaurants' intention to use virtual kitchens in Kenya. Of the four UTAUT constructs considered in this study, FC emerged as the most critical predictor of intention to use virtual kitchen among Kenyan licensed restaurants ($\beta = .215$, $t = 2.374$, $p < .05$), followed by PV, PE and EE in that order (see Table 7). Previous research, on the other hand, found PE (e.g., Dakduk, 2023; Karulkar et al., 2021; Venkatesh et al., 2012) and EE (Karulkar et al., 2021) as the most dominant UTAUT predictors.

Table 5: Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .604[a] | .365 | .347 | .69286 |

*Note:*

a. Predictors: - (Constant), Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Price Value (PV)

Table 6: ANOVAa

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 39.675 | 4 | 9.919 | 20.662 | .000[b] |
| | Residual | 69.129 | 144 | .480 | | |
| | Total | 108.804 | 148 | | | |

*Note:*

a. Dependent Variable: Intention to use Virtual Kitchen (INT)

b. Predictors: (Constant), Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Price Value (PV)

Table 7: Regression Coefficients

| | USTC | | STC | | | COS | |
|---|---|---|---|---|---|---|---|
| **Model** | **B** | **STE** | **Beta** | **t** | **Sig.** | **TOL** | **VIF** |
| (Constant) | .638 | .360 | | 1.772 | .078 | | |
| Performance Expectancy (PE) | .195 | .092 | .192 | 2.131 | .035 | .545 | 1.835 |
| Effort Expectancy (EE) | .187 | .093 | .173 | 2.000 | .047 | .591 | 1.693 |
| Facilitating Conditions (FC) | .215 | .091 | .202 | 2.374 | .019 | .611 | 1.635 |
| Price Value (PV) | .206 | .099 | .182 | 2.073 | .040 | .575 | 1.740 |

*Note:*

a. Dependent Variable: Intention to use Virtual Kitchen (INT)

USTC - Unstandardized Coefficients; STC - Standardized Coefficients; COS - Collinearity Statistics; STE - Std. Error; TOL – Tolerance; VIF – Variance Inflation Factor



### *4.3.1 Effect of Facilitating Conditions on Intention to Use Virtual Kitchens*

The findings show that FC was the most important construct in predicting virtual kitchen use intentions among licensed restaurants in Kenya. FC entails the availability of necessary infrastructure and structures for the successful implementation of a virtual kitchen. According to the current study findings, a percentage increase in the perception that relevant structures and infrastructures are available to support virtual kitchen use increases the intention to use virtual kitchens by about 0.22% among licensed restaurants. The findings suggest that for licensed restaurants in Kenya to adopt virtual kitchens, it is critical to assess the availability of necessary infrastructure and structures to facilitate the transition to a more streamlined delivery model. These would include the availability of production and packing equipment, the availability of space, the incorporation of technology such as point-of-sale (POS) systems and

online food delivery platforms (OFDs), as well as the logistical aspects associated with forming partnerships with delivery companies.

Given that virtual kitchen adoption in Kenya is still in its early stages, restaurateurs in Kenya are more likely to form intentions when they perceive the facilitating conditions to be favorable for the virtual kitchen model's implementation. The current study's findings agree with those of Ongkasuwan et al. (2022), who discovered a statistically significant relationship between FC and virtual kitchen adoption in Thailand, China, and the US. This finding adds to previous research that found FC had a significant effect on intentions to use OFD services (e.g., Capri, 2021; Hakim et al., 2023; Karulkar et al., 2021). The study's findings, however, contradict those of Gouveia (2021), who found no statistically significant impact of facilitating conditions on the use of virtual kitchens in Portugal.

### *4.3.2 Effect of Price Value on Intention to Use Virtual Kitchens*

According to the current study's findings (see Table 7), the second most important UTAUT construct in predicting licensed restaurants' intentions to use virtual kitchens in Kenya was PV. The study findings generally indicate that a percentage increase in the perception that virtual kitchen use will result in lower operational costs in comparison to the resulting benefits increases intention to use virtual kitchens among licensed restaurants by approximately 0.21%. PV, in this context, refers to the cost of licensed restaurants in Kenya adopting virtual kitchens. Restaurant managers/owners are constantly aware of their operating costs and will only consider strategies that offset their costs in comparison to the benefits realized. In this regard, restaurateurs would incur initial investment costs related to production and packaging equipment, as well as rental costs in some cases. Additional expenses would include those associated with partnering with delivery companies and OFD platforms such as Uber Eats, Glovo, and Jumia Food, as well as commissions paid out. The perceived benefit of venturing

into virtual kitchens, on the other hand, must outweigh the perceived cost of operating a traditional restaurant. When compared to operating a traditional restaurant, using a virtual kitchen would result in lower initial investment costs, lower rental costs, lower staff costs, and lower marginal cost of operation.

According to the study findings, managers/owners of licensed restaurants in Kenya will be more willing to use virtual kitchens if they believe there will be a significant reduction in operational costs when compared to the accruing benefits of virtual kitchen use. While partnering with delivery companies, OFDs linkage, and commissions paid to delivery personnel will incur additional costs, the benefits realized, such as reduced costs associated with in-house staff and rental units, would outweigh the costs incurred. The study findings support those of other researchers (e.g., Gouveia, 2021; Ongkasuwan et al., 2022), who discovered that PV had a significant impact on virtual kitchen adoption. The study also corroborates other previous findings (e.g., Cai et al., 2022; Capri, 2021; Hakim et al., 2022; Kuttimani et al., 2018; Palau-Saumell et al., 2019; Vu et al., 2023) that used UTAUT to understand technology adoption in other similar contexts and concluded that PV had a significant impact on technology adoption intentions.

### *4.3.3 Effect of Performance Expectancy on Intention to Use Virtual Kitchens*

PE was the third most important UTAUT construct that predicted Kenyan licensed restaurants' intention to use virtual kitchens (see Table 7). PE refers to the perceived benefit that managers/owners of licensed restaurants in Kenya will gain from using virtual kitchens in carrying out their business operations. According to the study findings, a percentage increase in the belief that virtual kitchens will result in positive outcomes increases the intention to use virtual kitchens among licensed restaurants by about 0.20%. In this case, performance metrics would include both operational (e.g., increased service delivery efficiency, innovation

capacity) and financial metrics (e.g., reduced cost of operations, enhanced profit margins, energy usage, ecological foodprint, uncertanity etc.) (Işık et al., 2024, 2023a, 2023b, 2021, 2018, 2017, 2020, 2014; Masud et al., 2024; Pasigai et al., 2024; Anas et al., 2023; Bulut et al., 2023; Dogru et al., 2023a, 2023b; Faroog et al., 2023; Han et al., 2023; Islam et al., 2023a, 2023b; Jabeen et al., 2023; Karagoz et al., 2023, 2021; Koscak et al., 2023; Ahmad et al., 2022; Alvarado et al., 2022a, 2022b, 2022c Deng et al., 2022; Ongan et al., 2022). In line with the study, restaurant managers/owners are more likely to implement virtual kitchens if they believe it will improve restaurant performance. Licensed restaurants in Kenya would benefit from the use of virtual kitchens in terms of fulfilling takeaway orders placed through OFD systems. This would increase the convenience and speed with which online orders are fulfilled, thereby increasing restaurant sales productivity. The findings are consistent with those of Gouveia (2021) and Ongkasuwan et al. (2022), who found that performance expectancy predicted virtual kitchen adoption significantly. Other studies that have used UTAUT to understand technology adoption (e.g., Capri, 2021; Dakduk, 2023; Hong et al., 2023; Karulkar et al., 2021; Lee et al., 2019; Palau-Saumell et al., 2019; Vu et al., 2023) have found similar results. For instance, Hong et al. (2023) in their study indicated that PE significantly affected the adoption and use of online food delivery systems. Unlike Dakduk (2023) and Karulkar et al. (2021), the current study, while significant, did not identify PE as the most dominant UTAUT construct in predicting technology intention.

#### *4.3.4 Effect of Effort Expectancy on Intention to Use Virtual Kitchens*

The EE construct was the least dominant UTAUT construct that significantly predicted the intention to use virtual kitchens by Kenyan licensed restaurants (see Table 7). In this regard, EE is the degree of convenience and ease experienced when using virtual kitchens. Though virtual kitchens function in the same way that traditional kitchens do, they are technologically

advanced kitchens designed to maximize delivery. It is therefore expected that the operation of the virtual kitchen and its technological application will be easily understood by its adopters or users among licensed restaurants in Kenya. According to the study findings, a percentage increase in the belief that virtual kitchen use will be simple increases the intention to use virtual kitchens among licensed restaurants by about 0.19%.

The study suggests that managers/owners of licensed restaurants in Kenya are more likely to adopt virtual kitchens if they believe that their adoption will be an easy process free from any technicality and complexity. It should be simple for users to transfer the process of preparing meals for takeaway orders to a virtual kitchen. As a result, managers/owners of these Kenyan restaurants should find it simple to learn about and use the virtual kitchen platform. The connection between virtual kitchens and OFD platforms in Kenya like Jumia Food, Uber Eats, and Glovo should be seamless. The partnering process should also be simple for restaurateurs to consider investing in such a business model. The findings of this study are consistent with those of Ongkasuwan et al. (2022), who discovered a significant relationship between EE and virtual kitchen adoption. The results also concur with a similar study by Capri (2021), which found that EE substantially predicted OFD utilization. The findings further corroborate previous research (e.g., Palau-Saumell et al., 2019; Lee et al., 2019; Okumus et al., 2018; Khalilzadeh et al., 2017), which used the UTAUT framework to assess the role of EE in determining intention to use various technologies in the restaurant industry. The results, however, contradict Gouveia's (2021) finding that EE had no statistically significant impact on the acceptance and utilization of virtual kitchens in Portugal.

## 5. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

### *5.1 Conclusions*

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The primary goal of this study was to look into the factors that influence virtual kitchen adoption among licensed restaurants in Kenya using a modified UTAUT2 theory. The study relied on four UTAUT2 constructs, namely PE, EE, FC and PV to predict the intention to use virtual kitchens. Data was collected from managers/owners of 149 licensed restaurants in Kenya and subjected to multiple linear regression analysis.

The study discovered that all four constructs: FC, PV, PE, and EE were significant predictors of licensed restaurants' intention to use virtual kitchens in Kenya, in that order of importance. The study shows that before adopting such a concept, managers/owners of licensed restaurants in Kenya should first evaluate the availability of the relevant conditions, including infrastructure and structures, required for the successful adoption of virtual kitchens. The study also suggests that before implementing such a concept, restaurateurs in Kenya should weigh the cost implications of the investments against the perceived benefits. The findings further, emphasize that licensed restaurants in Kenya should only use virtual kitchens if they believe it will result in positive outcomes. Finally, the study reveals that restaurant owners and operators in Kenya should consider the ease of use of virtual kitchens before implementing them to streamline their business operations.

### *5.2 Research Limitations*

While this study presents some intriguing findings about the adoption of virtual kitchens among licensed restaurants in Kenya, it does have some limitations. The research begins with a recognition of the scarcity of scientific literature on the virtual kitchen business model. As a result, this study should be regarded as preliminary, particularly in Kenya. Second, the study only looked at licensed restaurants in Kenya and did not look at other restaurant types. It's unclear whether these establishments would be interested in the virtual kitchen business model. As a result, the study's findings may differ and these findings should only be applied to licensed

restaurant businesses in Kenya. Finally, the research was strictly quantitative in nature. Given that the virtual kitchen is still a new phenomenon in Kenya, more in-depth research using a qualitative lens would be interesting.

### *5.3 Recommendations for Future Studies*

Given that the current study focused solely on licensed restaurants, it is necessary to investigate and compare the adoption of virtual kitchens by restaurant categories not included in this study. Future research should also look into how a virtual kitchen partnership with OFD affects the intention to use virtual kitchens in Kenya, as well as the role of other stakeholders in the virtual kitchen adoption process. Future studies should also examine how contextual factors like restaurant location, target markets, and years of operation would affect adoption intentions of virtual kitchens. This current study can be expanded by conducting a mixed-method study on virtual kitchen adoption in Kenya to gain a better understanding.

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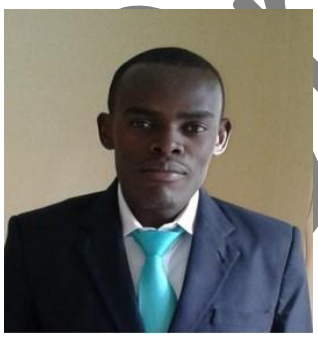

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**Tables**

Table 1: Application of UTAUT models in the hospitality and tourism context

| Author(s) | Research Context | Sample | Model | Statistical Method | UTAUT Variables |
|---|---|---|---|---|---|
| Gouveia, 2021 | VIRTUAL KITCHENs adoption, Portugal | N = 55 | Modified UTAUT | PLS-SEM | PE, EE, FC, PV |
| Palau-Saumell *et al.*, 2019 | Mobile apps used in Spanish restaurants | N = 1200 | Modified UTAUT-2 | SEM & CFA | PE, EE, FC, SI, HM, Habit |
| Lee *et al.*, 2019 | OFDs, Korea | N = 340 | Modified UTAUT-2 | CFA & SEM | PE, EE, FC, SI, HM, Habit, PV |
| Okumus *et al.*, 2018 | Acceptance of Smartphone diet apps, USA | N = 395 | UTAUT | PLS-SEM | PE, SI & EE |
| Khalilzadeh *et al.*, 2017 | NFC-based Mobile payment, USA | N = 412 | Extended UTAUT | SEM | SI, EE, FC, HM, PE, BI |

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Table 2: Reliability results

| Key Variables | Cronbach's Alpha | No. of items |
|---|---|---|
| Performance Expectancy (PE) | .952 | 4 |
| Effort Expectancy (EE) | .914 | 3 |
| Facilitating Conditions (FC) | .935 | 4 |
| Price Value (PV) | .934 | 4 |
| Intention to Use Virtual Kitchen | .926 | 3 |

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Table 3: Construct validity results through the rotated component matrix

| | Component | | | | |
|---|---|---|---|---|---|
| **Variables** | **PE** | **FC** | **PV** | **INT** | **EE** |
| EE1 | | | | | .820 |
| EE2 | | | | | .832 |
| EE3 | | | | | .831 |
| FC1 | | .852 | | | |
| FC2 | | .831 | | | |
| FC3 | | .840 | | | |
| FC4 | | .826 | | | |
| PE1 | .793 | | | | |
| PE2 | .878 | | | | |
| PE3 | .829 | | | | |
| PE4 | .845 | | | | |
| PV1 | | | .750 | | |
| PV2 | | | .856 | | |
| PV3 | | | .841 | | |
| PV4 | | | .858 | | |
| INT1 | | | | .877 | |
| INT2 | | | | .818 | |
| INT3 | | | | .869 | |
| % of Variance | 19.041% | 18.995% | 18.681% | 14.792% | 14.452% |
| | | | 85.960% | | |

*Note:*
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Kaiser-Meyer-Olkin Measure of Sampling Adequacy. .880

| | | |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 2744.645 |
| | df | 153 |
| | Sig. | .000 |



Table 4: Demographic profile of respondents and restaurants

| Profile | Freq | % | Profile | Freq | % |
|---|---|---|---|---|---|
| ***Age*** | | | ***Education Level*** | | |
| 20 – 29 Years | 13 | 8.7 | Diploma | 86 | 57.7 |
| 30 – 39 Years | 41 | 27.5 | Undergraduate | 63 | 42.3 |
| 40 – 49 Years | 60 | 40.3 | Total | 149 | 100.0 |
| 50 – 59 Years | 22 | 14.8 | | | |
| 60 Plus Years | 13 | 8.7 | ***Take Away Services*** | | |
| **Total** | **149** | **100.0** | Yes | 117 | 78.5 |
| | | | No | 32 | 21.5 |
| ***Gender*** | | | **Total** | **149** | **100.0** |
| Male | 101 | 67.8 | | | |
| Female | 48 | 32.2 | ***Take Away Intentions*** | | |
| **Total** | **149** | **100.0** | N/A | 117 | 78.5 |
| | | | Yes | 32 | 21.5 |
| ***Experience*** | | | **Total** | **149** | **100.0** |
| < 5 Years | 34 | 22.8 | | | |
| 5 – 10 Years | 58 | 38.9 | ***Meal Preparation*** | | |
| 11 – 20 Years | 44 | 29.5 | In-Premise | 143 | 96.0 |
| > 20 Years | 13 | 8.7 | Off-Site | 6 | 4.0 |
| **Total** | **149** | **100.0** | **Total** | **149** | **100.0** |
| | | | | | |
| ***Position*** | | | | | |
| Restaurant Manager | 97 | 65.1 | | | |
| Restaurant Owner | 3 | 2.0 | | | |
| Manager and Owner | 49 | 32.9 | | | |
| **Total** | **149** | **100.0** | | | |

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Table 5: Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .604[a] | .365 | .347 | .69286 |

*Note:*

b. Predictors: - (Constant), Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Price Value (PV)

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Table 6: ANOVAa

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 39.675 | 4 | 9.919 | 20.662 | .000[b] |
| | Residual | 69.129 | 144 | .480 | | |
| | Total | 108.804 | 148 | | | |

*Note:*

a. Dependent Variable: Intention to use Virtual Kitchen (INT)

b. Predictors: (Constant), Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Price Value (PV)

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Table 7: Regression Coefficients

| | USTC | | STC | | | COS | |
|---|---|---|---|---|---|---|---|
| **Model** | **B** | **STE** | **Beta** | **t** | **Sig.** | **TOL** | **VIF** |
| (Constant) | .638 | .360 | | 1.772 | .078 | | |
| Performance Expectancy (PE) | .195 | .092 | .192 | 2.131 | .035 | .545 | 1.835 |
| Effort Expectancy (EE) | .187 | .093 | .173 | 2.000 | .047 | .591 | 1.693 |
| Facilitating Conditions (FC) | .215 | .091 | .202 | 2.374 | .019 | .611 | 1.635 |
| Price Value (PV) | .206 | .099 | .182 | 2.073 | .040 | .575 | 1.740 |

*Note:*

b. Dependent Variable: Intention to use Virtual Kitchen (INT)

USTC - Unstandardized Coefficients; STC - Standardized Coefficients; COS - Collinearity Statistics; STE - Std. Error; TOL – Tolerance; VIF – Variance Inflation Factor

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**Figures**

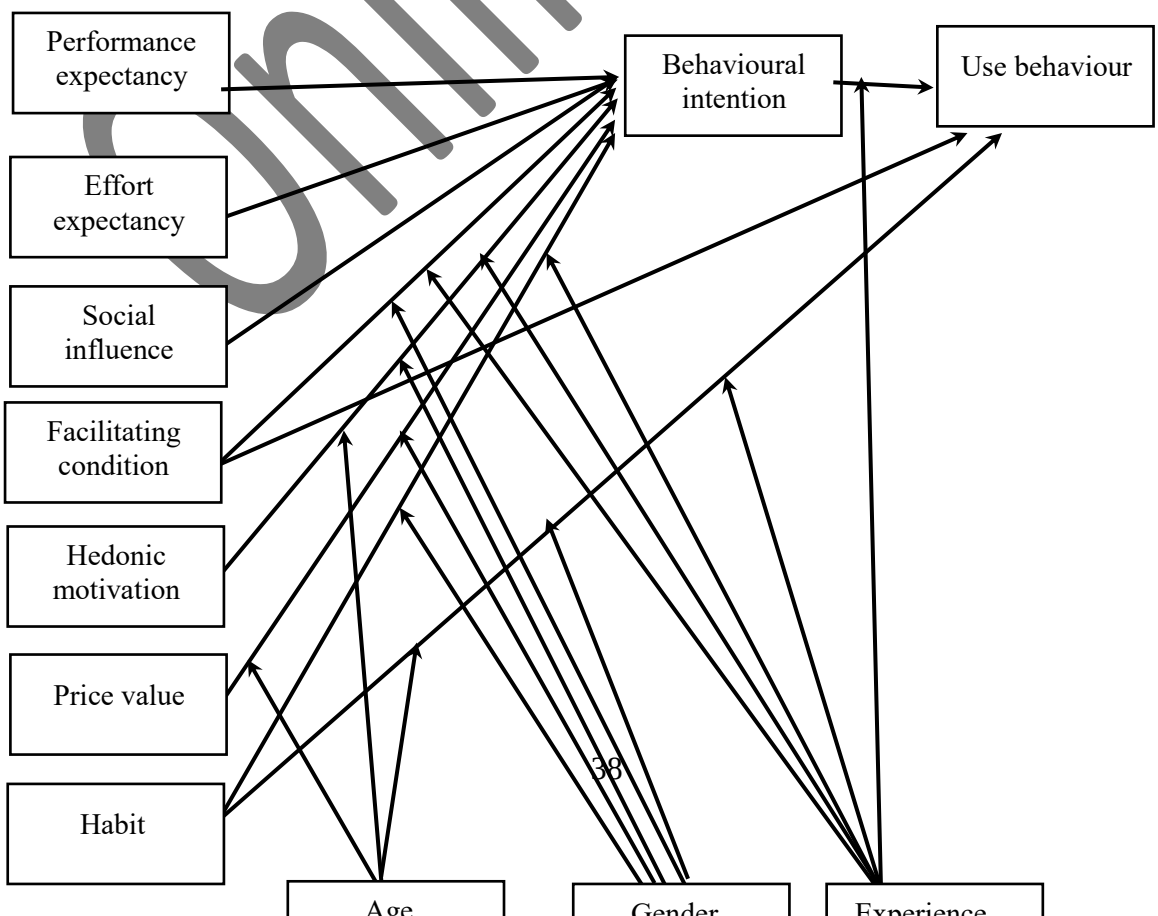

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Figure 1: UTAUT 2 Model (Venkatesh et al., 2012)



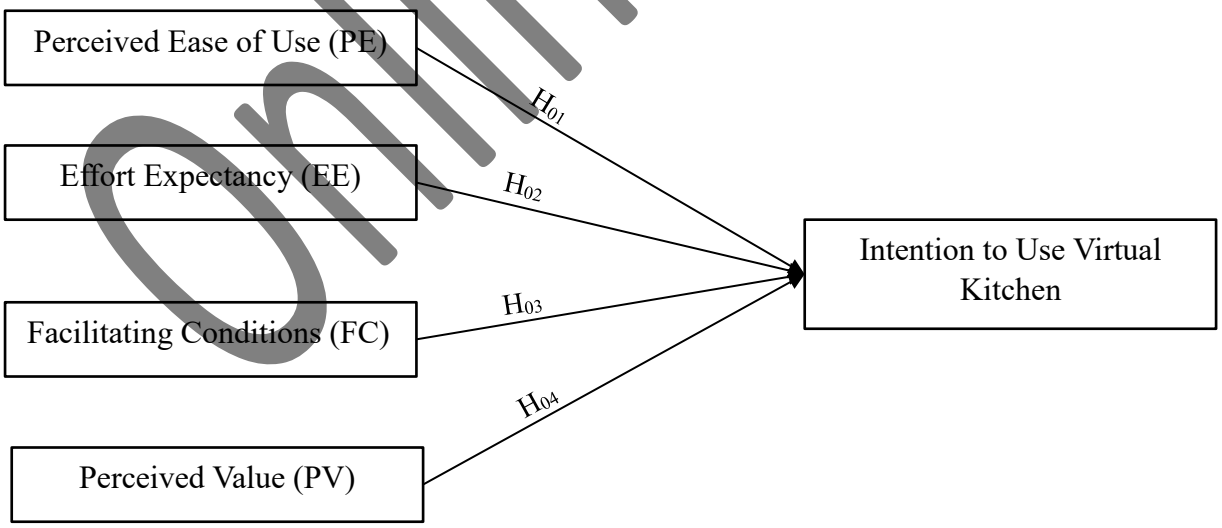


Figure 2. Research Model. Source: Adapted from Venkatesh et al. (2012)

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