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# Factors Influencing Consumer Adoption of New Technological Products: An Analytical Review of Technology Adoption Theories and Models

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## Abstract
This study aimed to identify the factors that play a role in influencing individuals' decisions to accept or reject any technology introduced to the market, thereby helping the responsible for marketing these technologies to increase the chances of their adoption by consumers. Accordingly, the study examined – through four main axes – the most important theories and models that have addressed the issue of technology adoption. The study concluded that the most significant factors are performance expectancy, effort expectancy, social influence, and facilitating conditions, as these factors appear in most theories. In addition, the factors of perceived trust and perceived risk have gained considerable attention recently and cannot be neglected in the technological environment.

**Keywords:** Consumer; Technology; Technology adoption theories.

## Introduction
One of the hallmarks of the modern era is the growing reliance on information and communication technology, which has become a primary source of wealth creation and competitive advantage at both macro and micro levels. This is a result of the rapid pace of technological development, which has exceeded all expectations and been accompanied by radical changes in all areas of life without exception. This technological evolution has had a profound impact on individuals' daily lives—starting with electronic products available in the market such as mobile phones, computers, video games, etc., through various electronic services that provide conveniences in many fields (e-learning, e-banking, e-commerce, mobile payment, social media, etc.), and up to the latest technological innovations represented by artificial intelligence.

Despite the availability of all these new technologies, their acceptance or rejection at the individual level has become a challenge for marketing researchers. It also preoccupies technology producers, making them wonder to what extent a new technology will be competitive in the market and how readily the target segment will accept its use. Therefore, researchers – in psychology, sociology, information systems, and marketing alike (such as Davis, Rogers, Venkatesh) – have developed several theories and models to predict technology adoption in various domains and to identify the factors that can influence it. This is the focus of the present study, which will present and analyze the most important of these theories by addressing the following central question:

**Research Problem**

What are the various factors that can influence individuals' behavior toward technology?

**Objectives of the Study**

This study aims to reach scientific findings that explain the reasons for the success or failure of any technology introduced to the market. These findings will, in turn, help in formulating marketing policies and strategies that enhance the likelihood of consumers accepting the technology.

**Methodology**

To achieve the study's objectives and answer the research question with sound findings, a **descriptive method** was adopted, as it is an analytical approach focused on describing information related to a particular subject.

**Structure of the Study**

To address the research problem, we have divided this paper into four main sections (axes) as follows:

1. **Psychological and Social Models of Technology Adoption**
2. **Technology Acceptance Model (TAM)**
3. **Innovation Diffusion Theory (IDT)**
4. **Unified Theory of Acceptance and Use of Technology (UTAUT) and Trust Theory**

**1. Psychological and Social Models of Technology Adoption**

Many theoretical models developed to explain and predict individuals' behavior in using information and communication technologies are rooted in social psychology. Two prominent examples are the **Theory of Reasoned Action (TRA)** and the **Theory of Planned Behavior (TPB)**, which will be discussed in this section.

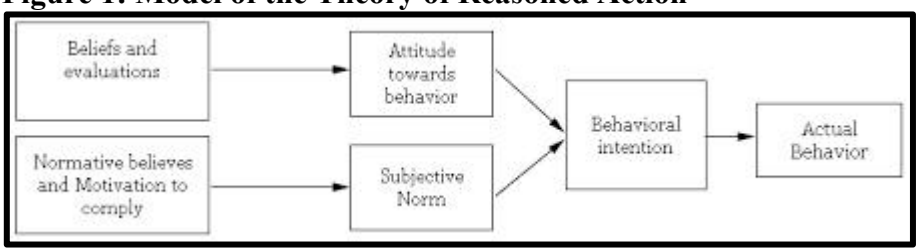
**1.1 Theory of Reasoned Action (TRA)**

The Theory of Reasoned Action, developed by Fishbein and Ajzen (1975), provides a suitable framework for explaining the formation of behavioral intentions through the components of individual attitudes and the social environment.[i] This theory posits that an individual's behavior is determined by their intention to perform that behavior, and that intention in turn is influenced by two factors: the person's attitude toward the behavior and their **subjective norm** (social pressure). In this context

- **Subjective norm** is determined by the individual's beliefs about how other people (especially those who are close or important to them) view the behavior in question—essentially, their perception of the social expectations regarding the appropriate behavior.
- **Attitude** toward the behavior is influenced by the strength of the individual's belief that performing a certain behavior will lead to the expected outcomes. In other words, the more strongly a person believes that enacting the behavior will yield positive results, the more favorable their attitude toward that behavior will be.[ii]

The figure below illustrates the relationship between attitudes, intention, and ehavior according to the Theory of Reasoned Action.

**Figure 1: Model of the Theory of Reasoned Action**



*Source: Chong Pui San Bessie, "Consumer Trust, Perceived Value and Behavioral Intention in Online Auction," PhD dissertation, City University of Hong Kong, January 2005, p. 49.*

In the field of information technology, TRA has been used as a foundation to test the adoption of several new technologies, such as e-commerce, information systems management, and online banking, among others. It has also been applied in various domains beyond IT. However,[iii] the theory has been criticized by some researchers because it assumes that all behaviors are under full volitional control of the individual. To address this limitation, Ajzen extended TRA in 1991 and proposed a new theory—**Theory of Planned Behavior (TPB)**—by adding a third factor (perceived behavioral control) to the model. This addition recognizes that not all behavior is completely voluntary: the stronger an individual's perceived control over the behavior, the more likely they are to intend to perform it. [iv]

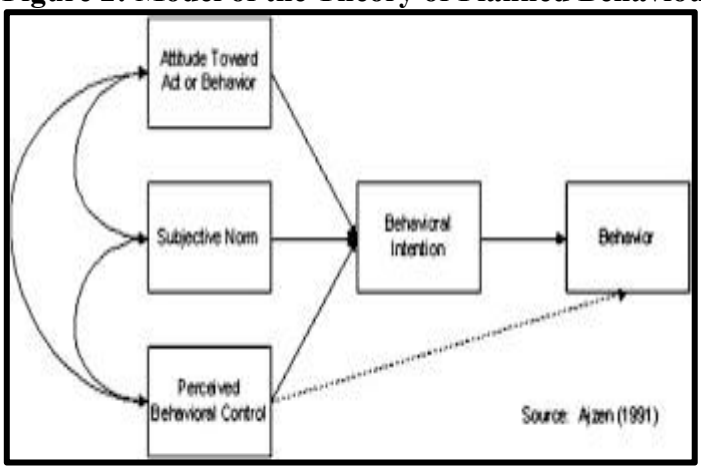
### 1.2 Theory of Planned Behavior (TPB)

Ajzen's Theory of Planned Behavior builds upon TRA by introducing the concept of **perceived behavioral control**. Essentially, TPB assumes that human social behavior is often guided automatically by the information or beliefs people have about the behavior in question. These beliefs stem from a variety of sources such as personal experiences, formal education, mass media (radio, newspapers, television, internet), and interactions with family and friends. Regardless of their origin, these beliefs shape the decision of whether or not to perform the behavior. Ajzen distinguishes between three types of beliefs:

1. **Behavioral beliefs:** Individuals hold beliefs about the positive or negative outcomes that may result from performing the behavior. These expected outcomes (i.e. behavioral beliefs) determine the individual's attitude toward performing the behavior — in other words, whether they evaluate the behavior positively or negatively. Generally, to the extent that performing the behavior is perceived to lead to more positive outcomes than negative ones, the attitude toward the behavior will be favorable.
2. **Normative beliefs:** Individuals form beliefs about whether important people or groups in their lives would approve or disapprove of them performing the behavior, and also whether those referent individuals themselves perform the behavior. These normative beliefs give rise to **subjective norms** (social pressure to perform or not perform the behavior).
3. **Control beliefs:** Individuals develop beliefs about personal and environmental factors that may facilitate or impede their attempts to perform the behavior. These beliefs about control contribute to perceptions of high or low self-efficacy and form one's **perceived behavioral control** regarding the behavior. [v]

Based on this framework, the Theory of Planned Behavior holds that an individual's actual behavior is determined by their **behavioral intention**, which in turn is shaped by three components: (a) the person's **attitude** toward performing the behavior (i.e. their overall positive or negative evaluation of engaging in that behavior); (b) **subjective norms**, which arise from social pressure regarding whether one should or should not perform the behavior; and (c) **perceived behavioral control**, the new factor added to TRA, which refers to the perceived ease or difficulty of performing the behavior. Perceived behavioral control is based on one's prior experience and anticipated obstacles or barriers. [vi] As a general rule, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger the individual's intention to perform the behavior. It should be noted, however, that the relative importance of these three factors can vary across behaviors and contexts. [vii] The figure below provides a graphical depiction of the Theory of Planned Behavior model.

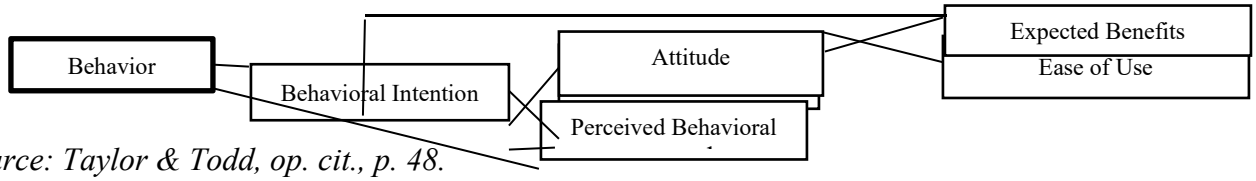
**Figure 2: Model of the Theory of Planned Behaviour**




*Source: Paul Baines & Chris Fill, "Marketing," Oxford University Press, 3rd Edition, 2014, p. 59.*

Although TPB was criticized by some for excluding the influence of emotions (for example, feelings of enjoyment),[viii] it has been widely applied to study numerous new information technologies — for instance, online shopping (e-commerce) and internet banking. Subsequent researchers proposed extensions to TPB; one notable development was the **decomposed Theory of Planned Behavior** by Taylor and Todd (1995), which combined elements of TRA, TPB, and TAM (Technology Acceptance Model) into an integrated framework, [ix]as shown in the following figure.

**Figure 3: Model of the Decomposed Theory of Planned Behavior (Taylor & Todd, 1995)**




*Source: Taylor & Todd, op. cit., p. 48.*

According to Taylor and Todd's model, the primary determinants of a consumer's intention to adopt a technology are **attitude**, **subjective norms**, **perceived behavioral control**, and **perceived usefulness**. In this integrated model, **perceived ease of use** influences behavioral intention indirectly: it affects intention by impacting the individual's attitude and by influencing the perceived usefulness of the technology.

## 2. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a framework developed to capture users' perceptions of any new technology via specific factors that influence their willingness to use that technology in the future.[x] TAM has become the most widespread and frequently applied model for examining acceptance of a wide variety of technologies. It was initially devised as a method to predict and explain the acceptance of information technology,[xi] particularly to evaluate software applications within organizations. Below, we highlight the key determinants included in this model.

### 2.1 Original TAM (Davis, 1989)

Fred D. Davis was one of the foremost researchers studying users' acceptance of new technologies. [xii] In 1986, aiming to explain user behavior toward information systems, he developed the Technology Acceptance Model, drawing upon the earlier Theory of Reasoned

Action and Theory of Planned Behavior. [xiii] Davis hypothesized that a user's **attitude** toward a given technology is a primary factor influencing whether they will actually use it. [xiv] Furthermore, he assumed that individuals tend to use or not use a technology depending on the degree to which they believe it will help them perform their tasks better – a belief referred to in TAM as **perceived usefulness**. However, even if prospective users perceive a technology to be useful, they may simultaneously believe that it is too difficult to use. Thus, the performance benefits of using the technology could be outweighed by the effort required to use it – a concept captured as **perceived ease of use** in the model. [xv]

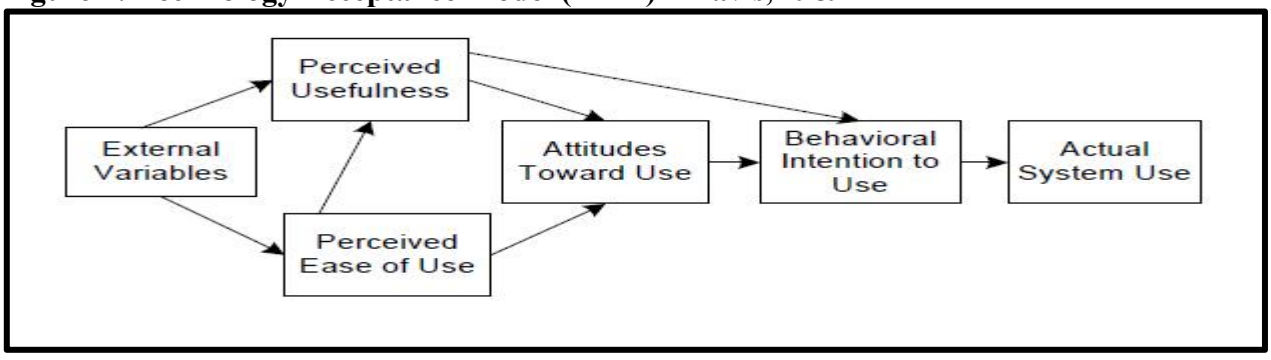
In TAM, an individual's intention to use a technology is influenced by their attitude toward that technology, and attitude itself is shaped by the person's beliefs about the **perceived usefulness** of the technology and its **perceived ease of use**. [xvi] These core TAM constructs are defined as follows:

- **Perceived Usefulness:** The degree to which an individual believes that using a particular technology will enhance their job performance or productivity.
- **Perceived Ease of Use:** The degree to which an individual believes that using the technology will be free of physical and mental effort.

The model further posits that perceived ease of use has a direct and strong effect on perceived usefulness. Given two technologies that offer the same functionality, users will generally choose the one that is easier to use. Therefore, designers should aim to increase a technology's perceived usefulness either by adding new functional features or by making it simpler to use. [xvii]

TAM is built on principles adopted from the **attitudinal approach** in psychology (Fishbein & Ajzen, 1975). According to that perspective, external stimuli influence a person's attitude indirectly by altering the person's beliefs about the consequences of a behavior. In the TAM context, the design features of a technology act as **external stimuli** that affect users' beliefs about using the technology. [xviii] In other words, the characteristics of the technology's design indirectly influence the user's attitude toward the technology by directly affecting the perceived usefulness and perceived ease of use. The diagram below presents Davis's original Technology Acceptance Model. [xix]

**Figure 4: Technology Acceptance Model (TAM) – Davis, 1989**



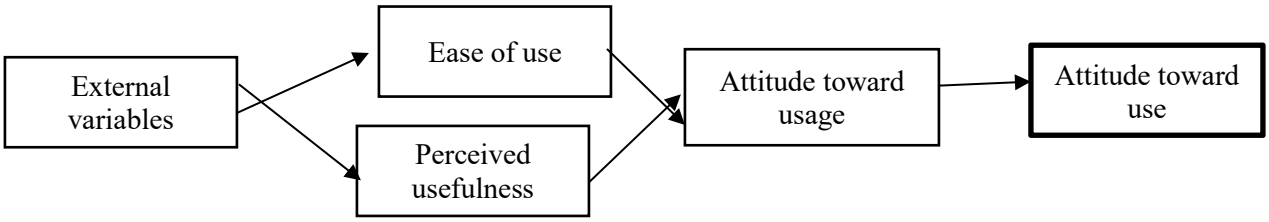

***Source:*** *Fred D. Davis, "User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impacts," International Journal of Man-Machine Studies, 38(3), 1993, p. 476.*

## 2.2 Revised TAM (Davis et al., 1993)

In 1993, Davis and colleagues proposed a modification to the Technology Acceptance Model, noting that **perceived usefulness** has a direct effect on the intention to actually use the

technology. [xx] Through numerous empirical tests of TAM, perceived usefulness consistently emerged as a strong direct determinant of usage intentions. [xxi] The revised model thus allowed perceived usefulness to influence behavioral intention not only through attitude but also directly.

**Figure 5: Revised Technology Acceptance Model (TAM), Davis et al., 1993**




*Source: Wadi' Nasri, "Model of Internet Banking Adoption in Tunisia" ("Adoption Model of Internet Use in Banking Services in Tunisia"), Jordanian Journal of Business Administration, University of Jordan, Vol. 11, No. 3, 2015, p. 672.*
*(Note: Figure 5 illustrates the modified TAM as described by Davis et al., 1993.)*

## 3. Innovation Diffusion Theory (IDT) – Rogers

In this section, we discuss the foundations of the **Innovation Diffusion Theory (IDT)** developed by Everett M. Rogers, which is one of the most widely used theories in the field of marketing to study how innovations are adopted. This theory seeks to explain **how**, **why**, and **at what rate** innovations spread through markets.

### 3.1 The Innovation Adoption Process (according to Rogers)

The theoretical origins of studying the adoption of new products or innovations among consumers in target markets can be traced back to Rogers' research in the early 1960s. Rogers distinguished between **adoption** – which pertains to the decision made by an individual consumer or a decision-making unit to make full use of a new product or idea – and **diffusion** – which is the spread of the innovative idea from its source (e.g. the company or originator) to the end users or consumers. Rogers' early work in this area served as a launch pad for numerous subsequent studies aimed at identifying the factors and influences underlying the decision to adopt or reject a given product. [xxii]

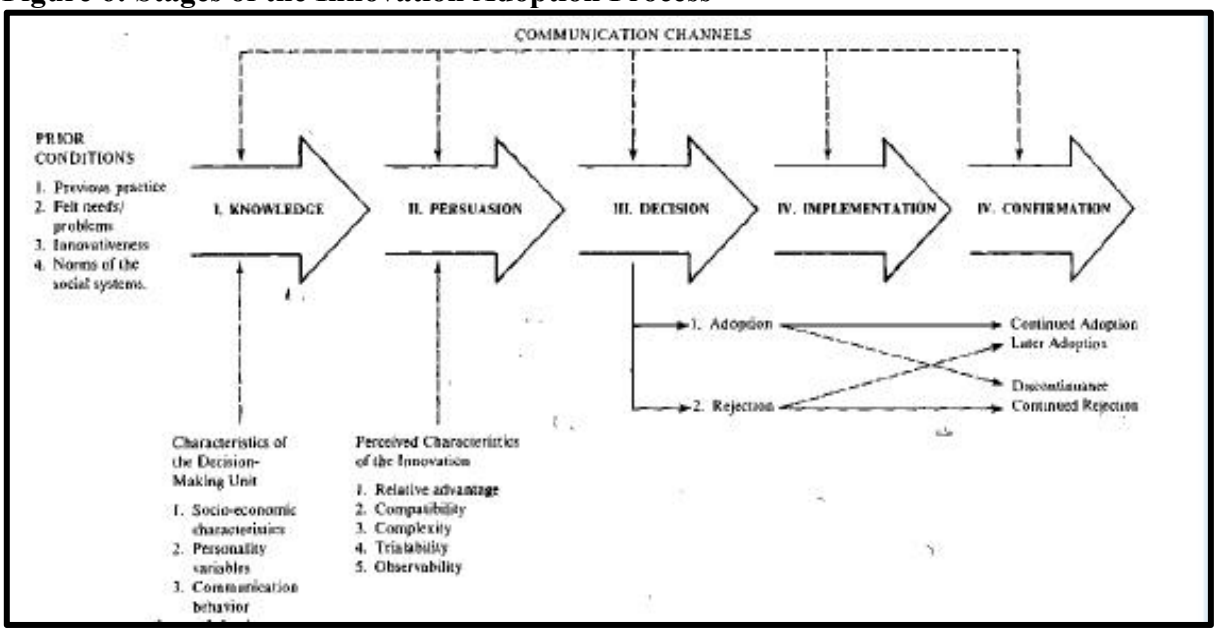
In marketing, the process of adopting a new product by a target market can pertain to a **category of products** (e.g. televisions, mobile phones), a **specific product** (e.g. a flat-screen TV, a 3G smartphone), [xxiii] or an **entirely new technology** (e.g. the fax machine, ATMs, email, personal computers, e-commerce). [xxiv] The **time dimension** is a key factor in the adoption process for both parties involved: on one hand, the company strives to accelerate the diffusion of its product within as short a time as possible; on the other hand, consumers are eager to decide to adopt the product and start using it to benefit from its unique advantages as quickly as possible. [xxv]

The acceptance or rejection of new products is a matter of critical importance. Marketers, when introducing an innovation to the market, pay close attention to the stages a consumer passes through before adopting the product and the length of time needed for the consumer to accept it and incorporate it into their set of routinely used products. The success of a new product's diffusion in the market largely depends on how well the marketer understands these stages and the factors influencing each stage. Such understanding enables the marketer to devise an appropriate marketing mix that can influence consumer behavior and accelerate the adoption process. [xxvi]

Rogers, the architect of the Diffusion of Innovation theory (which is applicable in both

individual and organizational contexts),[xxvii] defined the **adoption process** as *"the process through which an individual consumer or decision-making unit passes, beginning with awareness of the new product, followed by the formation of attitudes, leading to a decision to adopt or reject, and then to continued use or discontinuation of use."* In other words, consumers move through sequential stages from initially learning of an innovation, to developing an opinion about it, to deciding on adoption or rejection, and finally to either continuing or ceasing its use post-adoption. [xxviii]

**Figure 6: Stages of the Innovation Adoption Process**




*Source: Everett M. Rogers, "Diffusion of Innovation," Free Press, 5th edition, 2003, p. 170.*

### 3.2 Perceived Characteristics of Innovations

According to Rogers (2003), consumers' intention to purchase or adopt a new product is strongly linked to how potential adopters **perceive the characteristics** of that innovation. Rogers identified five key perceived attributes of innovations. (These attributes primarily influence the second stage of the adoption process – the persuasion stage, where consumers form an attitude toward the product.) The five characteristics are: [xxix]

- **Relative Advantage:** The degree to which an individual perceives an innovation to be better than the product it supersedes. A greater relative advantage (which is positively related to adoption) can manifest as economic benefits and/or social prestige.
- **Compatibility:** The degree to which the innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. An innovation that is more compatible with the adopters' lifestyle and values will create less uncertainty, thereby facilitating adoption.
- **Complexity:** The degree to which an innovation is perceived as relatively difficult to understand and use. Rogers posits that complexity has a negative relationship with the rate of adoption – the more complex an innovation is perceived to be, the slower its adoption.
- **Trialability:** The degree to which an innovation can be experimented with on a limited basis before making a full adoption decision. The ability to trial or sample an innovation (for example, through free samples or trial versions) can accelerate its adoption and diffusion, as it reduces the risk to the consumer.

- **Observability:** The degree to which the results or benefits of an innovation are visible to others. Innovations with outcomes that are easily observed and communicated tend to be adopted more quickly.

Innovations that are perceived by individuals as having more of these desirable attributes will be adopted more rapidly than those that do not. Prior research indicates that these five attributes are among the most important factors in explaining an innovation's rate of adoption, with the first two attributes — relative advantage and compatibility — generally being the most influential. [xxx]

Based on Rogers' original work (1962), **Ostlund (1974)** suggested a sixth attribute by emphasizing the role of **perceived risk** in the adoption of innovations. He argued that accepting an innovation also depends on the individual's perception of risk associated with it, which refers to the potential negative consequences (financial, psychological, or otherwise) that the consumer might experience if the adoption decision turns out to be a wrong choice. [xxxi]

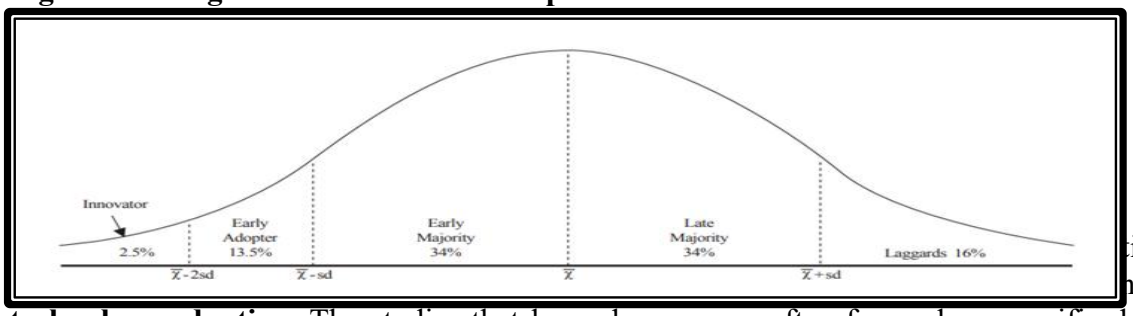
### 3.3 Categories of Innovation Adopters

The decision to adopt an innovation does not occur uniformly across all consumers; individuals vary in how quickly and readily they embrace new products. Some consumers are quick to adopt innovations, others take more time, and some never adopt them at all. [xxxii] **Time** is thus a critical factor in the diffusion process. Rogers categorized adopters into several groups, each having distinct characteristics that influence how they perceive and respond to innovations, as well as the length of time they take to adopt. According to Rogers' classification, the adopter categories are: [xxxiii]

- **Innovators:** These are the very first users of a new product, comprising roughly 2.5% of potential consumers. Innovators are venturesome and eager to experiment with new ideas and products. They tend to be well-informed, socially active, and willing to take risks. Their enthusiasm for new products also leads them to communicate with others and provide guidance or opinion leadership about the innovation.
- **Early Adopters:** This group accounts for about 13.5% of potential consumers and is often referred to as the "visionaries" or opinion leaders. Early adopters are characterized by a high degree of opinion leadership in their communities; they are respected by their peers and are not as risk-prone as innovators, but they adopt new ideas early and judiciously. Marketers often view early adopters as key influencers who can spur broader diffusion of the product.
- **Early Majority:** The early majority constitutes roughly 34% of the target consumer population. These consumers adopt new products slightly before the average person, though they typically take some time to deliberate before adopting. They are more deliberate and cautious, having an average social status with medium income, education, and risk tolerance. The early majority looks for evidence of the innovation's effectiveness and benefits before committing.
- **Late Majority:** Also about 34% of potential consumers, the late majority is more skeptical and cautious about innovations. They tend to adopt only after a significant portion of the population has already accepted the innovation (i.e. when it has become mainstream). Members of the late majority often have below-average social status or are more traditional; their skepticism and financial constraints make them hesitant to adopt new products until the benefits are clearly established and pressure from peers or economic necessity compels adoption.
- **Laggards:** Making up roughly 16% of consumers, laggards are the last to adopt an innovation, if they ever do. They typically have the lowest social status, are often older and

more set in their ways, and may have lower financial resources. Laggards rely on traditional solutions and will only adopt a new product when it has become deeply entrenched in society or perhaps even approaching obsolescence. They often wait until an innovation is fully mature or even being replaced by another innovation before considering its adoption.
The critical marketing challenge for any firm introducing an innovation is to transition from a phase where the product is only adopted by Innovators and Early Adopters to a phase where it is embraced by the **early majority and late majority** (together representing about 68% of the market). Reaching this broad audience often determines the commercial success of an innovation. [xxxiv]

**Figure 7: Categories of Innovation Adopters**




tions in ntext of **technology adoption**. The studies that have done so are often focused on specific domains such as the adoption of electronic banking, either examining diffusion of innovation directly or incorporating Rogers' constructs into other models. Most of these studies indicate that **relative advantage**, **compatibility**, and **complexity** are consistently significant factors in explaining the adoption of online banking services. Black et al. (2001) noted that while the diffusion of innovation theory provides a good starting framework for studying online banking adoption, it should be augmented with **social factors** and **individual differences** to attain a better understanding of the phenomenon. Furthermore, Rogers did not explicitly account for the **perceived risk** associated with an innovation in his original formulation, even though later research has shown that perceived risk can be an important factor in explaining the spread (or hesitation in adoption) of innovations such as online banking. [xxxv]

## 4. Unified Theory of Acceptance and Use of Technology (UTAUT) and Trust Theory

The theories discussed above each introduce several determinants of technology adoption. However, recent critical studies highlighted various shortcomings and gaps in these individual models. To achieve a more comprehensive understanding of technology acceptance and to identify additional relevant factors, researchers saw the need to either propose new integrative theories or to extend existing ones with new elements. In this section, we address two of the most current frameworks in this field: the **Unified Theory of Acceptance and Use of Technology (UTAUT)** and the **Trust-Based Model**.

### 4.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model was conceived in response to the multitude of different models and theories being used to explain technology acceptance. Researchers in information systems faced a challenge in choosing among these various models — some opted to select factors from multiple theories, [xxxvi] while others picked one model at the expense of others. This fragmentation highlighted the need to consolidate the important determinants into a single unified framework for analyzing user acceptance of technology. To this end, Venkatesh, Morris, and Davis (2003) developed the UTAUT model by synthesizing **eight existing**

**theories**, namely: (1) Theory of Reasoned Action, (2) Technology Acceptance Model, (3) Motivational Model, (4) Theory of Planned Behavior, (5) the combined TAM and TPB (C-TAM-TPB), (6) the Model of PC Utilization, (7) Innovation Diffusion Theory, and (8) Social Cognitive Theory. [xxxvii]

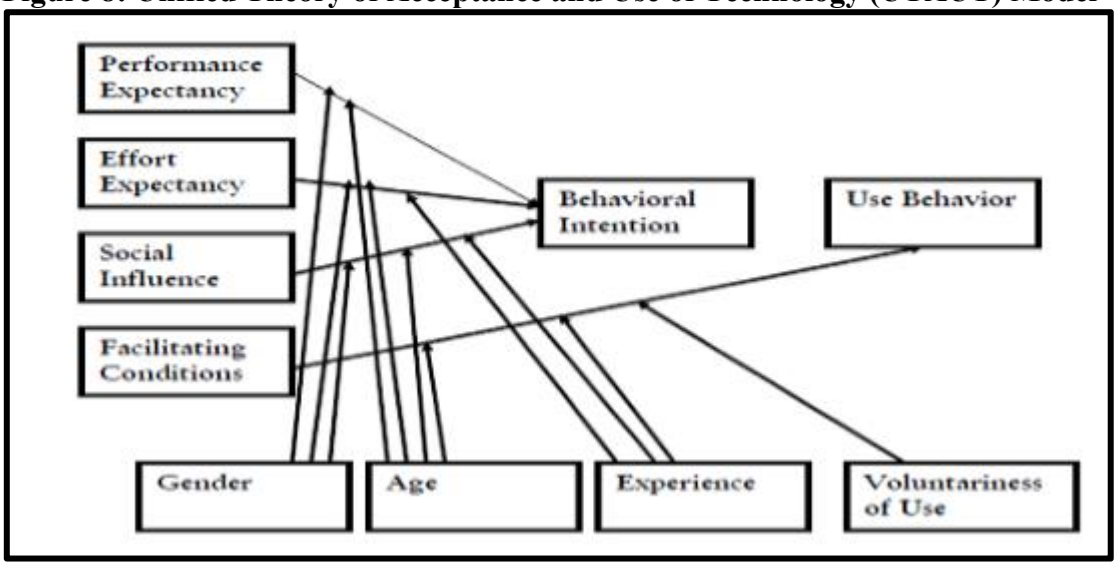
Since its first publication in 2003, the UTAUT model has served as a core framework applied to study a wide variety of technologies, in both organizational contexts (e.g. within companies) and non-organizational contexts (consumer usage). While UTAUT was initially validated primarily in organizational settings,[xxxviii] it has been extended to consumer contexts as well. UTAUT explains user adoption of new technologies through several key factors, defined as follows:

- **Performance Expectancy:** The degree to which using the technology is perceived to provide benefits to consumers in performing certain activities (i.e. the expected improvements in performance or productivity as a result of using the technology).
- **Effort Expectancy:** The degree of ease associated with consumers' use of the technology (analogous to how easy or effort-free the technology is to use).
- **Social Influence:** The extent to which consumers perceive that important others (such as family and friends) believe they should use a particular technology. This is essentially the effect of social pressure or encouragement on the individual's decision to adopt.
- **Facilitating Conditions:** Consumers' perceptions of the resources and support available to use the technology. This factor encompasses the degree to which an individual believes that an appropriate infrastructure (organizational or technical) exists to support the use of the technology.

In addition to these core determinants, the UTAUT framework also examines the impact of several moderating or control variables on technology adoption. The original UTAUT model included **voluntariness of use** and certain demographic factors (**gender, age, experience**) as moderators that could influence the strength of the relationships between the core determinants and technology acceptance. [xxxix] In 2012, Venkatesh et al. introduced **UTAUT2**, an extension of the unified theory tailored to consumer contexts. UTAUT2 added three new constructs that were not present in the original model: **hedonic motivation** (enjoyment derived from using the technology), **price value** (the consumer's cognitive tradeoff between the perceived benefits of the technology and the monetary cost of using it), and **habit** (the extent to which people tend to perform behaviors automatically due to learning). Additionally, UTAUT2 removed the **voluntariness** moderator, reasoning that for consumer technologies, use is typically voluntary (unlike in organizational settings where use can be mandated). Some studies also indicated that voluntariness has only an indirect effect on usage intention and no significant effect when consumers are the target users of a new technology. [xl]

The UTAUT model has been criticized by a few scholars for incorporating a large number of predictor variables, which can make the model complex. Nevertheless, it is generally considered more powerful than previous technology acceptance models (such as TAM and its variants) in explaining and predicting technology adoption. The following figure presents the Unified Theory of Acceptance and Use of Technology model. [xli]

**Figure 8: Unified Theory of Acceptance and Use of Technology (UTAUT) Model**

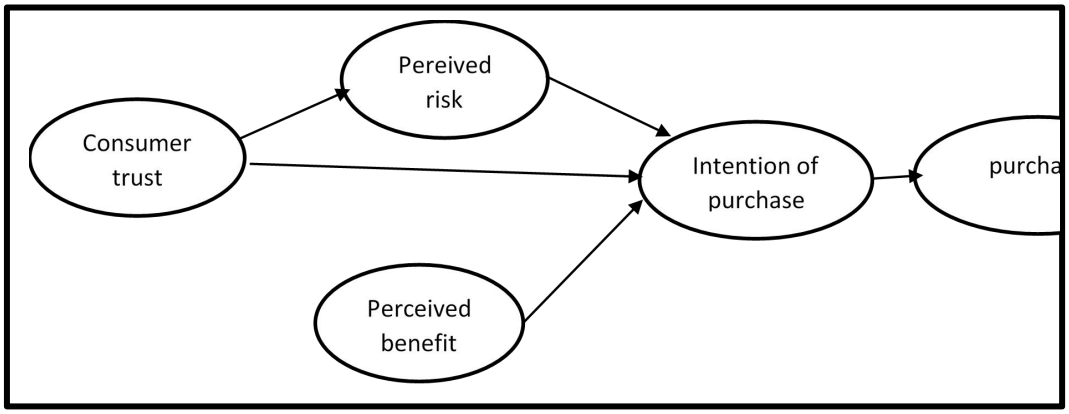



*Source: Venkatesh, V. & Davis, F. D., "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," Management Science, 46(2), 2000, p. 447.*

### 4.2 Trust-Based Model (Kim et al., 2008)

No discussion of technology use, especially in the context of online services, would be complete without addressing the concepts of **trust** and **security**. These concepts are relatively new in the technology adoption literature but have attracted significant attention from researchers.[xlii] In light of this, Kim et al. (2008) developed a **trust-based model** that describes the consumer decision-making process when making a purchase from an e-commerce website. This model highlights the role of **trust** and **perceived risk** in shaping consumers' online purchase intentions, particularly in the context of online retail.

**Figure 9: Trust-Based Model of Online Consumer Decision-Making (Kim et al., 2008)**




*Source: Dan J. Kim et al., "A Trust-Based Consumer Decision-Making Model in Electronic Commerce: The Role of Trust, Perceived Risk, and Other Antecedents," Decision Support Systems, 44(2), 2008, p. 548.*

According to the model proposed by Kim and colleagues, a consumer's intention to purchase

online is influenced by three main elements: **perceived risk**, **perceived benefits**, and **trust**. In summary:

- **Perceived Risk:**[xliii] The consumer's expectation of incurring negative, uncertain outcomes from an online transaction. Perceived risk is a significant barrier that can hold consumers back when they consider making purchases over the internet.

The concept of perceived risk has a rich history in information systems and marketing research. Ever since Raymond Bauer (1960) introduced the notion of consumer risk-taking in marketing literature as a potential determinant of purchase behavior, researchers have recognized that *"consumer behavior involves risk in the sense that any action will lead to consequences that cannot be anticipated with certainty, and at least some of which are likely to be unpleasant."* [xliv] Over time, various dimensions of perceived risk have been identified. For example, **Jacoby and Kaplan** outlined seven types of risk: financial risk, performance risk, physical (safety) risk, psychological risk, social risk, time risk, and opportunity loss risk.

In the context of online shopping, however, only three categories of risk are typically considered most relevant: **financial risk**, **product risk**, and **information risk** (which includes security/privacy concerns). **Product risk** pertains to the item being purchased – for instance, the product may be defective or not as expected. **Financial risk** (including aspects like opportunity cost and time loss) does not relate to the product itself but rather to the transaction process or online channel – for example, a payment could be processed incorrectly or charged twice due to a technical error or an inadvertent double-click on the "purchase" button. **Information risk** involves the security and privacy of the data exchanged during the transaction – for example, a consumer may feel uneasy about providing credit card information online due to the possibility of credit card fraud or identity theft. [xlv]

Other research in e-commerce has proposed alternative categorizations of perceived risk in online shopping, often highlighting three similar facets named **privacy risk**, **payment risk**, and **source risk**. These roughly correspond to the concerns discussed above. [xlvi.] **Table 1** summarizes these three types of perceived risk in the e-commerce context along with their definitions.

**Table 1: Types of Perceived Risk in E-Commerce**

| Risk Type | Definition |
|---|---|
| **Privacy risk** | Personal information collected about individuals without their knowledge or consent when they provide their credit card details online. |
| **Payment risk** | The financial consequences or losses resulting from providing one's credit card information online. *(For example, unauthorized charges or duplicate payments.)* |
| **Source risk** | The level of credibility and trustworthiness of the website or online seller. |

*Source: Lili Zheng et al., "Chinese Consumer Perceived Risk and Risk Relievers in E-Shopping for Clothing," Journal of Electronic Commerce Research, 13(3), 2012, p. 257.*

- **Perceived Benefits:** The consumer's belief about the extent to which they will be better off as a result of conducting an online transaction. Consumers may choose to shop online because they perceive numerous advantages compared to traditional in-store shopping — for example, greater convenience and flexibility, cost savings, time savings, and access to a wider range of alternatives. In contrast to perceived risk (which acts as a potential obstacle to online purchasing), perceived benefits serve as a positive motivator for the consumer. Therefore, the more benefits consumers believe an online purchase offers, the more likely

they are to engage in online shopping. [xlvii]

- **Perceived Trust:** The consumer's personal belief that the online seller will fulfill its obligations and behave as expected in the transaction. In the context of e-commerce, [xlviii] **trust** has been defined as *"the consumer's expectation that the online vendor will not take advantage of their vulnerability and will uphold its obligations in the online transaction."* This definition highlights the notion of consumer **vulnerability**, which is very important in online environments. Because online transactions inherently involve some degree of uncertainty and risk (the consumer often has to act without fully guaranteed outcomes), [xlix] trust functions as a crucial mechanism to overcome the perception of risk. In other words, when facing an uncertain and uncontrollable situation, a consumer's trust in the online vendor or system becomes the key strategy for dealing with the unknown future. Put simply, trust is one of the primary determinants of consumer behavior in situations where negative outcomes are perceived as a possibility. [l]

According to Kim et al.'s trust-based model, a consumer ultimately makes the decision to purchase online based on their **behavioral intention** to buy. This purchase intention is directly influenced by the consumer's perceptions of benefits, risks, and trust in the context of the online purchase. Specifically, a consumer is more likely to go through with an online purchase when **perceived risk** is low, **perceived benefits** are high, and **trust** is high (these are the direct effects on intention). In addition, consumer trust can also increase purchase intention **indirectly** by mitigating the perceived risk: higher trust in the online transaction can reduce the consumer's perceptions of risk, thereby further encouraging the decision to buy online. [li]

## Conclusion

In this article, we discussed the most important theories and models that have been developed and used over the years by researchers to explain consumer behavior toward technology. Despite the diversity and abundance of these models, it was observed that many theories often use different terminologies to describe essentially similar variables (with the notable exception of the **trust** and **perceived risk** constructs, which have gained significant attention only in recent times). Most of the key variables identified across the various models were eventually incorporated into the **Unified Theory of Acceptance and Use of Technology (UTAUT)**, which was designed to provide a unified framework for studying and analyzing technology adoption behavior. The table below summarizes the core variables of the UTAUT model and the equivalent or related terms used in other prominent theories:

**Table 2: Equivalent Terms for UTAUT Variables in Other Theories**

| UTAUT Construct | Definition (UTAUT) | Corresponding Constructs in Other Theories |
|---|---|---|
| **Performance Expectancy** | The degree to which an individual believes that using the technology will provide them with benefits and improvements in performance. | *Perceived Usefulness* (TAM, C-TAM-TPB); *Relative Advantage* (IDT) |
| **Effort Expectancy** | The degree of ease associated with the use of the technology. | *Perceived Ease of Use* (TAM); *Complexity* (IDT – negative correlation) |
| **Social Influence** | The degree to which an individual perceives | *Subjective Norm* (TRA, TPB, |

| UTAUT Construct | Definition (UTAUT) | Corresponding Constructs in Other Theories |
|---|---|---|
| | that important others believe they should use the new technology. | C-TAM-TPB) |
| **Facilitating Conditions** | The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the technology. | *Perceived Behavioral Control* (TPB, C-TAM-TPB) |

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