# Understanding the Post-Prescription Phase of New Drugs: Towards a Modeling Trial

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## Abstract

Purpose–Existing research on new drug prescriptions has primarily focused on the factors influencing physicians to initially prescribe a new medication. However, the post-prescription phase, where physicians decide to continue or discontinue a drug, has been less explored. The objective of this manuscript is to bridge this gap via assessing the key components of the post-prescription phase. Methodology–A total of 145 physicians participated in the quantitative survey through face-to-face interviews. Findings–The results revealed that the Post-Acceptance Model (PAM) (Bhattacherjee, 2001) predicts the consequences of prescribing new drugs. Specifically, the confirmation of physician expectations after the initial prescription of a new drug promotes physician satisfaction with the initially prescribed medication. This satisfaction is a direct predictor of the prescribing physician's attitudinal loyalty. It significantly influences the new drug continuance prescription intention and physician commitment, but to a lesser extent, the recommendation intention. These findings are relevant to pharmaceutical companies in implementing strategies to boost physicians' continuance intention to prescribe their new drugs. Originality/Value– Most studies have focused solely on product adoption, neglecting the importance of use continuance. This manuscript bridges this gap by concentrating on the post-prescription phase within the context of new drugs. Specifically, the paper constructs an expanded framework rooted in the PAM to investigate new drug prescription continuance.

**Keywords:** New drug post-prescription, Post-Acceptance Model, Expectation Confirmation, Satisfaction, Continuance Prescription Intention, Recommendation Intention, Commitment.

## 1. Introduction

The pharmaceutical industry has undergone an accelerated growth and a significant expansion in recent years, making it one of the most powerful manufacturing industries in the world. The era of digitalization has transformed the pharmaceutical industry by providing pharmaceutical laboratories with revolutionary tools to develop new drugs. Moreover, the recent COVID-19 pandemic and the development of a vaccine in less than a year (the average time is between 10 and 15 years) have propelled the pharmaceutical scene and highlighted the potential of this industry to develop new drugs efficiently and rapidly.

The pharmaceutical industries, as well as their new drugs, cannot be separated from prescribing physicians with whom they operate directly. The prescription of drugs, in general, is one of the prerogatives of the physician. Indeed, the physician acts as a decision-maker. The physician therefore plays a crucial role in the selection of drugs. Moreover, regardless of the type of new drug, its immediate fate, once launched by the pharmaceutical laboratory, remains on the ground in the hands of the physician.

The effective dissemination of new drugs is crucial both for the financial performance of pharmaceutical industry and for the health of patients and all stakeholders.

## 2. Research Problem

Understanding the process of adopting a new product has engaged the attention of numerous researchers, leading to the development of various theoretical models. However, the 'post-adoption' phase has been relatively less explored.

In recent years, research on the post-adoption phase has begun to emerge. Despite an increasing number of post-adoption research, few have specifically concentrated on new drugs, and we believe it is essential to explore this area. The post-prescription phase is crucial in determining whether a new drug has been successfully implemented. The success of a new drug is not solely measured by its initial prescription but also by the continuance of its prescription. In fact, a physician is considered a new drug adopter if they include it in their personal medication repertoire and prescribe it regularly (Garjón, 2012).

Despite significant investments engaged by the pharmaceutical industry for drug development and launch, physicians may abandon their prescription. According to Bhattacherjee (2001), product usage can change: a user can increase or decrease its use or discontinue it entirely. While the initial adoption of a new product reflects a crucial indicator of success, its continued use contributes to its sustainability.

Furthermore, understanding physicians' behavior in the 'post-prescription' phase is vital for suppliers of new products. These 'physician customers' are at the center of the pharmaceutical industry's concerns. Identifying, attracting, and retaining physicians is the objective of this industry. To achieve this, we will attempt to identify the fundamental concepts that govern the post-prescription phase and the relationships between the various inherent constructs. In other words, we will endeavor to explain the primary consequences of physicians' decisions to prescribe a new drug.

## 3. Previous Literature & Conceptual Framework

The study of the post-prescription phase of a product begins with the identification of factors that influence it. Literature review reveals that some authors believe the continuity of use of a product is impacted by prior experiences (Limayem et al., 2003; Kim and Malhotra, 2005). However, others include additional variables that are considered major determinants in the post-adoption phase of products.

Through our literature review, we identified the key variables that shape the post-adoption phase, derived from various models addressing continuity of use. We believe it's essential to validate the importance of these variables with physicians in the empirical phase.

Our review of previous work indicates that most research on the post-adoption of new products has been modeled on the PAM (Bhattacherjee, 2001), based on Oliver's Expectation Disconfirmation Theory (EDT) (1980), emphasizing 'the decisive function of satisfaction in the intention of continuity of use of a new product' (Barnes and Böhriger, 2009; Liao et al., 2009; Kim and Zhang, 2010; Liu et al., 2010). However, we cannot overlook research that has adopted other theoretical frameworks to address the concept of continuity of use.

Post-Acceptation Model

Based on Oliver's Theory of Expectation Disconfirmation (1980) and the Technology Acceptance Model (TAM), Bhattacherjee (2001) developed a 'post-adoption' model known as the Post-Acceptance Model. Bhattacherjee (2001) argues that approaches derived from TAM do not adequately describe and evaluate individual behaviors beyond the initial acceptance phase.

Moreover, Bhattacherjee (2001) was among the initial researchers to formulate and examine a theoretical model of continuity of use that differentiates between acceptance and continuity of use. This model, focusing on the post-use period, emphasizes the variables that affect the intention of continuance of use of a product. These variables include perceived utility, confirmation of expectations, and satisfaction after use (Bhattacherjee, 2001).

The author asserts that satisfaction is the key factor in explaining the willingness to discontinue a product after initial acceptance, and that dissatisfied users are likely to cease usage even if they have a positive perception of its usefulness. Bhattacherjee's Model (2001) leads us to deduce that the intention of continued use of a product primarily stems from satisfaction after its use.

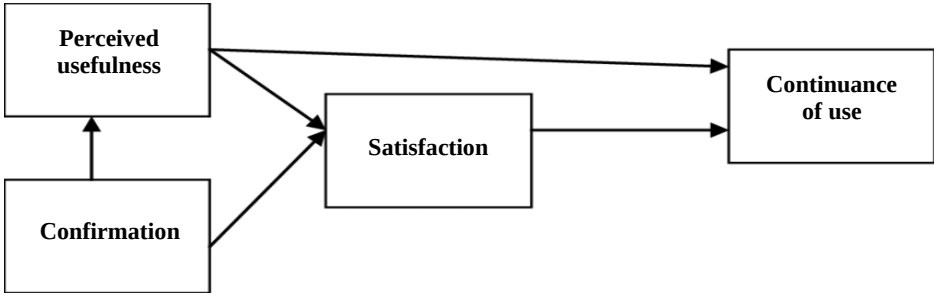


Figure 1: The Post-Acceptance Model PAM (Bhattacherjee, 2001)

While the PAM has demonstrated strong predictive power for post-adoption behavior, its perspective is somewhat limited, and it does not account for other external factors that could influence this phase. Our literature review has identified additional theoretical constructs that may impact the post-adoption phase.

In the subsequent sections, we will outline the key constructs relevant to the post-adoption phase, applicable to our field of study: the prescription of new drugs, and to our target population, physicians.

These components are primarily derived from the PAM model, complemented by literature components considered essential elements in the post-adoption phase and deemed appropriate for our study. These components will be detailed below.

Physician Expectations Confirmation: A Transition to the Post-Prescription Phase

Confirmation of expectations is the initial step in the post-adoption phase. After the first use of the new product, the user can confirm or deny their expectations. It's a widely used concept in explaining repurchase behavior for products or services (Keaveney et al., 2007; Lin et al., 2012).

Confirmation or disconfirmation of expectations is a concept used in Oliver's (1980) theory of disconfirmation of expectations to indicate the confirmation or disconfirmation of an individual's initial expectations regarding a product after its use. As per this paradigm, initial expectations, also known as standards of comparison or norms, are established prior to use and serve as a reference point compared with the actual result after use (Yi, 1990; Anderson and Sullivan, 1993). The level of expectations sets a baseline for the non-confirmation judgment, which is then used to assess satisfaction (Vanhamme, 2002).

In this approach of comparing standards and following product or service use, if perceived performance attains or surpasses the individual's initial expectations, confirmation is positive. This leads to post-adoption satisfaction and increased purchase (Bhattacherjee, 2001; Vanhamme, 2002; Nzyengui, 2022). However, when perceived performance falls short of the individual's initial expectations, confirmation is negative, leading to dissatisfaction (Bhattacherjee, 2001; Vanhamme, 2002; Nzyengui, 2022).

In the field of drugs, studies on the confirmation of physicians' expectations are still relatively limited. According to Denig et al. (1988), physicians' opinions about a particular drug are shaped by their expectations regarding treatment outcomes versus their personal experiences. These opinions significantly influence their subsequent prescribing decisions. Gönül et al. (2001) suggest that physicians rely heavily on regular feedback from their patients to confirm their expectations of drug outcomes and guide their future drug choices.

New Drug Satisfaction: The Linchpin of the Post-Prescription Phase

Satisfaction is a key concept in marketing theory. It is frequently used to explain the repurchase behavior of products or services (Keaveney et al., 2007; Lin et al., 2010).

Studies on satisfaction have explored various approaches and definitions of the concept. Despite differing opinions on the definition, researchers generally agree that satisfaction is "a psychological state, a judgment after the consumer experience, and a relative assessment" (Aurier and Evrard, 1998).

First, satisfaction is specified as a psychological disposition involving affective and cognitive processes. According to Aurier and Evrard (1998), satisfaction includes a cognitive process with emotional elements. Thus, satisfaction generates cognitive thought processes that lead to

emotional reactions. Additionally, satisfaction follows the act of purchase, consumer experience, and product use.

Therefore, satisfaction is judged as a result of experiencing the product. It's also considered a relative assessment, resulting from a comparative analysis of the consumer's subjective experience and the initial baseline, known as the standard of comparison.

According to Clerfeuille and Poubanne (2003), satisfaction is "a conscious sense of appreciation felt by the consumer towards a product or service that he has already experienced."

Oliver's research (1993) confirmed the positive relationship between confirmation of expectations and satisfaction. Bhattacherjee (2001) states that the confirmation of initial expectations following the user experience explains user satisfaction in post-adoption. Vanhamme (2002) asserts that the judgment regarding the comparison between expectations and performance is used to assess satisfaction. This research validates the existing link between confirmation/disconfirmation of expectations and satisfaction.

Within the research on physician satisfaction, Rusterholtz (2013) emphasizes its importance as a key marketing element. The drug market is characterized by several factors: limited differentiation among drugs, undifferentiated services of pharmaceutical companies, and increasingly high drug quality. These characteristics encourage a focus on "physician clients" to identify their levels of satisfaction or dissatisfaction.

In the drug context, Abdul Waheed et al. (2011) note that positive experiences during the treatment phase reflect confirmation of initial expectations, which is crucial for drug satisfaction.

As a result, we can formulate our research hypothesis:

H1: The confirmation of physicians' expectations following the prescription of a new drug affects positively their satisfaction with this new drug.

New Drug Continuance Prescription Intention: A Central Objective of the Post-Prescription Phase

Continuance of use refers to behaviors and attitudes that describe the repetitive use of a product during the post-adoption phase. Continuance of use "cannot covary with initial adoption since it is not possible to explain why some users stop using a new product after having initially adopted it" (Bhattacherjee, 2001).

Bhattacherjee (2001) focused on the intention of continuance of use and characterized it as "the degree of intensity with which a user is prepared to continue using a product in the future." Intention is a crucial theoretical concept in the theory of user behavior, predicting future purchase or use actions of products or services. The greater the intention, the more likely the behavior will occur. According to Bloemer et al. (1999), the intention of continuance of use is one of the dimensions of attitudinal loyalty.

By applying the Expectation Disconfirmation Theory (EDT), researchers argue that continuance of use is conditioned by the level of satisfaction (Yi, 1990; Hong et al., 2006). Fornell et al. (1996), Yu and Dean (2001), Vanhamme (2002), and Høst and Knie-Andersen (2004) suggest

that high levels of satisfaction can retain consumers and build loyalty. Satisfaction appears to be a necessary step in developing consumer loyalty.

Swan and Oliver (1989) and Anderson and Sullivan (1993) found a positive association between the level of satisfaction and the continuance of use intention of a product. Chong's work (2013) highlights this same relationship. Ha and Park (2013) and Bhattacherjee (2001) add that satisfaction is a strong predictor of intention to continue using a product. Hennig-Thurau et al. (2002) and Limayem et al. (2007) conclude that "continuance of use is a consequence of customer satisfaction in the literature".

Larsen et al. (2009), Liao et al. (2009), and Wang and Lin (2010) suggest that the intention of continuance of use varies with satisfaction, which is strongly explained by confirmation of expectations.

This literature review leads us to conclude that satisfaction is a major contributor in the phase of continuity of use.

In regards to drugs, the continuous prescription of a new drug is a crucial phenomenon in the pharmaceutical industry (Janakiraman et al., 2008). Several physicians continue to prescribe a drug due to its efficacy, confirmed by successful patient experiences (Abdul Waheed et al., 2011). Generally, after trying different products, individuals tend to use the one the most satisfying (Assael, 1998).

Rusterholtz (2013) states that physician satisfaction directly impacts prescription intentions. When a drug is prescribed, physicians develop a certain level of satisfaction based on the obtained results, influencing their intention to prescribe the drug in the future (Sanyal et al., 2017).

In light of this, it is possible to assert the hypothesis below:

H2: The physician's satisfaction with the newly prescribed drug positively influences his intention to continue its prescription.

Physician Commitment: An Evidence of Long-Term Orientation

Commitment is particularly applicable to research as it is "an essential component in building a long-term customer relationship" (Garbarino and Johnson, 1999). It appears as a "determining factor in successful relationships" (Berry and Parasuraman, 1991; Anderson and Weitz, 1992; Morgan and Hunt, 1994). Moreover, the commitment is linked to the issue of continuance or change in behavior (N'Goala, 2003). As outlined by Dwyer et al. (1987), commitment is "an implicit or explicit guarantee of the continuity of the relationship between exchange partners."

In this sense, commitment represents an indicator of differentiation between loyal consumers and inert consumers (Terasse, 2003). This factor is a necessary condition for developing consumer loyalty, reflecting the desire to sustain a long-term association with the product (Fournier, 1998; Uncles and Gilles, 1997). Commitment is therefore "manifested in a behavior of relational stability, and more specifically in a resistance to change" (Touzani and Temessek Behi, 2004). According to Crosby and Taylor (1983), commitment is introduced as "the tendency to resist change of preference in response to dissonant information or experience."

Liang and Chen (2009) define commitment as a genuine desire to remain in a relationship, stemming from an attachment to the partner or the services and products provided.

Hennig-Thurau and Klee (1997) identified a significant positive association between satisfaction and commitment. A high degree of satisfaction, repeatedly strengthened, creates a relationship of commitment triggered by emotional bonds. Satisfaction is linked to the meeting of needs of consumers, and the perpetual meeting of them generates emotional bonds that constitute commitment (Hennig-Thurau and Klee 1997; Hennig-Thurau et al., 2002).

According to Liang and Chen (2009) as cited by Cheikho (2015), "satisfaction is a retrospective evaluation and commitment is a propensity to act, which implies that satisfaction positively influences commitment in the relationship." Allagui and Temessek (2005) and Casalo et al. (2007) suggest that the more satisfied customers are with their product experience, the more committed they are to it.

Commitment is a key factor in the success of enduring relationships. Roberts-Lombard (2012) attests to the usefulness of the concept of commitment in measuring customer loyalty. Banyte and Dovaliene (2014) state that commitment generally leads to loyalty, acting as a kind of exit barrier. These results could be extended to physicians' prescribing decisions.

Certainly, an organization's sustained success is predicated on its potential to establish and support enduring customer relationships (Eisingerich and Rubera, 2010). Building a strong physician-pharmaceutical company relationship requires physician to be committed to the offered drugs. However, the pharmaceutical industry market is distinguished by increased competition as pharmaceutical companies offer similar products and services.

In this perspective, pharmaceutical companies need to design drugs that meet doctors' preferences to enhance their degree of satisfaction and consequently their degree of commitment (Kimpakorn and Tocquer, 2010).

The results of Osuna Ramirez et al. (2017) and Kimpakorn and Tocquer (2010) indicated that the presence of commitment to a drug is explained by the satisfaction of physicians, following the fulfillment of their initial expectations. This commitment is essential for the effective retention process of physicians in their prescribing behavior and habits.

The previous work showed that the relationship between physician satisfaction and commitment has only been demonstrated in the case of established drugs. This research will attempt to verify the stability of this relationship in the case of new drugs.

Our hypothesis is therefore formulated:

H3: Physician satisfaction with the new drug prescribed positively influences the prescribing physician's commitment to that drug.

New Drug Recommendation: A Privileged Exchange in the Post-Prescription Phase

In a marketing context, recommendation is initially a phenomenon of oral propagation of information or opinions about a product or service. This phenomenon has a strong persuasive effect on the receiver of the message. Recommendations are considered a more powerful source

of information than advertising, particularly when learning about an innovation, deciding to try a new product, or continuing its use (Herr et al., 1991). This communication attenuates the perceived risk, especially for new products (Bansal and Voyer, 2000).

The literature review reveals numerous definitions of recommendation. Many researchers consider recommendation as "an exchange, flow of information, communication, or conversation between individuals in an informal manner" (Mangold et al., 1999; Kim et al., 2001; Silverman, 2001). Silverman (2001) defines a recommendation as "an informal communication about services or products between individuals who are independent of the producer or seller and transmitted spontaneously in a manner independent of them in a medium also perceived as independent of the company."

These definitions highlight the characteristics of this type of communication. It is distinguished by its informality and the communicator's neutrality and freedom from a commercial influence. In the literature, recommendation is considered "a post-purchase consumer activity resulting from satisfaction with the company's product/service" (Vo, 2014). Gelb and Johnson (1995) explain that after using a product/service, the consumer experiences a feeling of satisfaction or dissatisfaction. This feeling evokes favorable emotional reactions in the case of satisfaction or unfavorable reactions in the case of dissatisfaction, significantly impacting recommendation behavior.

The degree of consumer satisfaction influences the ability to make recommendations. An increase in satisfaction favors the tendency to recommend the company or the consumed product to prospective consumers (Maxham III and Netemeyer, 2002; Ranaweera and Prabhu, 2003).

For a satisfied consumer, issuing recommendations should be "a logical reaction following a series of positive experiences" (Mittal et al., 1999). Allagui and Temessek (2005) state that satisfied consumers will tend to generate recommendations by telling others about good experiences and encouraging them to use the product.

In marketing research, consumer satisfaction is considered an important antecedent to recommendation. Multiple studies have confirmed the association between recommendation and satisfaction (Hennig-Thurau et al., 2004; Ladhari, 2005; Söderlund, 2006; Heitmann et al., 2007; Prayag et al., 2013; Engeset and Elvekrok, 2015; Huang et al., 2015; Prayag et al., 2015). Jones and Sasser (1995) and Rust et al. (1995) testify that satisfaction is a prerequisite for a favorable recommendation.

Drawing on the experiences and opinions of other consumers, recommendation helps reduce perceived risk, especially for new products (Bansal and Voyer, 2000). This phenomenon has a strong persuasive effect on the receiver.

In the field of new drug prescription, recommendation is crucial due to the high perceived risk involved in the decision to prescribe a new drug. This generates a strong need for qualified information, which, when coming from another physician, is judged as more credible and provides greater confidence in the decision to prescribe the new medicine.

A physician's predilection for recommending a particular drug may stem from loyalty, experience with successful prescription of that drug, or the result of marketing efforts implemented by the pharmaceutical company producing that drug (Sutiono et al., 2019).

According to De Matos and Rossi (2008), the probability of a consumer generating recommendations is linked to their level of satisfaction. When the performance of the product surpasses the customer's expectations, it can lead them to share their positive feedback concerning their positive experience (Vo, 2014). Thus, recommendation can be seen as a consequence of satisfaction.

We can therefore assume that satisfaction, following an experience of prescribing a new drug, is a direct determinant of the intention to recommend this drug to peers.

Consequently, we hypothesize that:

H4: Physician satisfaction with the new drug prescribed affects positively the physician's intention to recommend it.

## 4. Proposed Research Model

Our study aimed to extend Bhattacherjee's Post-Acceptance Model (2001) from the field of service continuity to the field of new drug prescription continuity. Numerous studies (Bhattacherjee, 2001; Bhattacherjee and Premkumar, 2004; Oghuma et al., 2015) have demonstrated the robustness of this model for examining post-adoption behavior.

Bhattacherjee's post-acceptance model (2001) focuses on confirmation, perceived usefulness, satisfaction, and intention of continued use. We included the following variables in our proposed model: commitment and intention to recommend. These factors are important consequences of prescribing a new drug. Continuance of use intention, commitment, and recommendation intention are clear indicators of physicians' attitudinal loyalty.

However, perceived usefulness was removed because drugs and treatments are inherently useful; they significantly contribute to improving quality of life and increasing chances of recovery or even survival in cases of serious diseases. Without drugs, physicians would be unable to provide their services to patients.

Figure 2 shows our research model for the post-prescription phase.

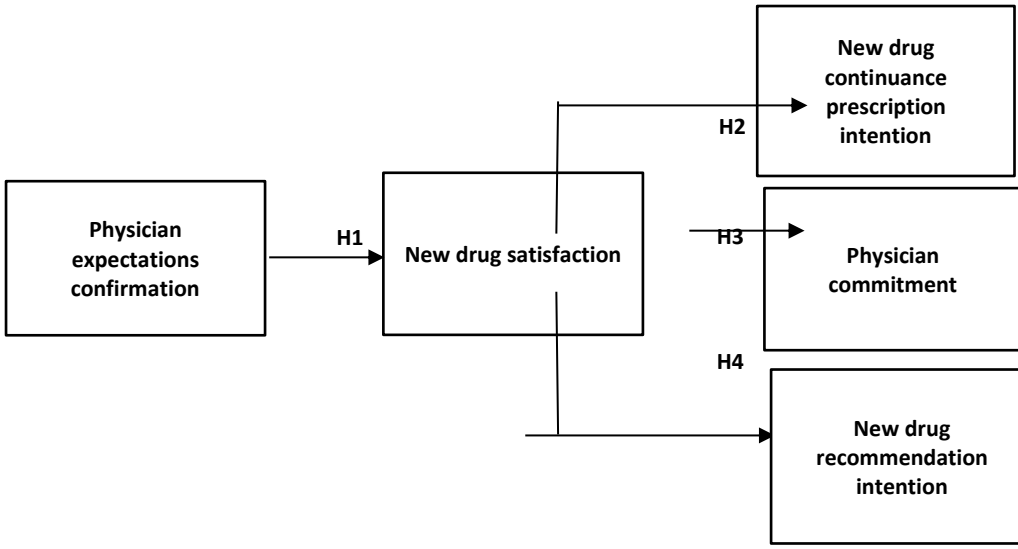


Figure 2: Research Model of Post-Prescription Phase

## 5. Research Methodology

To assess our research hypotheses and model, we adopted a quantitative approach based on a questionnaire. A face-to-face survey was carried out on a quota sample of physicians to evaluate the hypotheses.

In our study, we opted for the non-probabilistic quota sampling method to obtain a sample that reflects the same proportions as the parent population for every chosen criterion. Furthermore, the sample obtained will be representative of the population of physicians practicing in Tunisia regarding the variables of interest studied, based on data from the 2020-2021 Health Map published by the Tunisian Ministry of Health (2022). In our case, the variables of interest are specialty (general practitioner, specialist) and sector of practice (public, private).

Measurement Instruments

The questionnaire had two parts. The first part collected the physician's profile. In the second part, participants answered four questions on a five-point Likert scale. All question items were drawn from the literature.

To measure confirmation, we used Bhattacherjee's three-item measurement tool (2001). For the measure of physician satisfaction, we utilized the four-item scale originally introduced by Bhattacherjee (2001) and subsequently refined by Susanto et al. (2016). The continuance prescription intention was assessed with three items derived from Bhattacherjee (2001) and Suh & Han (2002). The three items for recommendation intention were inspired from the work of

Verhoef et al. (2002), whereas the six items to evaluate commitment came from Fullerton (2005). All selected items were translated into French and customized for the study context.

Data Collection

The questionnaire was pilot tested on 5 physicians and adjusted based on their feedback. It was then administered to a sample of physicians who agreed to participate in this survey at their workplaces. Subjects spent 10-15 minutes completing the entire questionnaire.

A total of 145 physicians successfully completed the questionnaire. The sample's distribution is summarized in the table below:

Table 1: Sample's Distribution

| Characteristics | | Frequency | Percentage |
|---|---|---|---|
| Speciality | General practioner | 48 | 33% |
| | Specialist | 97 | 67% |
| | Total | 145 | 100% |
| Sector of practice | Private | 90 | 62% |
| | Public | 55 | 38% |
| | Total | 145 | 100% |

Purification of the Measurement Instruments

To ensure the reliability of our measurement instruments and check the psychometric quality of the items representing the constructs under study, we conducted a Principal Component Analysis (PCA) following the recommendations of Gavard-Perret et al. (2012). This multivariate analysis method allows for data purification and reduction through a series of steps. We utilized SPSS 26 to execute the purification analysis, and the results demonstrate the reliability and suitability of the collected data for further examination.

The PCA results for the doctor expectation confirmation measurement scale demonstrate an acceptable Cronbach's alpha (0.776), a unidimensional scale with satisfactory explained variance (80.044%), and adequate Bartlett's sphericity test coefficients (0.000), validating the factorability of our data. For the new drug satisfaction, new drug continuance prescription intention, and new drug recommendation intention scales, the PCA results confirm the unidimensionality of the scales with good explained variance (86.705%, 75.778%, 80.024%). Hence, we can establish that these three constructs possess high reliability (0.949, 0.838, and 0.874), adequate Bartlett's sphericity test coefficients (0.000), and significant KMO coefficients (0.841, 0.727, and 0.736).

For the doctor commitment scale, the results obtained confirm the two-dimensional structure of this scale, which is consistent with the literature, with satisfactory explained variance (73.280%, 71.562%). Each dimension displays a satisfactory Cronbach's alpha (0.812, 0.801) and adequate Bartlett's sphericity test coefficients (0.000).

## 6. Results

PLS-SEM Approach

Collected and purified data was evaluated using Structural Equation Models (SEM) via Smart PLS 4.0. This computer program is valuable when the researcher explores cause-and-effect connections between variables. We chose the Partial Least Squares (PLS) modeling approach, which is well-suited to the context of our study. Our sample is relatively small, consisting of 145 doctors, and our model is designed to explore.

This approach comprises two steps: The initial step is to assess the measurement model and then to assess the structural model.

Measurement Model

According to Churchill and Iacobucci (2006), three indices should be examined to evaluate the model measurement: scale reliability, convergent validity, and discriminant validity.

The reliability analysis shows that the indicators values are satisfactory. The Cronbach alpha registered a range between 0.763 and 0.949 ($\alpha > 0.6$ in line with Hair et al., 2019).

Additionally, Jöreskog's Rhô values are higher than 0.7, in accordance with the guidance of Hair et al. (2019). The obtained results indicate the good reliability of the measurement scales for doctor expectation confirmation, new drug satisfaction, new drug continuance prescription intention, new drug recommendation intention, and doctor commitment. These results are stated in table 2.

Table 2: Scale Reliability Assessment

| | Reliability indicators | | |
|---|---|---|---|
| | $\alpha$ | $\rho_a$ | $\rho_c$ |
| Physician expectations confirmation | 0.763 | 0.858 | 0.876 |
| New drug satisfaction | 0.949 | 0.950 | 0.963 |
| New drug continuance prescription intention | 0.840 | 0.847 | 0.903 |
| Physician commitment | 0.817 | 0.886 | 0.929 |
| New drug recommendation intention | 0.875 | 0.879 | 0.923 |

Furthermore, convergent validity is satisfactory for all tested constructs. The loadings of items are greater than 0.6 as advised by Fernandes et al. (2012), and the Average Variance Extracted (AVE) are exceeding 0.5, which aligns with Chin's guidelines (1998).

Similarly, discriminant validity is also confirmed for all studied constructs through three main indicators: Cross loadings (Hair et al., 2019), Fornell & Larcker criterion (1981), and HeteroTrait-MonoTrait HTMT matrix (Henseler et al., 2016).

The loadings of the studied items are indeed exceeding the cross loadings. Additionally, the squared correlations among the constructs are lower than their respective Average Variance Extracted (AVE). The correlations between constructs are also less than 0.85.

Structural Model

The structural model is evaluated using five indicators: the Inflation Factor of the Variance (FIV), the Determination Coefficient ($R^2$), the Stone-Geisser Coefficient ($Q^2$), the size of the effect $f$ of Cohen $f^2$, the Goodness of Fit Index (GoF), and the Standardized Root Mean Square Residual (SRMR).

As indicated by Hair et al. (2017), the FIV of the different constructs showed satisfactory values ($0.2 < FIV < 5$). Therefore, we conclude that there are no collinearity concerns among the variables in our model.

The Coefficients of Determination ($R^2$) exceed the threshold of 0.26. As reported by Wetzels et al. (2009), the tested variables have a high predictive power.

Predictive validity is evaluated by the $Q^2$ Coefficient. The goal is for this coefficient to be positive. (Tenenhaus et al., 2005). The reported values are positive and range from 0.205 to 0.330. According to Fernandes (2012), this result reveals a moderate predictive validity.

According to Hair et al. (2017), the size of the effect of Cohen $f^2$ is classified as small, medium, or large if $f^2 \geq 0.02$, $f^2 \geq 0.15$, and $f^2 \geq 0.35$, respectively.

The obtained results (table 3) show that the size of the effect is considered medium for the effect of new drug satisfaction on physician commitment and new drug recommendation intention. However, the size of the effect is considered large for the effect of physician expectation confirmation on new drug satisfaction and for the effect of new drug satisfaction on its prescription continuance intention.

Table 3: Analysis of the Effect Size $f^2$

| | $f^2$ | Conclusion |
|---|---|---|
| Physician expectations confirmation -> New drug satisfaction | 1.135 | Large effect |
| New drug satisfaction -> New drug continuance prescription intention | 0.641 | Large effect |
| New drug satisfaction -> Physician commitment | 0.271 | Medium effect |
| New drug satisfaction -> New drug recommendation intention | 0.150 | Medium effect |

As suggested by Tenenhaus et al. (2005), we computed the GoF of our model via the formula below:

$GoF = \sqrt{}$ (average AVE) x (average $R^2$)

The calculated Goodness of Fit Index (GoF) shows a value of 0.627, implying that the model is appropriate for the data and is eligible for a good fit quality. This value is well above the threshold of a great adjustment (0.36), as stated by Wetzels et al. (2009) and Henseler et Sarstedt (2012).

The Standardized Root Mean Square Residual (SRMR) displays a value of 0.085. This value is less than 0.10 per the guidance of Hair et al. (2019). Therefore, we consider the overall adjustment of our model to be satisfactory.

Tests of Hypothesis

All obtained indices met the required thresholds, reflecting a satisfactory quality of our model. This allowed us to evaluate the hypothesized relationships within our model.

Examining the causal relationships, we conclude that the confirmation of doctor expectations has a positive impact on doctor satisfaction ($\beta = 0.675$, $t = 11.178$) at the 5% level. Doctor satisfaction also positively influences the new drug continuance prescription intention ($\beta = 0.643$, $t = 7.785$), the new drug recommendation intention ($\beta = 0.371$, $t = 2.749$), and doctor commitment ($\beta = 0.485$, $t = 5.618$) at the 5% level.

The obtained results, stated in the table 4, therefore verify our hypotheses as all four tested relationships are positive and significant.

Table 4: Hypothesis Test Result

| Hypothesis | Relation | Std. β | Std. deviation | t-value | p- value | Conclusion |
|---|---|---|---|---|---|---|
| H1 | Physician expectations confirmation -> New drug Satisfaction | 0.675 | 0.060 | 11.178 | 0.000 | Accepted |
| H2 | New drug satisfaction -> New drug continuance prescription intention | 0.643 | 0.083 | 7.785 | 0.000 | Accepted |
| H3 | New drug satisfaction -> Physician commitment | 0.485 | 0.086 | 5.618 | 0.000 | Accepted |
| H4 | New drug satisfaction -> New drug recommendation intention | 0.371 | 0.135 | 2.749 | 0.003 | Accepted |

## 7. Discussion & Implications

Discussion

We have attempted to identify the post-prescription phase by verifying the main variables governing it. Next, we will examine the key findings of our study.

The post-prescription phase: A framework combining the Expectation Disconfirmation Theory and the Post-Acceptance Model

Analysis of the results relating to the post-prescription phase indicates that this phase follows the expectations confirmation model (Oliver, 1980) and the post-acceptance model (Bhattacherjee, 2001). Indeed, the relationships studied at this stage are part of a 'post-use' period. Moreover, this post-prescription phase is triggered by the decision of prescription of a new drug.

Consistent with the literature, satisfaction with the newly prescribed drug was found to be the result of confirmation of initial expectations. Our study showed that physician satisfaction seems to be the product of a comparative evaluation of expectations regarding the newly prescribed drug and the obtained result following its prescription. This supports previous research, notably

that conducted by Abdul Waheed et al. (2011), which states that the positive experience during the treatment phase reflects the confirmation of initial expectations. The latter is decisive for satisfaction with the prescribed drug.

Satisfaction with the Newly Prescribed Drug: A Driving Force Behind Prescribers' Attitudinal Loyalty

Our research has shown that the three relationships linking satisfaction with the newly prescribed drug to the intention to continue prescribing it, to the intention to recommend it, and to the physician's commitment are positive and significant. Satisfaction is therefore a pivotal element in this post-prescription phase.

This conclusion confirms that drugs, as health products with distinctive characteristics, are not exempt from the theories of continuity of use. Like consumer products, drugs maintain the same standards in the post-use phase. In fact, satisfaction with the new drug prescribed is correlated with the intention to continue prescribing it, the intention to recommend it, and the doctor's commitment. Drugs are therefore subject to the same general principles of continuity of use and are no exception.

Furthermore, a physician's satisfaction with a newly prescribed drug has been shown to significantly enhance their attitudinal loyalty. It's important to remember that our research focused on the attitudinal facet of loyalty, operationalized through three dimensions: the intention to continue prescription of a new drug, the intention to recommend it, and the physician's commitment to it. This attitudinal loyalty of physicians is a crucial element in the prescribing practice of drugs and an ultimate objective of the pharmaceutical industry.

Satisfaction with the newly prescribed drug can therefore help convert a prescribing doctor into a loyal one. The strongest impact of satisfaction was on the intention to continue prescription ($\beta$=0.643, $f^2$=0.641, large effect), followed by the physician's commitment ($\beta$=0.485, $f^2$=0.271, medium effect). The smallest effect was on recommendation intention ($\beta$=0.371, $f^2$=0.150, medium effect).

To better visualize the effect of satisfaction with the newly prescribed drug, we opted for a bubble chart. This graph highlights two dimensions of data: the online data and the data represented by the size of the bubble.

In our case, this representation integrates both the dependency relationship with the satisfaction of the newly prescribed drug expressed by the path coefficient $\beta$ (online) and the effect size of satisfaction expressed by Cohen's coefficient $f^2$ represented by the size of the bubble.

In the following, we will present the obtained bubble diagram (figure 3) generated using Excel software.

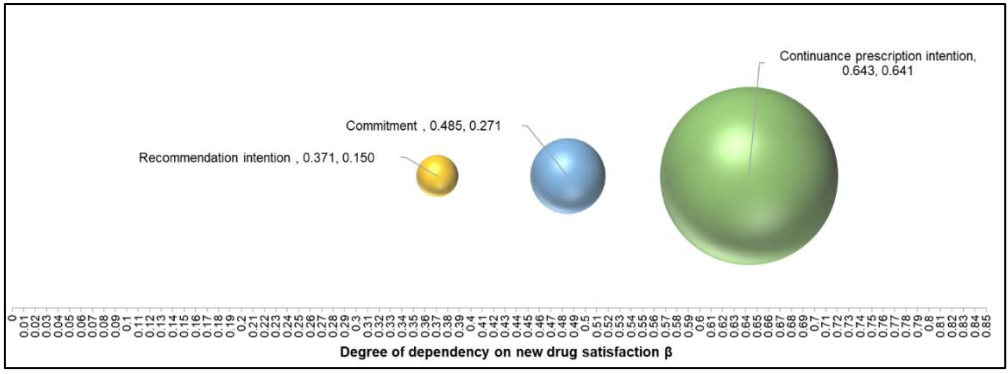


Figure 2: Bubble Diagram of the Effect of Satisfaction of the Newly Prescribed Drug

The diagram clearly shows that the greatest effect of satisfaction with the newly prescribed drug is on the intention to continue prescribing. In second place, we find the effect of satisfaction with the newly prescribed drug on the commitment of physicians. And the lowest effect of satisfaction with the newly prescribed drug is on the intention to recommend it. This suggests the possibility of going beyond satisfaction to better define this post-prescription phase.

## 8. Theoretical & Managerial Implications

This research studies the "post-prescription" phase of new drugs by explaining the variables that govern it. While this phase has received minimal attention, despite its importance, the identification of consequences of prescribing new drugs has been less studied than the identification of determinants of prescribing new drugs.

Studies have centered more on analyzing the elements that drive the adoption of new products than on analyzing the elements that encourage their continued use. Moreover, the study of this "post-prescription" phase in the medical field is highly relevant to academics.

This study supports the work of Oliver (1980) and Bhattacherjee (2001), who suggest that the paradigm of "confirmation of expectations - satisfaction" is relevant as a general framework for examining the post-use phase. Our work proposes an attempt to apply and extend the model of confirmation of expectations (Oliver, 1980) and the post-acceptance model (Bhattacherjee, 2001) in the context of new drugs (a unique product and an atypical consumer). The introduction of constructs such as intention to recommend and commitment has enriched these two models.

Traditionally, the effects of satisfaction are studied to measure continuity of use. However, the majority of this research has examined the use of technology at an organizational level. It's essential to verify the possibility of using these results to explain the behavior of physicians in the post-prescription phase, to study the potential transposition of these theories at an individual level (physician), and to ensure that the factors explaining the continuity of use of a technology are the same as those impacting the continuity of prescription of new drugs.

The main objective of this paper is to understand the marketing consequences of prescribing new drugs and their interactions. This would be of particular interest to practitioners in the pharmaceutical industry. Determining the variables that drive the continuity of prescription, recommendation, and physician commitment is important for new drug providers. These variables, confirmation of expectations and satisfaction with the newly prescribed drug, constitute the levers of physicians' attitudinal loyalty. Hence, the importance of monitoring these two indicators through continuous listening to physicians, for example, using a satisfaction barometer survey for newly introduced drugs.

## 9. Limitations & Future Research

Despite the interest in the highlighted results and their managerial consequences, our study is subject to some limitations, primarily methodological.

Firstly, the sampling method used to select interviewees. Lacking a sampling frame from which sampling units can be randomly drawn, the non-probabilistic sampling method was necessary.

The second limitation concerns the modest size and geographical distribution of our sample. A larger sample with wider geographical distribution would require considerable resources.

Another limitation relates to the instruments employed to measure the studied constructs, which were inspired by prior research. Even though the questionnaire was pretested and evaluated for reliability, there could still be linguistic biases in the English-to-French translation.

In addition to its contributions, the present work has suggested avenues for future exploration, summarized below.

It would be interesting to continue research to provide more detailed answers. For example, we believe it would be valuable to enrich the model of our study by examining loyalty using a mixed approach: complementing the attitudinal approach of physician loyalty, which focuses on intentions, with a behavioral approach based on the proportion of prescriptions and the frequency of prescription of a new drug.

It also seems interesting to supplement the model of our study by examining other variables likely to explain the post-prescription phase of a new drug. Although satisfaction represents a pillar of the post-prescription phase, it's possible that another parameter is involved.

In the field of drugs, considered a risky and uncertain context, trust may generate a meaningful impact on the decision to prescribe and continue prescribing. Therefore, studying the role of trust in new drugs in the post-prescription phase would be interesting.

These lines of research constitute interesting but not exhaustive reflections in the field of new drug prescription by physicians.

In conclusion, this study has enabled us to answer our research question by identifying the consequences of doctors' decisions to prescribe a new drug. While not claiming to be exhaustive, it would be interesting to consolidate our study with the research perspectives mentioned above as part of future work.

## 10. Conclusions

The purpose of this research is to review the post-prescription phase of new drugs by physicians. To this end, we first tried to introduce this phase by explaining the transition from prescription of a new drug to continuance of its prescription and analyzing the theoretical underpinnings of this phase. Secondly, we have tried to highlight the main marketing components that guide this post-prescription phase for new drugs.

This study summarizes the literature on the post-prescription phase of new drugs. It highlights the basic concepts that govern this phase as well as the relationships that form the different basic constructs in this phase.

In our study, we focused on works that have directly explored this phase. The theories and models used as a theoretical basis are the Expectation Disconfirmation Theory (Oliver, 1980) and the Post-Acceptance Model (Bhattacherjee, 2001). These prove to be the most appropriate for explaining continuity of use. The constructs identified are confirmation of expectations, satisfaction, and prescription continuity.

Our literature review allowed us to pinpoint other theoretical constructs that have the potential to emerge during this phase: commitment and recommendation. Our research revealed the key factors affecting the phase of post prescription of new drugs. The findings demonstrate that satisfaction with the newly prescribed drug plays a significant role in influencing continuance prescription intention. Confirmation greatly impacts the satisfaction of the newly prescribed drugs. In addition to directly impacting continuance prescription intention, satisfaction with the newly prescribed drugs also substantially influences the physician commitment and the intention to recommend it.

By providing actionable insight and analysis, this study is of great value to both theorists and practitioners, including those in marketing, pharmaceutical management, and health policy. Attempts to explain the prescription decision and its consequences are clearly essential for improving prescribing practices for new drugs. To maximize financial investment in new drugs, pharmaceutical industries should ensure that physicians continue to prescribe their new drugs after the initial experience.

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