Lazy User Theory: A Dynamic Model to Understand User Selection of Products and Services

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Abstract

In this paper we suggest that a user will most often choose the solution that will fulfill her (information) needs with the least effort. We call this "lazy user behavior". We suggest that the principle components responsible for solution selection are the user need and the user state. User need is the user's detailed (information) need (urgency, type, depth, etc.) and user state is the situation, in which the user is at the moment of the need (location, time, etc.); the user state limits the set of available solutions (devices) to fulfill the user need. We present the lazy user theory of solution selection, two mBusiness case examples, and discuss the implications of lazy user behavior on user selection of products and services. Implications on the design of new products and services are also discussed.

1. INTRODUCTION

User adoption and acceptance of technology and attachment to mobile devices and services has been studied with a number of models like the Technology Acceptance Model (TAM) [1],[2], Unified Theory of Acceptance and Use of Technology (UTAUT) [3], Technology Task Fit (TTF) [4], [5] and HCI aspects with, e.g., cognitive fit theory [6], [7]. To our knowledge there are, however few theories that try to explain how users select solutions (products & services), when there are numerous possible solutions. In this paper we present a theory that explains the selection process as the user selection of the solution that demands the *least effort.*

Ideas regarding the use of least effort or least energy to fulfill a need can be found in physics (e.g., water flowing downhill follows the *path of least resistance*), but similar ideas have also been presented in behavioral sciences, e.g., in linguistics to explain scaling of human language [8],[9], where Zipf called his theory the *principle of least effort*. In information seeking (informatics) the theory of least effort was picked by Mann [10] as one of the principles guiding information-seeking behavior and hence the design of modern libraries.

The term "*lazy user*" has been used previously, e.g., in information seeking (text retrieval) [11], (user that uses only limited effort), in context aware computing [12] (user that demands the best effort – result trade-off), and in interactive feature selection [13] (sloppy user that is not precise in her selection).

Some similar issues are also researched in finance, e.g., "lazy banking" [14] is research into how banks are not willing to invest efforts into turning around failing businesses, but prefer to liquidate, because liquidation is the *least costly* and the most certain alternative. It is interesting to note that in corporate finance effort can usually be measured with monetary units.

This paper continues with a review of technology adoption models and related research, a presentation of the lazy user theory of solution selection, based on similar ideas as the principle of least effort. We elaborate further the ideas of switching costs and learning costs, and how these fit into our framework. We continue with two examples that illustrate the theory in connection with the context of mobile devices and services and then discuss implications of the theory on the design of products & services. We close with a summary and discussion.

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2. REVIEW OF TECHNOLOGY ADOPTION MODELS AND RELATED RESEARCH

Technology adoption models have been the subject of extensive research within the information systems (IS) community. We identified several models and theories explaining technology adoption. These theories and models try to identify the factors that favour technology adoption. In the following, we will review several models of technology adoption; the purpose is not to criticize these models, but to analyse them in order to understand how our framework relates to these established theories.

2.1. Theory of reasoned action (TRA)

TRA originates from social psychology. The model is based on three constructs: behavioral intention, attitude (beliefs about the consequences of adopting a behavior) and subjective norm ("the person's perception that most people who are important to him or think he should or should not perform the behavior in question" in [19]). The model suggests that behavioural intention is dependent on the attitude about the behavior and the subjective norm. The model has been criticized for its limitations where one has to make a choice between several alternatives (see [20] p. 325).

2.2. Theory of planned behaviour

The theory of Planned Behavior is an extension of the Theory of Reasoned Action [23]. The Theory of Planned Behavior identifies a correlation between behavioral intention and actual behavior, which is a new component in the model. A third determinant of behavioural intention is added - Perceived Behavioural Control – which is one's perception of the ease to adopt and perform a particular behavior.

2.3. Technology Adoption Model

The technology adoption model (TAM) was originally developed by Davis and Bagozzi (see [1][2]). TAM is one of the extensions of the theory of reasoned action described earlier. Like TRA, TAM includes behavioural elements, i.e., it assumes that certain variables will directly or indirectly affect the intention to act.

In TAM, the main variables are Perceived Usefulness (PU) - defined as the degree to which a person believes that using a particular system would enhance his or her job performance", and Perceived Ease-of-Use (POU) - defined as "the degree to which a person believes that using a particular system would be free from effort". PU and POU impact on the intention to use, which in turn impacts on actual usage behaviour.

TAM is one of the most influential adoption models within the IS community. The original study by Davis has been replicated and tested several times. Results have validated the reliability of the model, although it has been criticized for its low predictive value. What is also important to remember is that TAM uses user perceptions as variables.

2.4. Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT is a model developed by Venkatesh et al. [3]. The model is an effort to consolidate and unify eight earlier models on technology system usage (TRA, TAM, motivational model, theory of planned behaviour, a model combining the technology acceptance model and the theory of planned behaviour, model of personal computer utilization, innovation diffusion theory, and social cognitive theory). The model uses four key constructs (performance expectancy, social influence, effort expectancy and facilitating conditions) as direct determinants of usage intention. Four key moderators are also identified: gender, age, experience, and voluntariness of use.

2.5. Technology-Task Fit (TTF)

TTF argues that technology is more likely to have a positive impact on individual performance if the technology is aligned with the characteristics of the task(s) that the user has to perform. The model has been developed by Goodhue and Thompson [5]. The theory provides a measure (measure of task-technology fit). The measure is used as a predictor of improved job performance and effectiveness.

2.6. Diffusion of Innovation

Diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system"([21]). The theory is developed by Rogers and explains how and why innovations spread across cultures (organisations, society, communities…). Some of the key constructs used in the Diffusion of Innovation theory are: Relative advantage, Ease of use, Image, Visibility, Compatibility, Results demonstrability, and Voluntariness of use ([22]). One limitation of the theory is that all users do not have the same motivations for adopting technology.

3. LAZY USER THEORY OF SOLUTION SELECTION

3.1. Lazy User Theory

The lazy user theory of solution selection tries to explain how an individual (user) makes her selection of solution to fulfill a need (*user need)* from a set of possible solutions (that fulfill the need). The set of possible solutions is a subset of universal solutions that is constrained (limited) by the *user state* (circumstances). The position that the lazy user theory of solution selection takes is that from the possible available solutions a user selects the solution that demands the least effort (see Figure 1). In other words, the theory is based on the assumption that what is the path of least resistance in physics and the theory of least effort in informatics, can be applied to user solution selection to fulfilling a need, from a set of possible solutions. And that this has implications on how products and services should be designed and on how users adopt and attach to them.

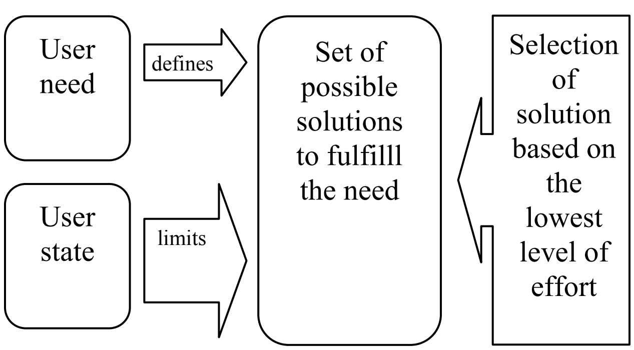

Figure 1. Lazy user theory of solution selection

For the purposes of this research we define the *user need* as an explicitly specifiable want that can be completely fulfillled. The need can be tangible or intangible. If the user need is, e.g., a piece of information, the description of the need would specify explicitly at least the type of information, the depth of information, the quality of information, the completeness of information, and the urgency of information delivery (see, e.g., [15] for studies on information need). The user need defines the (universal) set of solutions that fulfilll the need. Of particular interest to this paper are such user needs that can be fully fulfillled (satisfied) with products or services.

User state is the circumstances that surround the user at the moment when the user need arises. Examples of relevant circumstances are, e.g., location, available devices, available resources, and available time. The user state limits the universal set of solutions that fulfilll the user need to the set of possible solutions. In the cases presented in this paper we, e.g., expect that the user is in control of a mobile device (and services).

User need and user state define the set of possible solutions to fulfilll the user need; the possible solutions can be material or immaterial objects and can be delivered by different products, devices, or services, depending on the need.

The lazy user theory of solution selection assumes that the user will select the solution that demands the *least effort*. This requires that we describe what effort is and how we can order the amount of effort that different solutions require. For our purposes we observe that effort can be in the form of, e.g., time used, money used, energy used (physical work, mental work), or a combination of these. We assume that, within each individual form of effort, less of the form of effort is better, i.e., less money/time/energy used is less effort used. For situations where effort required is a combination of different forms of effort we observe that each individual has their own transformation function between the different forms, and that this individual transformation function may also change (according to circumstances – not necessarily different from user state). This means that different solutions carry a different level of demanded effort for different individuals at different times (circumstances). We want to observe here that for companies this kind of analysis may be easier, as the transformation functions are more transparent – time used for waiting or for doing physical or mental work have a price (cost), i.e., the measure is money - similar monetary measure may be impossible to define for individuals.

In addition to individuals possibly having different demanded effort levels for the same solutions, we also observe that the effort required cannot necessarily be explicitly determined ex-ante. This means that the users are making a "guess" or an estimate of the expected level of effort demanded by each possible solution. We also observe that the accuracy of estimates varies between individuals. These estimates or expectations of required effort level are then compared against actual effort level after a solution has been used. In other words, there is a feedback loop, through which the user evaluates actual effort against his expectations.

From the above we draw the conclusion that ordering the different possible solutions, when they consist of combinations of forms of effort, is difficult, and if this is attempted inaccuracy in this ordering should (must) be accepted (as precise transformation functions may be impossible to construct, and more importantly may prove to be useless, as they change). Such functions have been studied in economics since the early days of utilitarianism continued by neo-classical economics theories of agent preferences over choice sets. Our position is that if such preference ordering is tried it should be robust enough to have some practical use, such that it overcomes the differences between individual variances in preferences. It is also to be noted that the framework is dynamic: we do not suggest that users to use the same solution all the time, but that they dynamically have the possibility to choose between solutions depending on the circumstances. This dynamic aspect will be further emphasized in the next section where we will deal the issue of switching costs and learning.

To sum up, effort demanded by the solution is the amount of time, money, or energy (or a combination of these) used to fulfill the need and the user selects the solution that will fulfill the need with the least effort. In cases where the expected amount of effort demanded by more than one solution is equal (so similar that the user cannot make a definitive choice) the user is assumed to be indifferent in her choice between solutions.

3.2 Lazy user theory in relation with technology adoption models

In Section 2, we described a number of models that explain individual adoption of information technology. Many models are based on the behaviorist approach (TRA, TPB, TAM, UTAUT) and attempt to identify the factors that impact usage behavior, intention to use, and actual use. Other theories, e.g., Task-Technology Fit theory, attempt to demonstrate that a fit between technology and task characteristics increases individual performance. Then, the Diffusion of Innovation theory attempts to identify how innovations spread across groups of people.

The framework that we propose in this paper can be positioned and compared vis-à-vis the theories presented above:

- TAM and UTAUT use equivalent determinants of intention to use, i.e., user state characteristics in our model (vs. gender, age… in TAM and UTAUT).
- Diffusion of Innovation theory identified constructs (such as Relative advantage, Compatibility) which are related to what we have named "switching costs" (see section 4)
- Our model uses a similar mapping as the task-technology fit model to determine the set of available solutions. Our mapping is based on the user state, the user need, and the available solutions.

4. LEARNING ISSUES AND SWITCHING COSTS

4.1 Switching costs

When facing a decision to change from one solution to another, users must weigh the costs of switching: these are called switching costs. In economic and management literature, switching costs have been defined as "the costs associated with switching suppliers" [17].

Switching costs include (adapted from [18]): *durable purchase* (e.g., a software one-time license or acquisition), *complementary purchase* (e.g., software add-ons, peripherals), *relationship* (e.g., investment made in developing a relationship with the solution supplier, which could result in accumulated knowledge, expertise, contracted short or long-term service agreement and/or attachment), *learning/training* (e.g., initial learning, problem-solving knowledge acquired over time), *search costs* (e.g., investment made to find the solution supplier and to learn about the characteristics of the supplier and its offering), *psychological* (e.g., attachment, resistance to change), *network and critical mass* (e.g., the fact that there is a large enough customer base using the solution), *trust*, *risk of failure* (if the new solution does not perform as expected), *switching back costs*, *information management* (e.g., if the new solution requires to move data to a new database).

It is to be noted that these costs are not necessarily either high or low, but these can be identified placed on a continuum, where different degrees of costs exist. Also costs are not static, but change dynamically over time (e.g., learning costs, where knowledge is accumulated over time; or acquisition costs, which can change if the user can benefit from a temporary promotional offer).

In their study, Hess and Ricart [18] identify two types of costs: costs created by previous investments and costs created by potential investments. Some investments are so-called sunk investments (i.e., these cannot be redeemed when the user decides to use another solution). Some investments are transferable (e.g., a user can transfer part of its knowledge when using a new service with a similar interface as the previous solution, therefore requiring less learning). This has several implications for our framework:

Users will make a trade-off between previous investments and future possible investments: if a new solution is to be adopted by a user, the future investment and its associated returns will have to outweigh the benefits of previous investments. In other words, the marginal gain must be high enough in order to promote a leap in productivity).

Users will favour using solutions, where part of their previous investments can be transferred in order to ease the adoption process of that new solution.

Because the framework is dynamic (the user might switch back to a previous solution depending on its state and need), the user will try to avoid lock-in situations and favor the use of solution where switching costs are minimal.

Understanding why users switch is also an important issue, when investigating the solution selection process. In terms of switching costs; it is interesting to know which costs are the barriers to a possible switch, and what does trigger switching.

4.2 Learning issues

As part of the switching costs, we mentioned learning and training as important factors. In the following, we attempt to describe how these costs materialize in the solution selection and adoption process. We identify 4 learning phases in the solution adoption process:

- Pre-usage, before a solution is selected.
- First time of use
- Early use
- Routine use. Adoption cycle and learning (from first use to routine use - > sunk cost)

In the pre-usage phase, users need information about the solution: that information might be related to the use of solution itself, or it might also be related to other aspects of the solution, such as financial costs. If we consider learning investments at this stage, users might be interested in several issues (e.g., how easy the system is to use, how easy it is to learn to use, what the experiences of peer users are, what the possible drawbacks are). It is during this stage that expectations about system performance and usability are created. The channels through which users learn about a solution are many, but the most important might be through existing documentation or word of mouth.

The first time of use is often preponderant in the adoption process. It is often said that the first impression matters a lot in how we make our judgements. It is during the first use that the users will be able to compare his expectations about system use with actual use. This comparison is often done "on the spot" and might be based on positive or negative experiences of the system, because users usually remember only "highs" or "downs" during system use. The end result might be that the user accepts or rejects the system. This phase is crucial since it can be difficult to change the user's willingness to use if he has built a negative attitude towards a system.

During the early use phase, the user will establish a knowledge base which will lead her towards a routine in using the system. Based on the early experiences, the user learns in more detail how the solution works, discovers new features and develops problem-solving skills and strategies (in case she runs into problems).

In the last phase (routine use), the user knows how to use the functions she needs and can use routinely the system without committing any major error. The user does not know how to use all the functions of the system (few users actually do), but she knows how to solve problems. The user focuses on keeping up-to-date her knowledge about the system.

This learning process illustrates the different phases where the user has to make a learning investment. Each of these learning investments (acquiring knowledge, gaining experience, learning to use, developing problem solving skills and strategies, updating knowledge about the system) are different in nature: they require different levels of effort and happen at different points of time in the learning process. Part of these investments is transferable; for example, a system using a similar interface than a previous system.

5. EXAMPLE - RESULT OF THE GAME

A sports interested mobile telephone owner user has made a bet on the result of the game and knows that the game has ended. She wants to know, as soon as possible, if she has won. The user need is, therefore, information on the end result of the game, as soon as possible. The overall possible ways of getting the information are numerous, however, if we consider two user states a) the user is at home watching TV on the sofa and b) the user is at an airport abroad waiting, the set of possible ways to obtain the result of the game are different. In user state a) we assume that the user has eight different possible solutions (radio, TV-news, teletext, call friend and ask, newspaper next morning, internet, mobile Internet, and SMS result service). In user state b) the set of solutions are limited to the possibilities offered by the mobile phone (call friend and ask, mobile internet, SMS result service) and Internet at the airport at an elevated cost.

In user state a) the user choices that offer the least effort are teletext (the user is sitting on a sofa with a remote control nearby), an SMS result-service and TV-news. Depending on chance the TV-news may be showing the result instantaneously, which would make it the least effort solution, however, if this is not the case and the user is an experienced user of teletext, then teletext would be the least effort solution. However, if the user is not experienced with teletext and there are no TV-News that would show the result, then an SMS service would be the least effort solution. It seems that there may be a set of solutions that offer very similar low levels of effort, which makes the selection of the solution difficult to the user. In such cases the user familiarity with the solution may be the deciding factor, e.g., if the user *is not* accustomed to using teletext and *is* accustomed to using the SMS service, then the SMS service may be the least effort solution even if the user is sitting next to the television. In any case, it is most likely that the user will select one of the three solutions identified here as the least effort solutions.

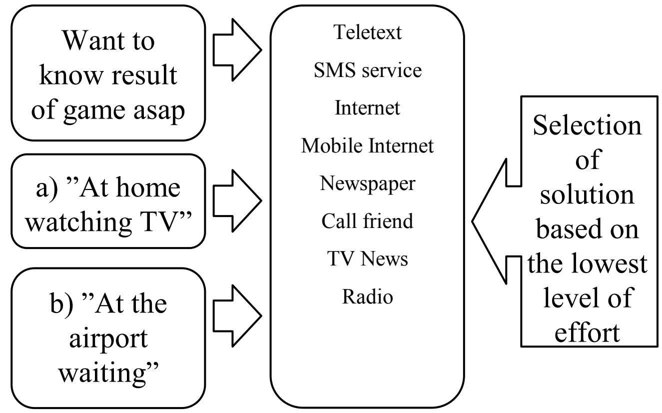

Figure 2. Result of the Game

In user state b) the user has a more restricted set of possible solutions and the least effort solution is the SMS service. The set of possible solutions is dictated by the state of the user.

If the user needs are unconditional (crisp, non-fuzzy), i.e., truly “as soon as possible” then the set of possible solutions is only the solution that will fulfilll the need fastest, in user state a) either teletext or the SMS service, or in state b) the SMS service. If however, the statement is fuzzy, and the user need asap actually means “in the near future” or “soon” then the set of possible solutions is also fuzzy.

A possible implication of the example is that finding instances of needs that are unconditional will help in identifying services that users will have a high level of attachment to, because they fulfilll their (unconditional) need better. Another issue that is of importance to attachment (and adoption) is the effect of the “if it works don’t fix it” mentality, i.e., if the user is an experienced teletext user (e.g., remembers the teletext page on which game results are shown), then teletext will remain the least effort solution, even with advanced shortcut buttons for the SMS service. This indicates that if there is a “sunk effort” in learning to use a solution it will make the development of attachment to new solutions more difficult. Further, it indicates that there must be a different user state that must first create the need to trigger the learning effort for a new solution that can after the new “sunk effort”, in the different user state, replace the old least effort solution (learning to use the SMS service at the airport will make it as effortless to use also while watching TV, and can hence become the universal least effort solution). The amount of learning effort users have to invest may explain the speed of adoption and attachment.

6. EXAMPLE - mTICKET

In our second example we discuss the Helsinki City Transport Company's mTicket that enables mobile phone users to pay for their tram, metro and bus tickets with an SMS. More information on the actual system can be found from, e.g., [16]. We expect that the user is not a holder of a tram pass, that she has a mobile telephone capable of sending and receiving SMS, and that she is waiting at the tram stop. The user need is to get the ticket for the tram. We are considering two different user states a) the user is in a hurry and does not have cash and b) the user has all the time in the world and is carrying cash.

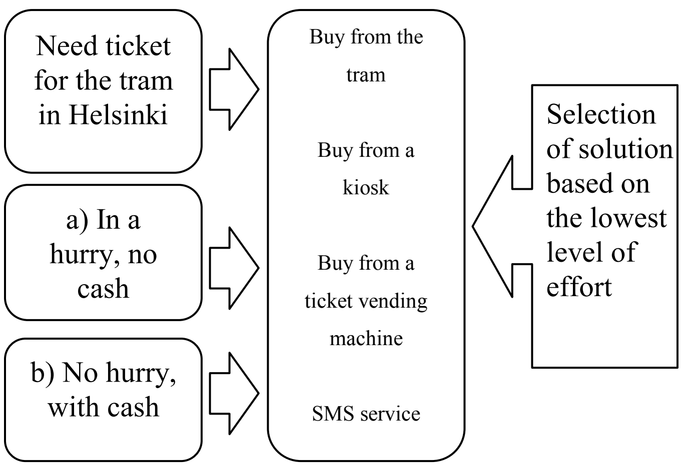

Figure 3. mTicket

The set of solutions for buying the ticket are to buy one from the tram (with cash), to buy one by using the SMS service (information on every tram stop), to buy one from a kiosk (non - evenly distributed throughout the city), or to buy one from a vending machine (available at metro stops).

In user state a) the user choices to fulfilll the need are reduced to buying the mTicket, as the user has no cash (trams accept only cash) and as she has no time to buy with a credit card from a kiosk, or a vending machine, both located at a distance.

In user state b) the user choices are all the four possible solutions. According to the lazy user theory the user selects the solution with the lowest level of effort. In user state b) the least effort is to buy the ticket from the tram with cash, or to buy the mTicket. Buying the ticket from the tram means that the user must walk to the front of the tram and buy the ticket from the driver; buying the mTicket means the user must take her mobile phone and send an SMS to the correct number. Even if the user would have unlimited time (and can afford to miss the next tram) it is unlikely that buying the ticket from a kiosk, or from a vending machine, would under any circumstances be the least effort solution. If the tram does not come instantly and the user has spare time to buy the mTicket (and at the arrival of the tram just walk in the tram), the least effort solution will most likely be to use the mTicket.

User attachment to mTicket can be enhanced by advertising the service, e.g., at the tram stops – potential service users that have time to wait for the tram are likely to adopt due to it being the least effort solution. Further, there are a number of other possibilities to enhance the attachment of users to the service, e.g., the pricing policy of mTicket can be made such that it gives an incentive to use, which reduces the workload of the drivers and contributes the trams ability to keep the tight timetables (service quality). Additionally, if the mTicket is available as a shortcut, e.g., in the services menu of the mobile phone as a "one-button-solution" the effort will be even further reduced and possibly make the mTicket clearly the least effort solution. The above mentioned issues are also usable indicators for service design more generally.

On a related note, in 2006, in Stockholm, Sweden, referring to safety concerns bus drivers refused to accept cash payments after a series of ticket payment robberies. This resulted in losses for the City of Stockholm – an mTicket type solution would possibly have solved the problem.

7. IMPLICATIONS ON THE DESIGN OF NEW PRODUCTS AND SERVICES

Based on the discussion and examples above we can draw some conclusions on the implications that the lazy user theory of solution selection can have on users' attachment to and acceptance of products & devices.

The theory would indicate that if a solution is a universally least effort fulfillment to a need, then the user would always use it for the need, put in other words, this is in concert with Zipf [8] "To be habitual, an action must be relatively effortless (or carry a particularly large psychic reward)". mTicket is an example of a close-to-universally least effort service for sporadic tram users (monthly passes are even lower effort for everyday users due to significantly lower cost).

Design of products and services from the point of view of least effort can yield a different focusing of resources, e.g., ease of use would become a more important consideration in design. For example, providing devices' user interfaces with similar shortcuts that we find on PC desktops might enable them to be more effortless to use. In the "result of the match" example a shortcut to match results would probably make the SMS service unbeatable at ease of use.

By searching and identifying user states where there are no devices that fulfill the user needs (fill the void tactics) and by identifying unconditional user needs (truly asap) niche markets for products and services can be found.

Possible "sunk learning investments" issues may make users "mentally allergic" to having to learn new things, when they already know one easy way of fulfilling their needs – the marginal utility of a very small increase in ease of use may not justify the effort of new learning, at least if circumstances (user state) do not change. This is again in line with Zipf's [8] prediction that individuals are turned back by modest obstacles that they know could be overcome by spending some effort. This means that users may not adopt new solutions unless the cost of learning is not fully refunded by advances in ease of use. If a solution is adopted and a lower level of effort is reached there is friction in changing to an even lower effort level new solution due to the sunk investment in learning.

8. SUMMARY AND DISCUSSION

This paper has presented a theory about solution selection that is based on the principle of least effort. Two case examples were presented and two different types of user needs, information need and payment need, were used to illustrate the theory. Some implications to users' attachment and to design of new products & services were discussed.

How far away is the theory from previous theories, e.g., TRA, Theory of Planned Behavior, TAM, UTAUT, TTF, Diffusion of Innovation? We feel that it has a number of points of tangency. All of the theories seem to be united on ease of use, i.e., low effort level being a major issue in adoption.

Future research on the issue should include looking at existing products and services from the point of view of the theory, and testing the theoretical model empirically.

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