

DIFFUSION OF INNOVATIONS WITHIN THE ONLINE ENVIRONMENT

- INVESTIGATING THE INTERNET'S EFFECT ON DIFFUSION OF INNOVATIONS

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This article is a subset of the master thesis with the same title and author. The thesis was conducted at the headquarters of a company with its business focused to the online environment. The thesis used a cross-sectional design, and the primary method used was a self-completion questionnaire. However, in the design part of this questionnaire both interviews and literature studies were conducted to form the academic foundation of the thesis. The purpose was to be exploratory by examining the validity of traditional diffusion theories within the online environment. The deliverable desired was an indication if key concepts within diffusion theory can be applied in the online environment.

Background

One of the hardest things to do in business management is to predict how the market will adopt a new product. Even if the new product has clear advantages over previous alternatives, the diffusion pattern is very rarely obvious. Some innovations spread fast and some spread slowly, most of the time the diffusion pattern seem to have a life of its own. To understand these patterns is the main objective of diffusion theory. However, today's diffusion of innovation theories are primarily based on the studies conducted up until 1991, which means that they have not taken the new Internet economies into consideration. When considering the enormous impact the Internet has had since its introduction, it stands to reason that there has also been an

impact on how innovations diffuse in the marketplace.

Purpose

The objective with the thesis was to be exploratory by examining the validity of traditional diffusion theories within the Internet economies. The deliverable desired was an indication on if key concepts within diffusion theory can be applied in the online environment.

Working procedure

The thesis was primarily a quantitative study, as it focused on numbers and measurements. However, some qualitative aspects were included as for example expert interviews in order to generate the questions for the data collection.

Further, the thesis used a cross-sectional design, as the purpose was

to draw conclusions about the validity of traditional diffusion theory on a large population. By using that design it was possible to study a sample and draw conclusions about the total population. The design also worked well with the corporate setting, as there were a large number of potential participants to include.

Causality among variables in the analysis of the collected data was not an issue as the thesis aimed at confirming or rejecting already defined causal relationships within the field.

As this thesis aimed to draw conclusions about a very large population, large set of data was needed for the analysis. This implied that the primary method used in this survey needed to be a self-completion questionnaire that was distributed to the company's customers. Due to cost, time and practical reasons an Internet based questionnaire was be distributed via e-mail. However, in the design part of this questionnaire some interviews were held with experts within the company to ensure the best possible questionnaire design.

These interviews were of an unstructured method to ensure the expertise is fully utilized. Literature studies were also conducted to form the academic foundation of the thesis.

Sampling considerations

The population in the thesis was existing customers. The population was divided into twelve categories, based on what country the customer were from. Each group had three sub groups, from which a stratified

random sample was drawn. This sampling method was chosen to ensure that all groups whom were considered to be key for the analysis were fairly represented.

The sub group categorization was done based on the activity of the user and the nature of their account.

Table 1 - Population size

	Sub group 1	Sub group 2	Sub group 3	TOTAL
C1	10 000	55 000	255 000	320 000
C2	35 000	260 000	945 000	1 240 000
C3	25 000	65 000	345 000	435 000
C4	140 000	1 020 000	2 285 000	3 445 000
C5	185 000	440 000	870 000	1 495 000
C6	240 000	1 585 000	7 240 000	9 065 000
C7	180 000	325 000	1 070 000	1 575 000
C8	111 000	485 000	3 045 000	3 641 000
C9	585 000	1 305 000	9 200 000	11 090 000
C10	370 000	470 000	1 995 000	2 835 000
C11	570 000	400 000	1 725 000	2 695 000
C12	1 450 000	820 000	3 420 000	5 690 000
TOTAL	3 901 000	7 230 000	32 395 000	43 526 000

From the population the sample sizes were calculated using variables generally accepted for social sciences, with a required precision of $\pm 5\%$ and a confidence level of 95%. As the variability within the groups was hard to estimate, a conservative value of 50-50 was used. The resulting target sample sizes, rounded up to nearest denary, is demonstrated in Table 2 below.

Table 2 - Target sample size

	Sub Group 1	Sub group 2	Sub group 3	TOTAL
C1	380	360	380	1 120
C2	380	370	380	1 130
C3	380	370	380	1 130
C4	380	380	380	1 140
C5	380	380	380	1 140

C6	380	380	380	1 140
C7	380	380	380	1 140
C8	380	380	380	1 140
C9	380	380	380	1 140
C10	380	380	380	1 140
C11	380	380	380	1 140
C12	380	380	380	1 140
TOTAL	4 560	4 520	4 560	13 640

As the populations were very large all sample sizes converged at around 380 respondents. In order to create the true relationship between the subgroups the respondents' answers were weighted with a weighing factor reflecting their share in the total population.

Summary of Findings

Measures of satisfaction

Two tests were made on the topic of customer satisfaction; the satisfaction index and the net promoter score. Not surprisingly they were found to correlate.

Since the satisfaction results also correlated with market performance it was used to do a country tier classification. A proximity factor was also found based on the geographical positioning of the markets. The home market and its neighboring countries show a higher satisfaction than do markets that are located far away from the home market.

Perceived attributes

The perceived attributes are one of the main concepts within diffusion theory. They are said to be the main driver of the rate of adoption and should thus be a good indicator of market performance. When all attributes were weighted tighter to a master index variable and analyzed this gave a total measure of the perceived attributes theory and it

showed to be significantly different between all market tiers. This suggests that the concept as a whole is still very much valid within the online environment. There were variations between the individual attributes, but when the data set is large enough and the analysis is done on a high level, the findings suggest that the theory is still valid. This gives merit to the actions and conclusions drawn from diffusion theory, which as it seems, are perfectly applicable on this type of organization.

Innovation-decision process

In general the innovation-decision process was found to describe the online environment very well in this thesis. There are a few factors that seem to be differentiators and others that seem to be disqualifiers. Monitor each step in the innovation-decision process is of great importance since the later in the process the change agent tries to rectify a poor process the harder the effort is. Therefore the organizations need to be on-top of this process from first awareness generation, all through to the confirmation stage.

Prior conditions

Prior conditions is a concept related to the innovation-decision process as it states in which environment the process starts in. Two identical innovation-decision processes can have totally different results in two systems with different prior conditions. The thesis did therefor attempt to measure how good the prior conditions were among the different market tiers. The findings suggest that prior conditions play an important role in the online environment. In particular previous usage was found to be decisive,

where a clear first-mover advantage was identified.

Innovativeness of the individual

Innovativeness of the individual is predicted by diffusion theory to affect the earliness by which he/she adopts new innovations. A system with innovative individuals will show a higher rate of adoption than a system with less innovative individuals. This case study set out to test if the characteristics of innovativeness individuals were overrepresented in markets with higher performance. Most of the characteristic showed no or a reversed relation to what was expected. This might be because the samples are not representative for this type of question, a market with higher success has probably moved further along the diffusion curve than have the unsuccessful markets, meaning that the individuals in that population to a greater extent consist of less innovative individuals. The occurrence of non-innovative individuals is in this case not a measure of failure, but rather of success. However no significant differences were found between tier two and three markets either. Suggesting that there is more work to be done on this concept. Innovativeness of the individual might fit better as a measure of the potential of a new market.

Piracy and diffusion theory

One of the largest differences between an innovation within the online environment and the physical world is the increased risk of unauthorized usage. Therefore this topic was covered separately, even though it is a part of the prior

conditions in which the innovation-decision process happens.

The perceived prosecution risk was tested and it showed a higher perceived risk in the more successful countries compared to the less successful ones. This suggests that a higher perceived prosecution risk might cause for greater rate of adoption. This would then imply that stiffer legislation would in the end work to speed up the rate of adoption.

Another finding was perceived magnitude of consequences and here the lower performing markets showed a lower result. This would suggest that individuals in less successful markets tend to value the cost of unauthorized use lower than individuals in other more successful markets. In addition to the drivers a question were asked about the general attitude towards unauthorized use, also this question showed the lower performing markets having a more positive attitude towards this consumption method compared to the other tiers.

Discussion and areas for further research

Measures of satisfaction

The thesis found that customer satisfaction correlates with net promoter score, but did not make any attempt to find out causality. Intuitively one would assume that a customer first becomes satisfied with a product, and then becomes a promoter of said product. However this is a concept that needs further study, once could also imagine a scenario where an individual identifies with a product or concept

so intensely that they actually promote it without, or prior to, being a customer themselves. A qualitative study into the motivations for a promoter's behavior could be done to shed more light on this phenomenon.

Also, the study found there to be a proximity factor in satisfaction, where the adopters close to the innovations point of origin were more satisfied than others. Further study could be done within this area to decide if the proximity factor is in fact a driver of its own, or if it is a result of the underlying drivers of diffusion as identified by diffusion theory. For example, the proximity factor could be a result of higher perceived compatibility due to the fact that the product originated in the same social context as the adopter is currently occupying. Living in a different country could mean higher perceived barriers.

Perceived attributes

The perceived attributes index showed to be valid in this study, which reaffirms the theory as a whole. There were some unexpected deviations though; primarily the fact that perceived relative advantage didn't show significant difference between the markets. The study suggests that relative advantage in itself is not a driver of diffusion, but rather a qualifier. Further study needs to be made within this area to conclude what the reason for this deviation is. Is the online adopter more demanding feature-wise? Meaning that having all the right features does not make you the winner, but merely allows you into the game. Does this mean that in order to speed up diffusion, corporations must stop communicating product features and

start communicating attributes that are actually drivers of adoption; such as compatibility and complexity?

As mentioned in the section above, compatibility and complexity both turned out to be drivers of diffusion. This means that corporations who are serious about managing the pace of diffusion must have a clear strategy on how to facilitate it. Starting with compatibility it is key that the individuals in each local system feel the innovation is compatible with their values and beliefs. Focusing on packaging and market messaging to convince individuals of this is one way to increase compatibility, but more research is needed on exactly how a corporation in today's economy can increase the perceived compatibility within a local system. Just as argued above for compatibility, the same goes for complexity, which is also a driver of diffusion. Perhaps complexity could be another indicator of the potential core driver causing the proximity factor in satisfaction. This also needs further in-depth research.

The two remaining attributes, trialability and observability, both showed to be qualifiers in this study. Meaning corporations has to manage them carefully as well, but they will not be decisive in diffusing the innovation faster than competitors. They are rather "must-haves" in order to qualify. Further studies could be done in order to figure out in what ways these attributes can be optimized based on new digital trial methods and new social networks for innovations to be observed in. For example, does observed usage in a digital environment have the same effect on an individual as observed usage in the physical world?

Innovation-decision process

Overall the innovation-decision process was found to be still valid in this thesis. Four of the five steps in the process showed clear results, reinforcing the findings made by previous studies. The step that did show the opposite result was the first step in the process; Awareness. This thesis found the most common source for generation of awareness knowledge was interpersonal channels; this is contrary to what traditional diffusion theory states. The fact that a measure of how information spreads does not align with the traditional understanding of diffusion is not all that surprising. When looking at the Internet's effect on the social environment, the dissemination of information is one of the areas where the largest change has been. To confirm this result one would have to do further research, focusing on how awareness knowledge is gathered among various systems with high connectivity. This is very important for corporations to understand, because either the previous understanding is still valid, which means that one should focus on mass-media channels to generate awareness; or the opposite is true and one should instead focus on optimizing the visibility in interpersonal channels. How this would actually be done also needs further study of the characteristics of the interpersonal channels in this social system.

Prior conditions

In this thesis a clear first-mover's advantage was identified. This would suggest that once a product has been adopted in a local system, and gathered critical mass, it is very hard for similar products to

compete. This could be due to the fact that products within the studied field and the studied industry in general, often have a very social aspect. The product that first gets to critical mass then gets a strong-hold of that local system, meaning other products have a hard time diffusing effectively, even though perceived advantages might be favorable. Further study needs to be made on this to establish when critical mass is achieved, and what can be done to break up a local system that is galvanized by the use of the same socially enforced product.

Innovativeness of the individual

The measure of innovativeness of the individual is not something that correlates with market performance or customer satisfaction for that matter. Instead, the opposite might even be true as in markets with further gone adoption shows less innovative individuals, as the adoption curve has progressed to early, or even late majority. The thesis instead emphasizes the need for differentiated communication messages, based on the where each market is on the adoption curve. This is a very hard task that corporations must tackle. At the same time they need to be perceived as innovative and edgy towards markets where the adoption is being done by innovators and early adopters, but in order to attract the large pragmatic groups of late majority the message needs to be different. Further study needs to be made on how this differentiated communication can be achieved, especially in relation to the generation of awareness knowledge via interpersonal channels. Can a corporation have several concurrent marketing messages, without

increasing perceived complexity and reducing perceived compatibility?

Piracy and diffusion theory

The thesis found that a higher perceived prosecution risk and a higher perceived cost of unauthorized use will lead to a less favorable attitude towards piracy. This suggests that tougher legislation would affect the attitude towards piracy, in a different field of study this can be expanded upon to see how to most effectively construct such legislation. Further the thesis found that an individual that does not appreciate the cost of piracy is more favorable towards it. This means that piracy could also be fought by clearly communicating the real losses made by the industry due to the loss of revenue. If this communication is successful, then this thesis suggests it would make individuals less favorable towards piracy. Further research needs to be made on how this communication should be made.

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