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An investigation into factors that affect adoption and diffusion of innovations in publishing and librarianship: a *Grounded Theory* approach

Abstract:
Getting innovations adopted is often difficult. Not because they lack obvious advantages, but because of the complex nature of the adoption and diffusion process. If everyone included in their strategy, the six elements of the *'innovation diffusion mix'* identified in this study, adoption and diffusion would be much easier.

Résumé:
Faire adopter des innovations est souvent difficile. Non parce qu'elles manquent d'avantages évidents, mais de par la nature complexe du processus d'adoption et de diffusion. Si chacun incorporait dans sa stratégie les six éléments de *l'innovation diffusion mix* identifiés dans cette étude, adoption et diffusion seraient grandement facilitées.

1. Introduction

Is there a set of tools to facilitate and accelerate the successful introduction of innovations into publishing and librarianship? This question is often asked by librarians and publishers alike when, in addition to printed books and journals, a series of subsequent innovations in publishing and librarianship materialized in the last decades of the past century. Research of innovation has significantly been revived in the 1980s by the emergence of new communication technologies (Van de Ven et. al., 1988). The implementation of many of these innovations failed, initiating an interest in better understanding of how to effectively introduce innovations. According to Rogers (1995) getting an idea adopted, even when it has obvious advantages, is often very difficult and many innovations require a lengthy period from the time they become available to the time they are widely adopted. For this reason, researchers have sought to understand the adoption and diffusion process with the purpose to facilitate and accelerate the acceptance of the innovations. This has lead to the emergence of a large and growing number of innovation studies. The rapid growth of innovation studies proves that adoption and diffusion research is a well-established research area in social and business science, and that the ideas that comprise adoption and diffusion theory have been applied widely, also in publishing.

2. Overview of ideas, theories and research relating to the adoption and diffusion of innovations

After reviewing the literature (see table 1), the author believes that a number of key concepts have emerged from the vast amount of research over the last 5 decades. In the early stages, innovation research focused on innovation through its *adopters*, later, a second approach with a focus on the *process* of innovation emerged, recognizing the various stages in the process and at the same time identifying individual adopter

characteristics for each phase. The inappropriateness of a focus on the individual adopter in organizational innovation research contributed to a third approach with a focus on the *organization* and its characteristics, assuming that the structural variables were the primary determinants of organizational innovation. In organizational innovation research, the emphasis shifted to two different approaches: those emphasizing the *results* of innovation adoption and those emphasizing the *process* of adoption.

In the process-oriented research approaches however, organizations were reduced to the equivalent of an individual adopter, and models and methods developed to study innovativeness in individuals were simply transferred to organizations, introducing systematic errors. Later process-oriented researchers advocated the inclusion of *implementation* in the adoption paradigm, while others advocated the inclusion of '*post-introduction phase'* strategies in the paradigm. Other researchers saw that innovation had to be understood from the point of view of the actors involved and encouraged works based on longitudinal case studies and focused on the *sequence of events* in the development and implementation of innovations. This change implied a swing in the natural context in which the innovation took place, and in which innovation was treated as a process of linear development, with easily identifiable and predictable sequences, cumulating in a visible and tangible result for the organization.

Studies with a *result*-approach were limited in that they investigated adoption decisions by individual firms, rather than being studies of diffusion, and in that relationships found were not always consistent. None of the outcomes of organizational innovation studies were unequivocal or provided convincing evidence for generalisable organizational innovation, and the relationships found were rather low. Despite much research, innovation seemed to emerge as primary causal in response to a large variety of factors influencing innovation adoption.

An integration of process and adopters' variables was later made. Critical in that approach is the appropriate determination of the phase in the market development life cycle of the target market, whereby the real skill is less on knowing the strategy than sorting out the situation in which it should actually be applied.

Not only adopter organization characteristics were recognized in the literature as of influence on the adoption and diffusion of innovations, also *supplier firm* variables were recognized as of influence. Amongst variables found influencing innovation adoption were the supplier's role in providing information and the supplier's internal development process and marketing strategies.

A focus on *innovation* characteristics was very rarely found and innovation characteristics relating to adoption were generally incorporated in studies with a predominant focus on other approaches. Some authors have asserted that under-specification of the innovation has been the course for little or no comparison of findings across studies. Recent research in knowledge management offered the opportunity to place the phenomenon of innovation adoption into the more general concept of sense making and thus offered new opportunities to better explain the adopter's mental mechanics.

The role of *environmental* variables and characteristics on the innovation adoption was only secondarily mentioned in the various studies, which is surprising after many decades of marketing practice in which equivalent attention is devoted to the organization's

strengths and weaknesses and the opportunities and threats in the competitive environment.

Table 1: overview of ideas, theories and research relating to the adoption and diffusion of innovations

Author(s) / Year	**Subject(s) of investigation**	**Major findings:**	**Comments:**
Beginning 20th century	Individual decision makers e.g. farmers, doctors, teachers, etc.	Most changes in a society resulted from innovations from other societies; the S-shaped diffusion curve; the role of opinion leaders in the process of 'imitation'	Ignoring that individuals were sometimes part of organizations
Rogers (1962)	Adoption process and adopter categories	Simple adoption process scheme and various adopter categories: *innovators, early adopters, early majority, late majority* and *laggards*	Model can only be used for interpreting historical data, rather than predicting the future
Webster (1971)	Results of the innovation in organizations	Speed of adoption is positively related to profitability of the innovation and competitive pressures, but negatively related to risks associated and required investments Concern for phenomenon of opinion leadership	These studies are no studies of diffusion, but studies of adoption decisions by individual firms
Webster (1971)	Relationships and influences among and within organizations	Concern for phenomenon of opinion leadership; the seller of the innovation is often most important source of information.	This type of research overlooks important economic criteria e.g. relative profitability and the aggregative data are likely to conceal important differences
Lancaster and White (1976)	Differences between industrial buying vis-à-vis buying in households	Different roles of deciders, influencers, users, buyers and gatekeepers; industrial buyers are never purely economically rational; sales representatives often only contacts between supplier and buyer	"Two step flow model" assumes entire passive role for target audience, which is not the case
Kottler (1988)	Diffusion strategies	Rapid skimming strategy; slow skimming strategy; rapid penetration strategy, and slow penetration strategy	
Frambach (1993)	Variables related to innovation supplier	Meeting the customers' needs is essential; suppliers marketing strategies: working with other producers, concentrating on 'early adopters, reducing risks, and gaining endorsement of opinion leaders	
Moore (1991 and 1995)	Adoption process and adopter categories	Technology Adoption Life Cycle includes *early market, chasm, bowling alley, tornado, main street and end-of-life.* Critical for diffusion is crossing the *chasm* by selection of a niche with compelling reason to buy, securing a beachhead segment and using bowling alley techniques to reach the main street market	In high tech main street markets an unstoppable series of paradigm shifts (Moore's Law)
Tzokas and Saren (1997)	Organizational strategies and their relationship with innovation adoption	The concurrent influence of a large number of factors other than strategy on the timing of the innovation adoption makes strategy a surrogate explanatory variable	
Cooper (1998)	The innovation phenomenon	Under-specification of the innovation is the cause of little or no comparison of findings across studies	Uncertainty about the number of dimensions an innovation may hold and their relative importance
Au and Enderwick (2000)	Adoptor's perceptions	Perceived difficulty and risk, and negative experiences are negatively related, and supplier's commitment, perceived benefit, compatibility, and enhanced value are positively related with the attitude towards adoption	
Pereira (2002)	Organizational sense making	All knowledge of the innovation must be incorporated into existing mental frameworks, once a decision is made, the justification will be developed retrospectively.	

The author found that the review of academic research provided a wide spectrum of features found relevant to innovation adoption, but did not give much practical guidance on how to influence the adoption process, as given i.e. in the best-selling books of Moore (1991 and 1995), whereas Moore (1991 and 1995) conversely gave very practical guidance on how to launch high-tech innovations but did not refer to the academic literature (with the exception of reference to Rogers (1962).

3. Investigation of adoption and diffusion as a circular process: *'Grounded Theory'*

Following the systematic gathering and reviewing of the literature about variables influencing the innovation adoption by the author, a number of substantive categories, *descriptive categories*, emerging from the analysis of the literature could be identified and named, describing the overall features of the adoption phenomenon under study. The numerous individual influencing variables, which were identified in the analysis of the literature, could all be categorized and related together within these *descriptive categories*. This process is referred to in the *Grounded Theory* literature as *open coding*, and the outcome is given in table 2.

Descriptive categories	**Examples of individual influencing variables**
Adopters	Early adopters, early majority, late majority
Adopting organizations	Adoptive experiences, firm size, organizational structure, competences
Supplier firm	Innovative climate, past experiences, understanding of the market place
Innovation	Radical/incremental, technological/administrative, product/process
Process	Agenda setting, matching, redefining/restructuring, clarifying, routinising
Environment	Competitive pressure, opinions industry peers, number of adopters

Table 2: descriptive categories describing the overall features of the adoption phenomenon

Given the large number of variables involved, a qualitative approach was adopted. Smith and Fletcher (2001) define *qualitative research* as "It is about asking, in a flexible way, comparatively small samples of people questions about what they do and think, and listening carefully to, and subsequently interpreting what they have to say".

After careful consideration, the author concluded that an 'interpretive' or 'phenomenological' approach best suited the topic of this investigation. In an interpretive approach: the social world is seen as socially constructed on the basis of shared meanings which are subjective; human patterns are not assumed to be fixed for ever; it is recognized that the researcher in the observation process can never divorce from the subjectivity of the constructed social context of which he is a part; and is there a focus on meanings rather than facts alone.

Central to this thinking is the work of Glaser and Strauss (1999). Their *Grounded Theory* approach is a general methodology for developing theory that is grounded in data systematically gathered and analyzed. The *Grounded Theory* approach as made by the author, involved a number of stages to 'ground' the theory: data collection using the same techniques as in other research methodologies; analysis of the data followed by the identification, labeling, categorizing and relating in an outline form (*open coding*); identification of causal relationships between the categories (*axial coding*); selection and identification of the core category and systematically relating it to other categories in order to arrive at the *Grounded Theory* (*selective coding)*.

The *Grounded Theory* approach requires diversity in data collection methods, ensuring that the theory is grounded in the data. In this research, the author has used a combination of methods for primary and secondary data collection:

- Review of the literature by searching the databases and electronic journals as provided by the University of Glamorgan's *Find it* service for the journal literature, together with the Amazon.com and British Library OPAC databases for references to monographs and serials;
- Case study analysis of a limited number of case studies selected from the results of an additional literature search performed at the University of Leiden (The Netherlands), using the "Library and Information Science Abstracts" database, covering the period 1969-2003/04;
- In-depth interviews with a group of 5 interviewees, selected by using the convenience sampling method, from a range of people already known to the author.

4. Case study analysis

The purpose of the case study analysis is to identify relationships between the *substantive categories* identified from the literature review, with the aim to explain and understand these relationships. This phase in the process of *Grounding Theory* is referred to as *axial coding* (Barker, no date). In order to identify relevant cases from publishing and librarianship, an additional literature search is performed, using the "Library and Information Science Abstracts" database, covering the period 1969-2003/04. A thorough search of the database found a paucity of work undertaken, 4 papers referring to innovations in the publishing industry and 29 to innovations in librarianship.

In the first stage of the case study analysis, the *drift* stage, the author attempts to learn the concepts of innovation adoption and diffusion within the context of the research. In the second stage of the case study analysis, the *design* stage, the development of a tentative explanation of the divergent observations so far collected is sought, whereby categories influencing adoption dynamics are collected, and where possible placed down a positive/negative-influence continuum to provide a sufficient (not statistically) body of observations with which "to flesh out" the model (Bonoma, 1985). In the final stages of the case study analysis, the *prediction* and *disconfirmation* stages, further testing the limits of generalizations not rejected in the previous stage is completed. Five case studies were ultimately selected for this research. This number of cases meets the requirement of 4-10 cases as recommended by Eisenhardt (1989) for use in a proper case study analysis.

4.1 Individual case study analyses:

M.P. Wilson, R.J. McCarter, A.B. McKay and R. Estime (1988) "The Management of Change: Lessons Learned from the IAIMS [Integrated Academic Information Management System] Experience"

The imperative of this study was to find a way to integrate information-processing technology into a professional academic setting, so that the benefits could enhance its activities. The major findings of this study are: the challenge is to also foster the adaptation of existing structures to support the innovation (Wilson et. al., 1988); the critical elements of the change process were: support of leadership; a critical mass; a picture of the level of dissatisfaction with the present status, a 'needs' assessment and a picture of the desired future; outside help; a pilot project; and, participation of (innovation) opinion leaders. (Wilson et. al., 1988);

J.G. Marshall (1990) "Diffusion of innovation theory and end-user searching"

This study explores the value of diffusion of innovation theory for predicting the level of implementation of end-user online searching. The major findings of this study are: Marshall (1990) suggests that relative advantage, compatibility and complexity are the strongest predictors of implementation and use of end-user searching by Canadian health professionals; "The results of this study demonstrate the importance of user perceptions on implementation behavior, … they account for a substantial proportion of the variance" (Marshall, 1990);

M. Holland (1997) "Diffusion of innovation theories and their relevance to understanding the role of librarians when introducing users to networked information"

This study reviews established theories from the area of diffusion research that are of relevance to librarians and information professionals trying to understand the implications of new communication technology and networked information. The major findings of this study are: "Innovations may fail because they do not have the right critical mass of resources and interests" (Holland, 1997); "Librarians and information professionals are involved in diffusion activity. These activities could broadly be described as persuading clients to adopt internet/networked information technology, providing support and training to end-users, communicating with clients through Internet technologies such as e-mail and the Web, and facilitating the development of new resources using Internet/networked information technologies. In this way we act as change agents in the wider diffusion process. The concepts of diffusion, change agency and critical mass provide us with a structure and criteria to analyse how effective we are, and reasons why some projects succeed and others fail" (Holland, 1997);

J.S. Ash (1999) "Factors affecting the diffusion of online end user literature searching"

"The aim of this study was to identify factors that affect diffusion of usage of online end user literature searching. Fifteen factors clustered into three attribute sets (innovation attributes, organisational attributes, and marketing attributes) were measured to study their effect on the diffusion of online searching within institutions" (Ash, 1999). The major findings of this study are: "There was little correlation between the two dependent variables internal diffusion (spread of diffusion) and infusion (depth of diffusion), they measured different things" (Ash, 1999); "The negative relation to infusion of *personal image enhancement* was possibly because end user literature searching was seen as a less luxurious way to have searches done, whereas the negative relation of *management support* perhaps indicated that the depth of diffusion could increase despite top-level management actions" (Ash, 1999);

M.D. White (2001) "Diffusion of an innovation: digital reference service in Carnegie Foundation master's (comprehensive) academic institution libraries"

"This analysis of academic digital reference services in institutions within the framework of diffusion of innovation theory, focuses on the measure and rate of diffusion, the characteristics of libraries in each adopter category, and the re-invention of the innovation during implementation" (White, 2001). The major findings of this study are: "Early adopters are generally in *larger institutions*, are *wealthier*, have *larger staffs*, are *more innovative* in providing computer services of all types, and have *higher demands from their clients*" (White, 2001).

Following the analyses of the individual cases, the author has coded the factors identified as affecting adoption and diffusion. Most substantive categories that emerged from the literature

review on innovation adoption *in general* also emerged from the individual case study analysis focussing on adoption and diffusion of innovations *in publishing and librarianship*. Whereas from the individual case study analysis, no *supplier firm* attributes emerged, a new substantive category emerged, including *change agent* attributes. The following table includes the new change agent attributes and the supplier firm attributes that emerged from the literature review.

Change agent attributes	**Supplier firm attributes**
Make new technologies available	Relative importance of the internal innovation development process
Create an understanding and appreciation	Innovative climate
Transmit information	Taking advantage of past experiences and/or synergies
Persuade clients to adopt	Understanding of where the market is
Provide training and support	Being major information source
Communicate with clients	Influence on potential buyers
Facilitate new resources development	Supplier's commitment
Share developments and experiences	Focus on dominant adoption type
Adapt existing structures	Focus on lucrative niche markets
Facilitate barrier reduction	Marketing strategies: promotional support and price levels
Provide leadership	Working with other producers
Create excitement	Positioning the innovation as market leader
Move the process rapidly	Risk reduction
Ensure opinion leader participation	Winning market support
Provide outside help	Using Direct Sales to cross the chasm
	Being "Gorilla", "Chimpanzee" or "Monkey"-type competitor
	Be point of reference for industry standards, architecture and vision
	Create favorable profit margins through charging value based prices and experiencing lowest cost-per-unit

Table 3: change agent and supplier firm attributes

As can be seen from the table, many attributes, earlier identified as *supplier firm attributes*, correspond with the *change agent attributes*, suggesting that supplier firms play a significant role as change agent in the adoption and diffusion by their customers. The role of the *supplier firm* as *change agent* as emerging from the case study analysis is earlier recognised by other authors e.g. Lancaster and White (1976), Frambach (1993), Moore (1991 and 1995) and Au and Enderwick (2000).

The divergent findings from the numerous studies included in the literature review and case study analysis suggest a multitude of simultaneous interactions between the identified variables. Various authors confirm this picture of divergent findings and a multitude of simultaneous interactions. Webster (1971), Zaltman et.al.(1973), Tzokas and Saren (1997), Damanpour (1988), Mansfield (1961-1965), Cooper (1998), Moore (1991 and 1995), and Carrero (2000).

5. In-depth interviews

In this section, the purpose is to select and identify the core substantive category and by systematically relating it to other categories, to further develop the *Grounding of Theory* (*selective coding*).

> "It involves validating those relationships, filling in, and refining and developing those categories. Categories are integrated together and a *Grounded Theory* is arrived at" (Barker et.al., no date).

The author has chosen to use a convenience sample to obtain quickly and economically a number of interview responses, within the context of *Grounding Theory* to be used for exploratory purposes only. The author is aware of the statistical limitations of projecting the results beyond the convenience sample. The interviewee group was chosen to represent equally supplier firms and librarians. In the interviews, questions about individual factors were easily answered, however it was very difficult to extract information about the relationships between the factors or about any hierarchy between the factors.

5.1 Findings from the interviews

The purpose of the interviews was to select and identify the core category of factors influencing the innovation diffusion process and to systematically relate it to the other categories to arrive at a *Grounded Theory*. Following excerpts from the transcription of the interviews:

Interviewee one, male, is a publisher with over 13 years of experience in electronic publishing.

- 'It is very difficult to launch an innovation if you cannot base it on existing dissatisfaction'
- 'In a smaller organization the individual adopter is more important'
- 'Larger organizations adopt later, are less alert'
- 'In new media, there are many smaller innovation cycles'
- 'Incremental innovations are cheaper for the supplier firm and more successful'
- 'The real profit is not in the introduction of the innovation, but in its incremental improvement'
- 'Innovation adoption is a circular process'

Interviewee two, male, is managing director of an international journal agent and bookseller.

- 'The transfer to electronic information had an enormous impact on librarianship. Many libraries could not adapt their processes so rapidly'
- 'Ultimately, efficiency improvements facilitated the transfer to the new technology'
- 'Despite all technological innovations in electronic publishing, academia still buys printed information'
- 'Negative influences came from the high costs, unfamiliarity with the marketplace, the early state of the innovation [not yet fully developed], and an unfavorable economic climate'
- 'Life cycles are indeed shorter'
- 'The most important factor for a supplier firm is the need to innovate'

Interviewee three, male, is general manager and vice president of one of world's leading international information providers.

- 'Information is to today's manufacturing executives what fire was to prehistoric cave men, properly controlled and applied, it sustains life, and perpetuates evolution, but mishandled or neglected it can quickly destroy'

- ‘The electronic world develops parallel to the paper world’
- ‘Since the price of scientific information doubles every 7 years, and library budgets maybe every 70 years, savings must always come first’
- Within the next 5 years, the current electronic journal model will no longer exist, but will be replaced by huge article databases, offering the user tailor-made solutions to his information needs’
- ‘The end users started to put pressure on the librarians’

Interviewee four, female; with a background as biologist, is now active as a search intermediary in an academic life science library.

- ‘Successful diffusion very much depends on the culture that exist within a library’
- ‘The emergence of end-user searching just caught us unaware; we saw it happening and had to respond to it as well as possible’
- ‘In the time of the printed bibliographies there was hardly any instruction; with the materialization of electronic bibliographies, we recognized the patron’s need for instruction’
- ‘The S-shaped adoption and diffusion curve was clearly visible; in the beginning we had to do a lot of promotion, but after some time we reached saturation’
- ‘The S-shaped curves of the subsequent innovations were steeper’
- ‘We are still in an ongoing information explosion and people want some kind of quality indicators’
- ‘The quality of the innovation is the starting point of all’

Interviewee five, male, combines his work as researcher and developer at the ICT department of a major university library, with teaching at an Institute for Media and Information Management.

- ‘The change agent is the person who ultimately sets the innovation off’
- ‘Where “old” sources are still valuable, people will use them alongside the innovation’
- ‘Centralized diffusion systems are often profit driven. Decentralized diffusion systems do not necessarily have to be profitable, as long as the costs are recovered’
- ‘We “re-invent” the electronic journals for use within our own organization’
- ‘In the ultimate use of an article nothing has changed. Where scientists used to work with a paper reprint of an article, they now work with a printout of the PDF-version of an article’
- ‘Without innovation there is nothing to adopt or to diffuse. It all begins with the innovation’
- ‘It is the adopting organization, which facilitates the diffusion of the innovation’
- ‘The individual adopter is a major player in the diffusion process, but stands somewhat outside the developments’.

Following the transcription and analysis of the interviews, the findings are categorized using the substantive categories identified from the literature review and case study analysis.

Innovation

The interviewees were in general agreement that the *innovation* is the nucleus of the adoption and diffusion paradigm. A number of *innovation* attributes were mentioned in the interviews of which *quality* emerged as the most significant. Depending on the background of the interviewee, different approaches to quality could be recognized: customer quality, production quality, process quality and value quality, all leading to the same practical approach to quality: “Quality is providing what the customer needs” (Eger-Ulm, 1998). It should not be

assumed that the diffusion and adoption of all innovations are necessary desirable. Some harmful and uneconomical innovations are not desirable for either the individual or the social system (Rogers, 1995). Whereas high quality allows premium *prices*, too high introduction prices impede rapid market penetration. In relation to the nature of the innovation emerged that innovations with an *incremental nature* tend to more easily diffuse compared with *radical* innovations and that innovations with a *process* or *conceptual nature* diffuse more easily than product innovations. Also came forward that the *accessibility* and *presence of other innovations* positively influences diffusion.

Environment
Based on the number of arguments that surfaced in the interviews, the *environment* is the second major determining factor in the adoption and diffusion paradigm. A division of these attributes into *opportunities* and *threats* is given in the following table.

Opportunity	**Threat**
Established platform to build upon	Shortening life cycles
Open standards	Absence of a critical mass
Governmental influence on large scale innovations	Market's negative view on the future
Influence of related innovations	New entrants entering the market place
Transition of technological innovations into process innovations	Ignorance in the market place
Radical innovations' succession by incremental innovations	Unfavorable economic climate
Paradigm shift from 'dust' to 'digits'	Margin erosion
Trend towards more tailor-made solutions	
Trend from bulk sales to pay-per-view	
Concentration in the market place	
Heterogeneity of the market segments	
Ongoing information explosion	
Space for innovations alongside 'old' solutions and vice versa	
Emerging decentralized diffusion	

Table 4: Attributes of the substantive category *environment,* divided into *opportunitie*s and *threats*.

As can be seen from the table, the number of opportunities outnumbers the number of threats, suggesting that the interviewees reviewed the environment as positive for innovation diffusion.

Supplier/Distributor
Concerns that emerged from the interviews were about the *strategy* the supplier firm needs to choose. These concerns compare with Kotler (2003) where he asserts:

> "The innovator bears the expense of developing the new product, getting it into distribution, and informing and educating the market. The reward for all this work and risk is normally market leadership. However, another firm can come along, copy or improve the new product, and launch it. Although this firm probably will not overtake the leader, the follower can achieve high profits because it did not bear any of the innovation expense".

Today's media market place, where '*old economy'* companies are playing the role of *adopter* and experiencing success with innovations, previously launched by '*new economy'* entrepreneurs who meanwhile have left the market place, is proof of the validity of Kotler's assertions.

Another concern that was expressed in the interviews is that publishers choose *direct distribution* in the early phases of the innovation's life cycle and as such exclude specialized distributor firms from the early diffusion of innovations, which leads to much disquiet on their side. Some of the interviewees felt that market leaders in science publishing in early markets were misusing their monopolist position to impose direct distribution and argued that specialized distributor firms have greater *homophily* with their clients than publishing firms. Rogers (1995) lists *homophily* among the factors of *change agent's* success, which is based on the following value-adding activities:

- To develop a need for change;
- To establish an information-exchange relationship;
- To diagnose problems;
- To create an intent in the client to change;
- To translate an intent into action;
- To stabilize adoption and prevent discontinuance;
- To achieve a terminal relationship, by self-renewing behavior on the part of clients.

These views concur with the outcome of the case study analysis in which the connection between the supplier's role and change agent's role emerged.

Adopter organization

There was much diversity emerging from the interviews among the mentioned *adopter organization's* attributes, which positively impact innovation diffusion. The interviewees from the supplier end of the model listed: dissatisfaction with current solution, alertness on / awareness of innovations; speed of adoption; and impact on internal processes. The interviewees from the adopter end of the model listed as attributes: innovative culture; stimulating leadership from an internal change agent; gain of benefits by the adopting organization; and recognition of the end user's need and requirement of advice, training and support. One of the interviewees mentioned an interesting paradigm shift: academic institutions begin creating alternative innovations and thus shift from the role of adopting organization into the role of innovation supplier.

Individual adopter

Interviewees with a library background contributed more to this theme than the interviewees with a publisher or distributor background. A division of the attributes that came forward from the interviews on attributes influencing the innovation diffusion into positive and negative influencing factors is given in the following table.

Positive factors	**Negative factors**
Heavy use of preceding product category; Bottlenecks in use of current technology; Dissatisfaction with existing solution; Adopter's awareness of his needs; Influence of innovations on adopter's current dissatisfaction; Recognition of advantages; Awareness leading to preference shift in the innovation's favor; Managers of the end users as change agent; End user's appreciation of the innovation;	Remaining preference for preceding technology; Inadequacy to imagine the innovation's desired features; Lost of critical aptitude among early adopters; Large size of organization; Lack of critical mass; End user's needs for instruction and support; Attitude of IT-professionals

Table 5: Attributes of the substantive category *individual adopters,* divided into positive and negative factors.

Process
There was consensus among all interviewees about the validity of Rogers' (1995) model of the *innovation decision process* and his typology of *adopter categories*. The views of the various interviewees, asserted that the same innovation diffusion process occurs with the diffusion of each new emerging innovation, whereby of course only very few innovations eventually pass successfully through all phases of the industrial diffusion process. The influences of the various *substantive categories* as identified in this study on the innovation diffusion process, were described by an interviewee as following: "Environmental factors influence innovation supplier firms, supplier firms shape the innovation's quality, innovations influence individual adopters and individual adopters influence their parent organizations".

6 Conclusion

With the aim to arrive at a clear conclusion, the key findings of this study are compared and contrasted with Rogers' (1995) innovation model (table 6). As can be concluded from the table, the findings of this study about *innovation* and *process* concur with Rogers' (1995) assertions about *innovation* and *time*. Also much similarity emerged with regards to Rogers' *communication channels* characteristics and the *supplier firm* characteristics as emerged from this study, and between Rogers' (1995) *social system* characteristics and the *organizational and individual adopter* characteristics as emerged from this study. The emergence in this study of the *environment*, as the second major determining factor in the innovation-diffusion paradigm, contrasts with Rogers' (1995) assertions.

6.1 The *Grounded Theory*: Innovation diffusion mix

A visualization of the innovation diffusion paradigm as emerged from this investigation, including the influencing substantive categories and the relations between the categories as come forward from the interviews is given in the following figure.

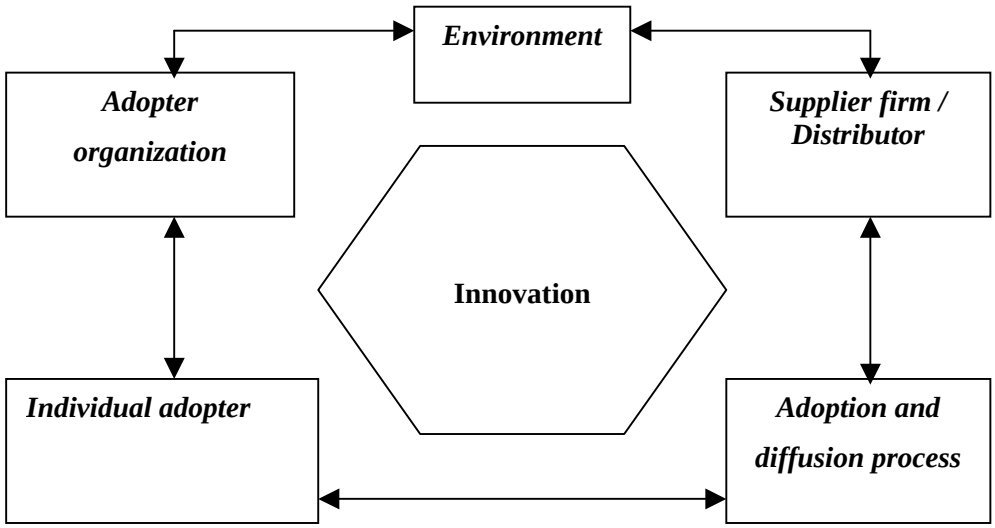

Figure 1: model of *substantive categories* influencing the innovation adoption process

Table 6: Substantive categories compared with the main elements in the diffusion of innovations model

Four main elements in the diffusion of innovations (Rogers, 1995)	**Major findings:**	**Six substantive categories emerged from this investigation:**	**Major findings from this study:**
Innovation	Major determining factors: perceived newness, efficacy, relative advantage, compatibility, complexity, trialability, and observability. Previous experiences influence perception of the next innovation.	Innovation	The innovation is the nucleus of the diffusion of innovations paradigm; Quality is the most significant attribute, followed by accessibility; Too high introduction prices impede penetration; Incremental, process and conceptual innovations diffuse more easily; Presence other innovations positively influence adoption and diffusion.
		Environment	Technological, socioeconomic and political factors influence the adoption and diffusion of innovations
Communication channels	Heart of the diffusion process consists of modeling and imitation by potential adopters of their network partners. More effective communication when two or more individuals are more homophilous. There should only be some heterophily regarding the innovation between the change agent and his clients but homophily on all other variables.	Supplier/distributor	The supplier firm's strategy towards the innovation, its distribution strategy and its change agent aptitudes are the determining factors
Time	Time plays a role in the classification of the system members on the basis of innovativeness, on the relative earliness / lateness of adopting and the rate of adoption.	Process	Consensus with Rogers' (1995) model and typology and about the same innovation diffusion process occurring with each new emerging innovation.
Social system	The structure of a social system, the system norms, opinion leaders and change agents, and the nature of the innovation-decision influence the diffusion of innovations in a system.	Organizational and individual adopters	Much diversity to be recognized among the determining factors that emerged: magnitude of current use and dissatisfaction, alertness / awareness, internal processes, internal change agents, innovative culture, organizational advantages and benefits, and capabilities.

The outcomes of the literature review, the case study analysis and the interviews have contributed a diverging accumulation of attributes, which all could be classified under the six *substantive categories* included in the *innovation diffusion mix*. In attempting to formulate a successful strategy for an innovation to become adopted and diffused, all six substantive categories must be taken into consideration. With regard to the formulation of such a strategy the following generalizations may guide the process:

Generalization 1: Innovation

- Meet the customer's compelling reason to buy completely and with no concessions;

Generalization 2: Environment

- Make sure you are targeting an attractive market niche which can be used as a bowling pin to knock over other pins in the bowling alley;

Generalization 3: Supplier / Distributor

- Start with direct distribution to learn from early markets and behave as a change agent;

Generalization 4: Adopter organizations

- Identify organizations with a compelling reason to buy or develop that compelling reason first;

Generalization 5: Individual adopter

- Explore dissatisfactions, aim at the manager of the end-user and avoid IT-departments;

Generalization 6: Diffusion process

- The only constant factor; adapt your strategy to meet the requirements in each of its stages.

Note that the *innovation diffusion mix* represents the supplier's view of the diffusion tools available for influencing adopters. From an adopter's view, each of the diffusion tools is designed to deliver a customer benefit. Winning companies will be those that can meet the adopters' needs economically and conveniently and with effective communication (adopted from Kotler, 2003).

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