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Characteristics of innovators in the building market

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CHARACTERISTICS OF INNOVATORS IN THE BUILDING MARKET

Rodney Arthur Yeo

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A	75 —	100%
B	70 —	74%
C	60 —	69%
D	50 —	59%

UNIVERSITY OF THE WITWATERSRAND
FACULTY OF BUSINESS ADMINISTRATION
JOHANNESBURG

A Research Report submitted to the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg, in part fulfillment of the requirements for the Degree of Master of Business Administration

Johannesburg, 1986

ABSTRACT

This research report studies the perception of actors in an industrial market of an innovative product class. Actors are classified according to a new definition of innovativeness, and opinion leadership. The characteristic differences between the most innovative, and the highest opinion leaders, and the rest of the population are derived. This approach has been used to investigate diffusion of new products in consumer markets, but has not been specifically applied to industrial markets. The vehicle chosen for the study was a perception questionnaire returned by individuals involved in the purchase of housing contracts. Some evidence was found of an informal communication network in this system, which is necessary for the process of diffusion. Univariate comparisons are made of a number of characteristic differences between innovators, and opinion leaders, and the rest of the population. These have been found to have a number of similarities to those found in consumer markets, and some clues are found as to the specific influences on innovation in this market. It is tentatively concluded that the diffusion process has some validity in this market.

This approach is limited in that it reports on the perceptions of individuals, and has no link to overt behaviour. It still has to be shown that these results will have influence on the purchasing decisions of the organisation. In addition, the specific market examined has a number of important differences to many industrial markets, and these result may not be duplicated.

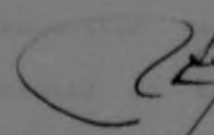
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DECLARATION

I declare that this research report is my own, unaided work. It is being submitted in part fulfillment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Rodney Arthur Yeo

11th day of December 1986

PREFACE

The purpose of this report was to take the first step in assessing whether or not the classic diffusion theory has any explanatory power in industrial markets. To do this, an approach commonly utilised in consumer markets was used. Actors in these markets were tested on a number of theoretically derived characteristics, as well as some that were newly proposed. The characteristic differences between the innovators and opinion leaders in the system were derived. A new definition of innovator was proposed. The utility of the new definition was tested in terms of its ability to delimit the population in a theoretically meaningful way.

The characteristic differences tested were expected to offer clues as to the functioning of the diffusion process in this market.

In order to test these differences, a market was chosen in which the writer is at present employed. This allowed the proposal of possible influences which were not suggested by the literature. The extensive differences between the functioning of consumer and industrial markets made the proposal of new influences necessary.

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CHAPTER 1

INTRODUCTION

1.1 THE DIFFUSION OF INNOVATIONS

The theory of the diffusion of innovations looks at the way in which new ideas, new practices, and the use of new products, innovations, spread through a society. Whether or not the innovation is "new" by some objective viewpoint is not important. An innovation is perceived as new by the population, or the social system through which it diffuses.

The word "diffusion" is used for a specific reason in this context: the spread of usage of the innovation is not regarded as a series of unconnected adoption decisions. Individuals within the system communicate with each other, and exert influence on each other. This influence can be against the adoption of an innovation. The failure of many desirable innovations can be ascribed to a misunderstanding of this process by the change agents

Diffusion is therefore seen as primarily a communication process, occurring over time, through a social system. This process has been shown to be influenced by a number of factors. The perceptions of the innovation by the actors will influence its speed of adoption. So too will the many channels of communication active in that system, the time factor in the many steps to be

taken before an actor adopts, and the social structure of the system. All of these factors are interactive. The perceptions of the innovation will be influenced by the social structure, the nature, and the use made, of the communication channels. Equally, the social structure may be influenced by adoption of innovations.

There are two broad fields of study in this area, results oriented and process oriented study. Results oriented studies are concerned with post-factor analysis of the outcomes of diffusion. Process oriented studies are concerned with the many steps and influences which have contributed to these results. In the field of marketing, process oriented studies are far more useful. The marketer does not simply want to know how some product was adopted, he wants to study the process, and hopefully gain some insight as to how he can influence that process for his own ends.

Within process oriented studies, two types of individuals are of particular interest, the innovator and the opinion leader. The innovator is that individual who adopts the innovation ahead of the rest of the population. He is usually differentiated from the rest by personality characteristics, communication behaviour and demographics. For the manufacturer about to launch a new product, this is the segment most likely to adopt his product in the short term, and so is certainly an interesting individual. It cannot be said that he will certainly be the individual that will influence the rest of the population to follow suit, as in some systems he may be seen as too "far out" to be influential, or the reasons

for his adoption may be too specific, and not general to the system. The opinion leader is the type of individual who does have the propensity to influence the rest of the population, and so is an important actor in the diffusion process. Marketing strategies aimed at the opinion leader can be more effective and less costly than wider approaches. If one can sell to the opinion leaders, they will then sell the product to others.

1.2. APPLICATION TO CONSUMER MARKETS

The theory of the diffusion of innovations has been widely applied to consumer markets, from the purchase fashion clothing to cars. In these markets the innovator and the opinion leader have been found to be important actors, as described above.

Most studies into diffusion in consumer markets have concentrated on the characteristic differences between innovators, and opinion leaders, and the rest of the population. Some researchers contend that the important individual is the one who is both an innovator and an opinion leader, and he is termed the "innovative communicator". Marketing strategies are proposed in which effort is directed toward these individuals, as opposed to the general public. Knowledge of the characteristics of these people has utility for the marketer for the following reasons:

- It leads to a better understanding of the diffusion process, and so offers clues as to how this process can be influenced;
- It leads to a better understanding of the consumer. These studies can be coupled to most forms of marketing research;
- It adds to the understanding of the communication and influence process. Most marketing techniques are related to the communication process.

1.3 APPLICATION TO INDUSTRIAL MARKETS

A number of studies were found utilising this theory in industrial markets, in which it was assumed that this process is valid. There is controversy about this point, with one researcher finding little evidence of the informal influence process. In addition there are a number of barriers to the adoption of this theory in these markets. Purchasers in industrial markets do not act in isolation - there are usually defined decision making units, and the purchasing decision may be diffused throughout the firm. Purchasers are trained in their jobs and usually have clearly defined purchasing objectives. In addition they may be professionally trained, and their success in the purchasing function may be the measure of their competence.

All of these factors make the purchasing behaviour in the industrial market more complex, and so less well understood than in consumer markets. They may combine to make the model of diffusion outlined in this study inapplicable to industrial markets: industrial purchasing decisions may be done in isolation, without any inter-personal influence, and the only viable studies of industrial diffusion may be results oriented.

1.4 AIMS OF THIS STUDY

This study aims to take a first step in testing whether or not the diffusion process, or some similar process, takes place in industrial markets. It is the contention of this author that there are many avenues through which the informal influence process can operate in industrial markets, especially those dominated by professionals. Such individuals belong to professional organisations, and both read and participate in debate through journals.

The problem of the definition of the innovator has been noted above, and so a new definition is proposed for industrial markets. Innovators, by this definition, are then investigated to determine their characteristic differences to the rest of the population. A similar study is undertaken amongst opinion leaders. This study also looks for evidence of usage of channels through which the influence process could take place, and looks for the relative importance of information sources on the product class. A number of possible outcomes are seen.

- Innovators may be differentiated from the rest of the population in similar ways to that found in consumer markets. Should there also be evidence of informal influence, this would be a first step to demonstrating that the theory of diffusion has some validity in this market.
- Innovators may be differentiated from the rest of the

population in unpredicted ways. This would then be a first step in understanding the form of diffusion which takes place in these markets.

- Innovators may be personally undifferentiated from the rest of the market. This would indicate that the theory as it stands has no basis in these markets.

Chapter 2 of this report will outline the general theory of the diffusion of innovations. Chapter 3 will discuss the literature relating this theory to consumer and industrial markets, and discuss the problems of relating the theory to the latter. Chapter 4 will examine the hypotheses tested, and the survey undertaken. Chapter 5 will list the results, and the analysis of these results. Chapter 6 will be the conclusion, in which the outcomes will be discussed in relation to the above objectives.

1.5 THE MARKET STUDIED

The market chosen for study is the population of purchasers' of housing contracts. The innovation being studied is the product class of innovative building systems (IBS).

Building of housing has been dominated in South Africa by traditional systems, usually bricks and concrete blocks. A number of innovative systems have been marketed, for over 50 years, and yet none has become widely used. This study does not concern itself with the issues of why this has come about, it looks at the perceptions of the purchasers' of the product class. For this reason, no individual system has been named or discussed.

While it is obvious that economic and political forces would have had a strong effect on this market, it is assumed that these forces would have worked evenly throughout the population. Consequently none of these forces are discussed.

This is a process oriented study, and it is the perceptions, and the reported actions of the actors that are measured.

The results of this study could be limited due to the nature of the market investigated. Purchase in this market is usually done in packages, usually put out to tender by the client or his consultants. These purchases do not require the changing of a production process. Actors in this field are largely professional - architects, engineers, quantity surveyors and others -and the

interaction of these professionals can be expected to be complex. In addition the purchaser may have to live with the purchase for a significant length of time, as a house can be expected to last 60 years or more.

All of these factors make this market significantly different to many production oriented markets, and so the results may not be meaningful to these markets.

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CHAPTER 2

THEORY : DIFFUSION OF INNOVATIONS

2.1 INTRODUCTION

> 'If every human group had been left to climb upward by its own unaided efforts, progress would have been so slow that it is doubtful whether any society by now could have advanced beyond the level of the Old Stone Age.
>
> RALPH LINTON
>
> Quoted in Rogers and Shoemaker [1971]

The process by which new ideas, and products, are adopted by the members of a society has long been of interest to marketing practitioners. The general theory of the diffusion of innovations has been used as a framework for examining this process in consumer markets (see Chapter 3). In this general theory the "innovator" is regarded as an important player, and so it is not surprising that most of these studies have concentrated on the characteristic differences between innovators and the rest of the population. In industrial markets, however, studies have generally concentrated on the results, as opposed to the process, of diffusion, and there is some dispute as to the applicability of the general theory to these markets. No studies were found examining South African industrial markets. This study aims to test whether significant characteristic differences exist in a specific market, ie. the purchase of building contracts.

While such differences, if they are identified, will by themselves have strategic consequences , it is also hoped that this will be one step closer to demonstrating whether or not the general theory is a useful framework for analysing industrial markets.

The theory itself is of a highly interconnected nature, and so this chapter will outline the basic elements of the theory, and Chapter 3 will go on to draw the connection to the marketing field.

Research into the diffusion of innovations spans many disciplines, from Anthropology to Marketing (Rogers and Shoemaker, 1971). Rogers, in 1955, encountered a journal reviewing research into the diffusion of educational innovations which closely paralleled his research on the same subject in a sociological context. Both fields had been progressing on the same subject, reaching the same conclusions, with no contact between practitioners. Since then there has been an extensive integration of the theoretical foundations of the subject.

Three separate books have been published with Rogers as author or senior author (Rogers, 1962; Rogers and Shoemaker, 1971; and Rogers, 1983). These authors regard these as 1st, 2nd and 3rd editions, although the 2nd is titled "Communication of Innovations." This is due the recognition that communication is the essence of diffusion of innovations.

This author found these references to be predominant in this field. Of all of the (more than 100) references found on the subject, only two did not rely strongly on the theoretical base, and make reference to, the above books. The theory of the diffusion of innovations is certainly adequately covered in these works.

The contents of this chapter will therefore be based on Rogers and Shoemaker (1971). All unrefenced statements that follow can be assumed to emanate from this source.

The traditions of research into the diffusion of research can be classified in two ways. It may either be process oriented, emphasising the processes involved, or result oriented, emphasising the economic consequences. As can be expected, these are two extremes on a continuous variable: sociological texts (such as any of the Rogers' texts) do not ignore economic forces or consequences, and economic texts (such as Mansfeild (1970)) do not ignore sociological forces and consequences.

Research studies may also be longitudinal, or cross-sectional studies. Longitudinal studies examine the diffusion process over time, and are mainly interested in forces influencing the rate and extent of adoption. Cross-sectional studies examine the characteristics of the actors, and forces present at a point in time. This study is cross-sectional.

Diffusion is the process by which an innovation is adopted by a social system. While many examples are possible (water boiling amongst Peruvian Villagers, home canning by American housewives), we are interested here mainly in the social system of the marketplace, and specifically the industrial marketplace, and the diffusion of new products and practices.

The elements crucial to the process are:

- The innovation
- which is communicated through channels
- over time
- amongst the members of a social system.

2.2 THE INNOVATION

An innovation is an idea, practice, or object perceived as new by an individual. It is not important whether the innovation is "objectively" new, subjective newness being the main criteria. The "newness" aspect of an innovation may be expressed in knowledge, in attitude, or regarding a decision to use it. Every idea must have been new at some time, and must change with the times.

Innovations are not all equivalent units of analysis. The perception of the innovation by the members of the social system will contribute broadly to the rate of the adoption, and its "success". Success in this context refers to the adoption (or otherwise) of the innovation, and does not imply desirability.

The characteristics which will influence this process can be summarised as follows:

A. Relative advantage;

B. Compatibility;

C. Complexity;

D. Trialability, or divisibility;

E. Observability, or communicability.

A. RELATIVE ADVANTAGE

This represents the intensity of the reward or punishment resulting from the adoption of an innovation, and the immediacy

of the result. In industrial marketing terms, the impact on the profitability and return on investment of the user, compared with alternate technologies, and the perceived risk involved in adoption (Webster, 1984).

Incentives (price reductions, preferential supply agreements) can have the effect of increasing the relative advantage and so promoting the diffusion of the innovation. When the incentive is stopped, the adoption rate is likely to revert to pre-incentive levels. The receivers evidently perceive the incentive as being separate from the intrinsic relative advantage of the innovation.

B. COMPATIBILITY

Compatibility is the extent to which an innovation is perceived as being consistent with existing values, past experiences, and needs of the individuals. Compatibility lowers the perceived risk of the innovation, and may be related to, (a) the socio-cultural values and beliefs of the units, (b) previously introduced ideas, or (c) client needs for the innovation.

If, for example, the members of a system believe that any innovative method of building is innately inferior and unacceptable (in other words they have a value system oriented against innovation in the specific field), the rate of adoption can be expected to be slower than in a system without this orientation.

C. COMPLEXITY

Complexity is the degree to which an innovation is perceived as being relatively difficult to understand and use. Complexity is also an influencing factor on perceived risk, and will work against the adoption of the innovation. In industrial markets, decision makers are often trained professionally to cope with complexity. Complexity must therefore be regarded as a relative factor that will modify the information-gathering behaviour of the individual (see below).

D. TRIALABILITY, OR DIVISIBILITY

Trialability or divisibility is the extent to which an innovation can be tried on a limited basis. Innovations which can be tried on a limited basis will be more easily accepted. Should a large capital investment be required to try an innovation, the risk of adoption will be increased and the innovation retarded in its diffusion. The same will be true if this investment means an irretrievable choice, as in the installment of an entirely new production process [Webster, 1971].

Some innovations may not be divisible by nature, for example large scale changes in production processes. While this will act as a retardant on the diffusion process, it will not necessarily halt it. Individuals will make a vicarious trial, either by means of a professional assessment, or by investigating the experiences of others in the system (see below).

E. OBSERVABILITY, OR COMMUNICABILITY

Observability is the degree to which the results of an innovation are visible to others [Rogers and Shoemaker, 1971]. Communicability is the degree to which these results can be observed by or described to others [Webster, 1984]. It is not only the visibility of the innovation's benefits, but also its communicability influence its rate of adoption.

Some innovations may be of benefit to the individuals involved, but may be relatively invisible to others in the system, for example precentative measures. Rogers and Shoemaker [1971] report that, despite their advantages, pre-emergent weed killers, when sprayed on a field before the weeds emerge, were relatively slow in diffusing through the farming community. There were no dead weeds for the farmers to show their neighbours.

2.3 COMMUNICATION CHANNELS

Communication is the transfer of ideas from a source with a view of modifying the behavior of receivers. As stated, communication is essential for diffusion, and the elements of the diffusion process show similarity to the elements of many communication models.

The nature of the social relationship between the individuals will influence the tendency of individuals to communicate about the innovation, and also the effect of telling on the receiver. Communication is therefore an influence process, and not merely the transmission of messages; it is also a two-way process, influencing both the sender and the receiver.

Channels by which the innovation is communicated also influence the reception. Channels may be personal or impersonal, and may have degrees of credibility.

A. MODELS OF COMMUNICATION FLOW

A number of communication models are used to demonstrate the importance of the individuals in the diffusion of innovations. These models are briefly described below.

The **Hyperdermic Needle Model** postulates that the mass media has direct, immediate, and powerful effect on a mass audience. The model pictures the mass media as a giant hypodermic needle, pecking and plunging into a passive audience. The omnipotent

media are pictured as sending out messages to a mass audience waiting to receive them. This model is based on evidence of the persuasive power of the media, but is unable to explain sufficiently the process of communication.

The Two Step Flow Model introduces the concept of opinion leaders. These are individuals believed to have status in society, which enables them to influence the behavior and beliefs of others in the system. The first step is the flow of information from source to the opinion leaders. The second step is the flow of influence from the opinion leaders to the rest of the population. This model views the masses as interacting individuals.

One implication of this model is that only opinion leaders are active in information seeking. Another is that society can be partitioned into these two levels, and that the mass media are the primary source of information. Communication cannot realistically be limited into two steps only, and the members of a system have varying exposure and attitudes to the media. Opinion leadership is a continuous variable that depends on social status and degree of homophily.

The Multi-Step Flow Model is based on a sequential relaying function that seems to occur in most communication situations. It has flexibility in that it does not specify the sources of information or the number of relays which make up the communication process. The exact number of steps in the process

depends on the intent of the source, the availability of mass media and the extent of audience exposure, the nature of the message, and salience of the message to the receiving audience.

All members of the audience will be exposed to, and effected in various ways by the media and other sources. In addition there will be a number of contacts between the members, and certain of these will play a more influential role in the passage of information. This model is used as a theoretical base for diffusion theory.

B. HOMOPHILY - HETROPHILY

Homophily is the extent to which pairs of individuals who interact are similar in certain attributes, such as beliefs, values, education, social status and the like. When the receiver and source are homophilous, better communication will occur, and this will be rewarding for those concerned. The more communication that occurs, the more homophilous the individuals will become.

For the marketer this has important consequences. It is important that change agents possess a reasonable level of homophily with the members contacted (Webster, 1984). If an active policy of seeking opinion leaders is being undertaken, it is important that not only individuals of high status be contacted. These individuals may very well be hetrophilous with the bulk of the population, and consequently little "trickle down" will take place.

It is likely that the followers will seek out opinion leaders of slightly higher status than themselves, or more accurately, of higher competence than themselves. The homophily factor, and the influence of the opinion leaders in facilitating or retarding the diffusion process, will be influenced by the norms of the social system (discussed below).

This does not mean that entirely homophilous communication is the most favourable form. Amongst homophilous individuals, there is likely not to be a large difference in knowledge, and a certain level of hetrophily may well be functional [Rogers, 1983]. The fact that a doctor speaks a slightly different language will not prevent people consulting, and being influenced by, them.

2.4 OVER TIME

A time dimension is involved in three broad areas in this process, the innovation-decision process, the innovativeness of the individual, and the rate of adoption of the innovation amongst the members of the sysi

A. THE INNOVATION - DECISION PROCESS

Rogers and Shoemaker (1971) define this process as the mental process through which an individual passes, from first knowledge of an innovation, to a decision to adopt or reject it, to final confirmation of this decision. The most common conceptualisation of this process is through the five stages of awareness, interest, evaluation, trial, and adoption/rejection.

Rogers and Shoemaker prefer the four stage process of, knowledge, persuasion, decision and confirmation. A paradigm of this process, with some of the contributing factors is shown in Figure 2.1.

(i) Knowledge Function

How do individuals become aware of innovations? Is the likelihood of exposure random? Individuals expose themselves to messages which are in accord with their interests, needs and attitudes, and consciously or subconsciously avoid messages which are in conflict with their dispositions. This tendency is called "selective exposure". There is dispute whether the needs precede awareness, or whether the need is created, or at least influenced

by awareness (but this is possibly a chicken - or - egg dilemma).

Knowledge can be of various types. Awareness knowledge relates to the existence of an innovation. How-to knowledge relates to the use of the innovation. Principals-knowledge relates to the functioning principals underlying the innovation. Most change agents concentrate on awareness-knowledge, but could be better served by concentrating equally on the other two as well.

(ii) Persuasion Function

At this function, the individual forms a favourable or unfavourable attitude to the innovation, and is likely to actively seek information about it. Personality and social factors will influence where he will seek information, what message he will receive, and how he will interpret the information. It can be seen that Rogers and Shoemaker have combined the functions of interest and evaluation into this function.

The individual is likely to perform a vicarious trial at this point and the mass media are unlikely to provide the specific kind of reinforcement that the individual needs to confirm his beliefs at this stage: word-of-mouth communication will play a large role at this stage.

There are two levels of attitudes: a specific attitude toward the innovation, and a general attitude toward change. This general attitude may well have been influenced by previous negative experiences with innovations, and by personal characteristics and

Paradigm of the innovation-decision process.

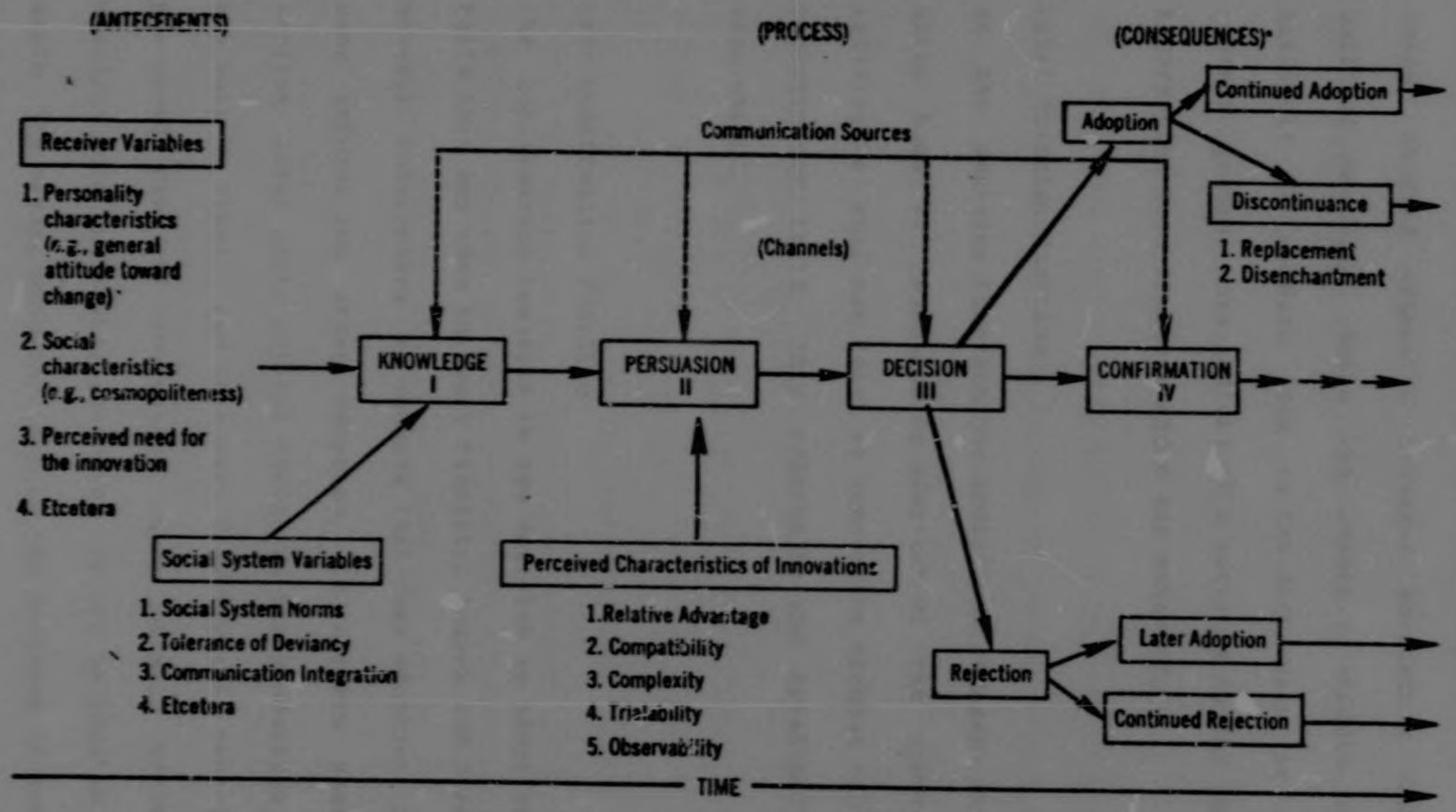


Figure 2.1

Paradigm of the innovation-decision process.

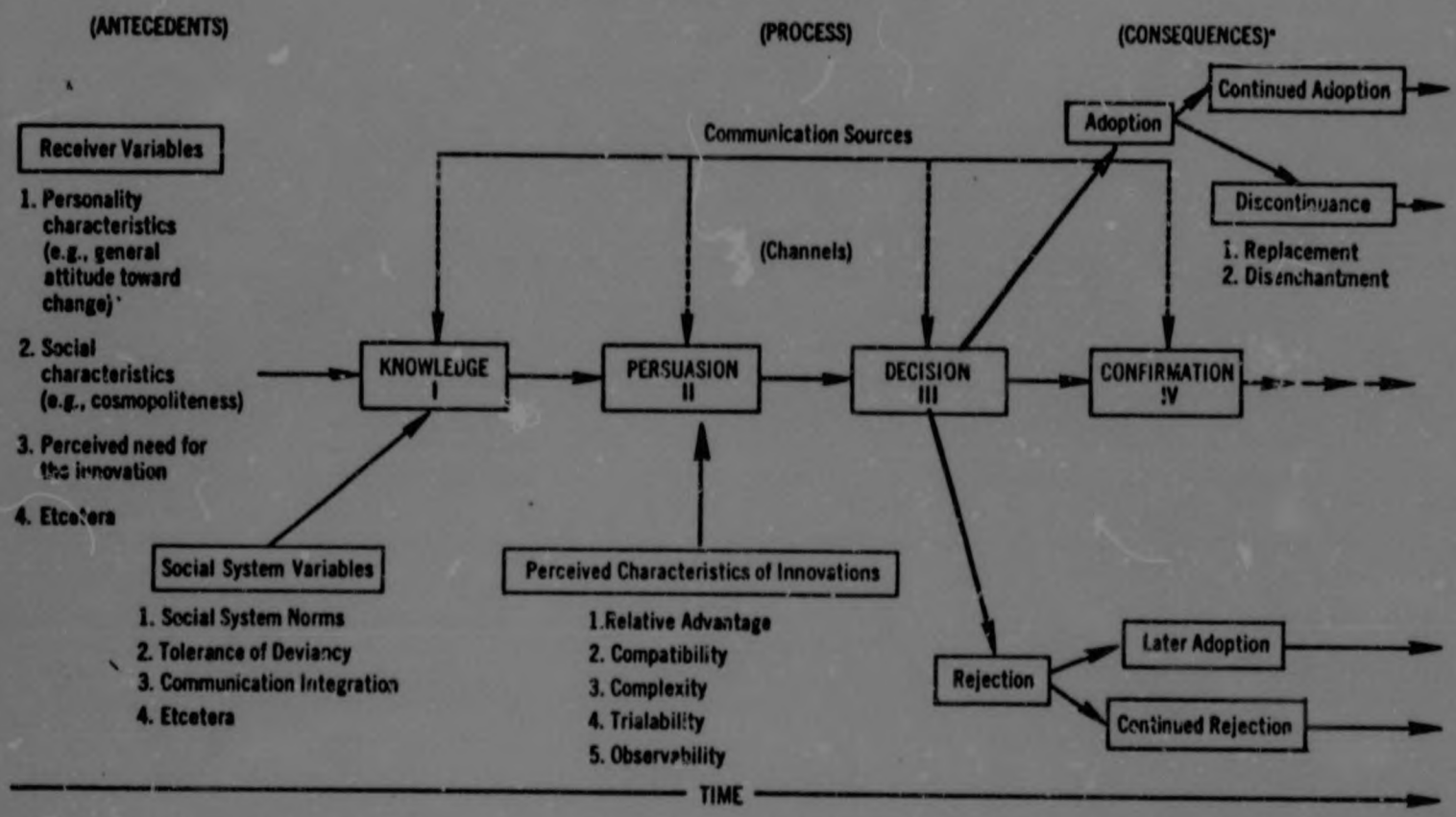


Figure 2.1

system norms, and broader messages carried in the mass media. In the subject of this study, for example, mass media have in recent years carried extensive messages advocating innovation in building methods. While the relative effects of this are difficult to measure, due to the difficulty in establishing control groups, the individual's attitude to the gathering of information from the mass media was measured.

(iii) Decision function

At the decision function the individual engages in activities which lead to rejection or adoption of the innovation. Most individuals will not adopt an innovation without trying it on a probationary basis. This relates to the trialability of the innovation.

(iv) Confirmation Function

The confirmation function is the decision to adopt or otherwise. While this may seem to imply finality, Rogers and Shoemaker quote several researchers as showing that many adopters continue to seek information after adoption. In markets where adoption implies large scale capital change in the production process it may well be final, and this very finality will contribute to the perceived risk of innovation. Many markets exist in which adoption can be easily reversed, or can be done on a partial basis. The market examined here is the purchase of housing, which is generally provided by building firms separate from the purchaser, and are usually purchased in packages (building

contracts). Complete and final adoption is difficult to visualise.

B. THE INNOVATIVENESS OF THE INDIVIDUAL

Secondly, time is involved in the innovativeness of the individual, that is the relative earliness/lateness with which the individual adopts the innovation in comparison to the members of his social system. The social system is divided into various categories along the axis of innovativeness. Rogers and Shoemaker favour a five-category system, based on a normal population distribution.

All individuals in a social system do not adopt an innovation at the same rate. Generally they have been found to adopt in an ordered time sequence, and have been classified into "adopter categories" on the basis of when they first began using a new idea. In other words, the "innovativeness" of an individual in diffusion theory is based originally not in the individual's personal characteristics, but rather in terms of the individual's behaviour, specifically in terms of the timing of his adoption of the new idea in question.

(i) General Categories

Researchers appear to have come up with as many categories of innovators as fields of research [Rogers 1983]. Rogers points out that a system based on a normal distribution of the population

has gained over the last few years a prominent position. The adoption of an innovation is likely to follow a normal, bell-shaped curve over time. Figure 2.2 shows the idealised normal, rate of adoption curve, and the S-shaped cumulative adoption curve (as per Rogers and Shoemaker, 1971). These curves are similar to those derived from psychological research into the learning process (empirical), and can also be expected from the diffusion effect (conceptual). This effect can be demonstrated by building a model in which, as an innovation is introduced into a society, the first convert influences two others, who in turn each influence two others, and so on. The resulting distribution follows a binomial expansion. This function follows a normal rate of adoption, and resembles diffusion functions measured in real markets.

Rogers and Shoemaker (1971) quote many research studies as showing that adopter categories approach normalcy. These authors believe that it is conceptually important that categories be based on a normal distribution. The categories advanced by them are shown in Figure 2.3. In this categorisation, innovators are the first 2,5% of a population to adopt the new idea.

(ii) Characteristics of early adopters

Most of the marketing studies involve cross-sectional studies, or a study of the characteristics of the early adopter at a point in time. This study is of a similar nature. Why are these characteristics of interest to marketing researchers? Darden and Reynolds (1974) point out that:

".... the innovator is recognised as one of the key actors in the diffusion process. In the case where innovators are also opinion leaders, their distinguishing characteristics and purchase motivations are especially germane for market planning."

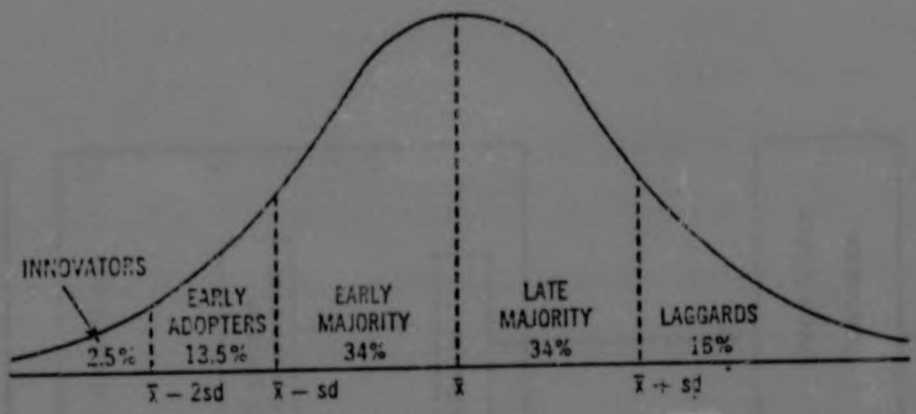
If innovation and opinion leadership are coincident, these individuals will firstly be the "easiest targets" [Baumgarten, 1975], and an important part of the diffusion process itself, as quoted above. His mass media habits, personality attributes, education level, and so on, will obviously be of great interest to the marketer [Feldman and Armstrong, 1975].

C. RATE OF ADOPTION

The third area of time influence is the rate of adoption of the innovation by the members of the social system, and is usually measured by the time taken for a certain percentage of the members to adopt the innovation.

The S-shaped function of adoption of an innovation over time can be explained both by a learning process, and by the binomial function modelling the diffusion process. The rate at which an innovation is adopted is of great interest to the marketer of a new product [Webster, 1984]. Production and distribution planning are dependent on a forward prediction of demand. For investors contemplating the development of new products, the discounted cash flow from the project (especially in high interest

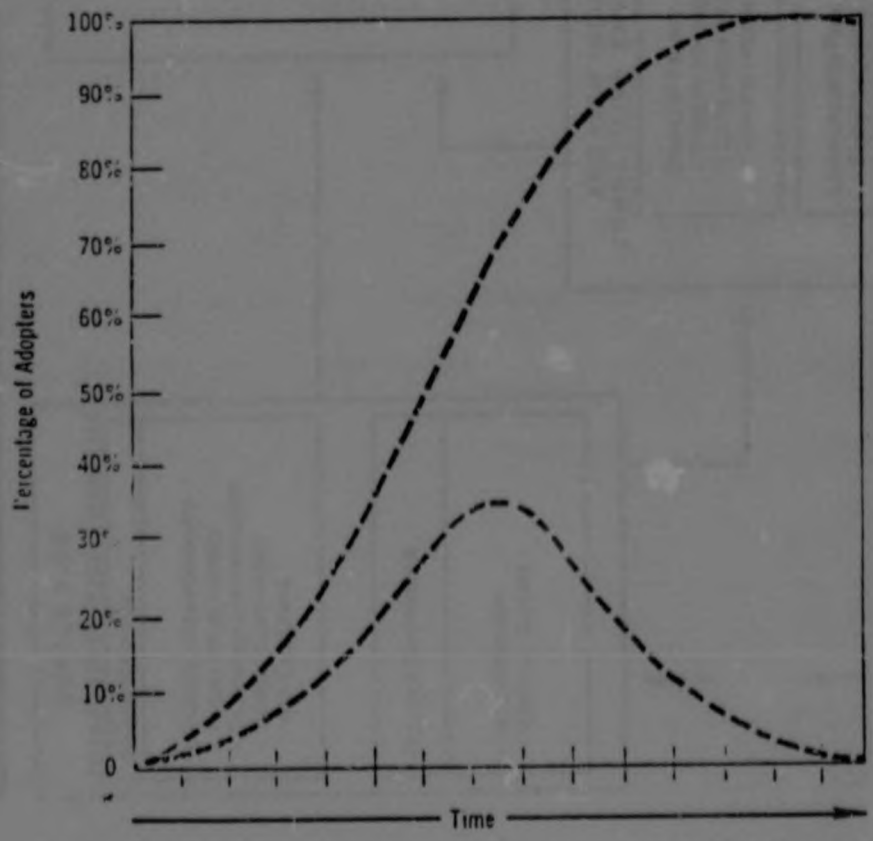
Adopter categorization
on the basis of innovativeness.



The innovativeness dimension, as measured by the time at which an individual adopts an innovation or innovations, is continuous. However, this variable may be partitioned into five adopter categories by laying off standard deviations from the average time of adoption.

Figure 2.2

The bell-shaped frequency curve and the S-shaped cumulative curve for an adopter distribution.



Both of these curves are for the same data, the adoption of an innovation over time by the members of a social system. But the bell-shaped curve shows these data in terms of the number of individuals adopting each year, whereas the S-shaped curve shows these data on a cumulative basis.

Figure 2.3

A Competitive Behavior Paradigm for Technology Diffusion Among Organizations

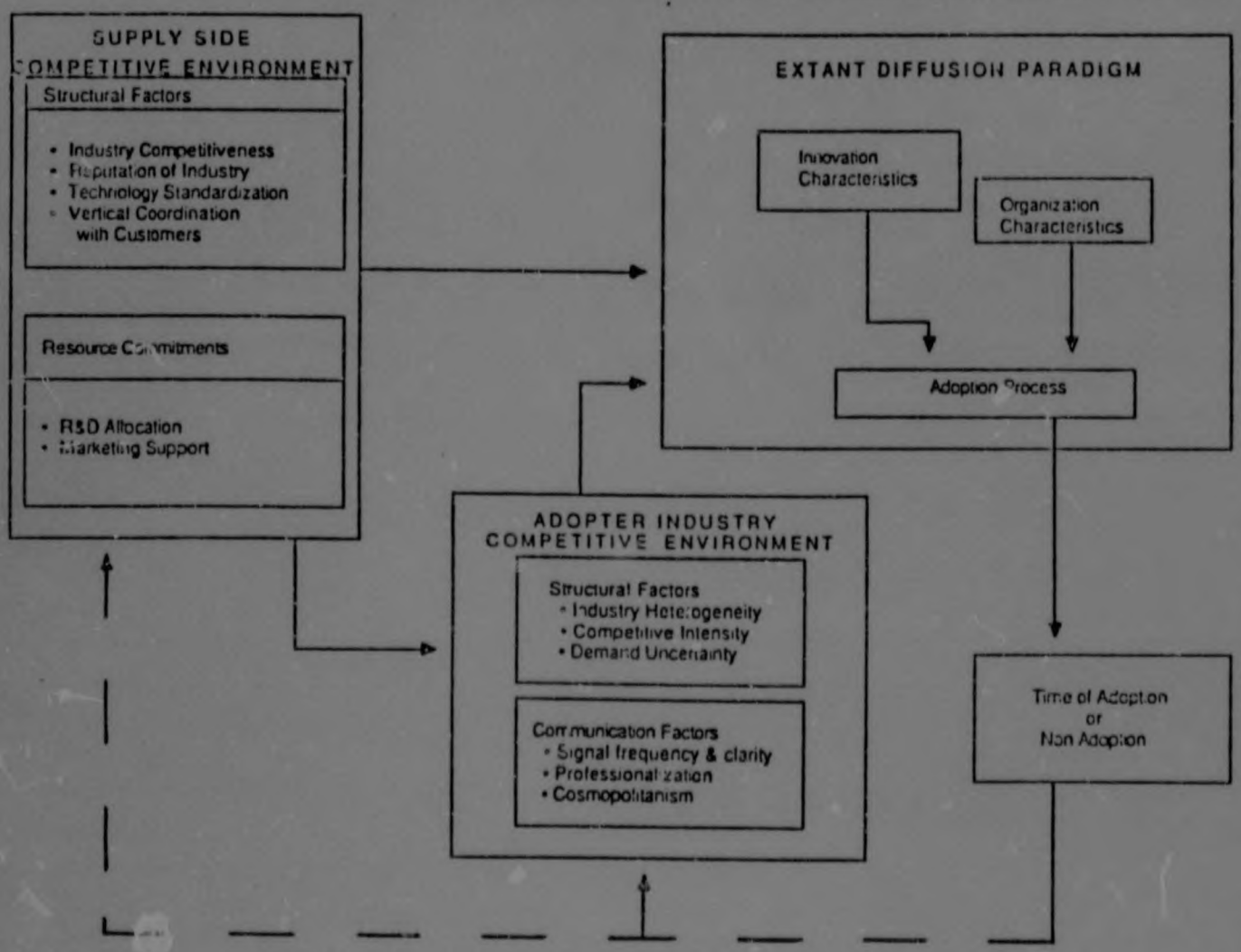


Figure 2.4

environments), is highly dependent on the rate of adoption.

This rate is usually measured by the time taken for the adoption of the innovation by a certain percentage of the social system (normally 50%). Mansfield [1970] and Webster [1984] point out that this process is usually a long one, taking from five to ten years. Mansfield shows that these time lags have decreased over the last few years.

(i) Factors Influencing the Rate of Adoption

A large number of factors influencing the rate of adoption have already been discussed. Among these are the perceived attributes of the innovation: relative advantage, compatibility, complexity, trialability , and observability.

The social system also has an influence on the rate of adoption. This is discussed in more detail in the following sub - chapter. The rate of adoption is influenced by the effective integration of communication in the system.

2.5 AMONG MEMBERS OF A SOCIAL SYSTEM

A social system is defined as "a collectivity of units which are functionally differentiated and engaged in joint problem solving with respect to a common goal". The members or units may be individuals, informal groups, complex organisations, or sub-systems. The sharing of a common goal is the factor binding the social system together.

The social structure of the system affects the innovation's diffusion patterns in many ways. The system constitutes boundaries within which the innovation diffuses.

The social structure exists due to the differentiation of the units. It is an historical arrangement of the statuses or positions of the units. Formal organisations consist of tiled positions and hierarchical structures, but even informal groupings have some degree of structure, determining interaction and influence patterns. The social system acts to impede or facilitate the diffusion process through "system effects".

The two kinds of variables involved in this process are, (a) the individual's personality, communication behavior, attitudes, education, and so on, and (b) the nature of his social system. The characteristics of individuals will be discussed in more detail elsewhere.

A. SYSTEM NORMS

The social structure of the system exists due to an historical and practical arrangement of the statuses and position of the units. Within simple social systems this can be easily visualised as a "pecking order" amongst the units. No references could be found as to its meaning in an industrial market. Nonetheless, the social structure is influential to the diffusion process via "system effects" - the degree to which system norms facilitate introduction of new ideas. System norms are usually described along a continuous axis of traditional and modern norms [Rogers and Shoemaker, 1971, 32]. These authors point out that system norms may be as important in explaining individual innovativeness as are individual characteristics.

Traditional social systems are characterised by:

- Lack of favourable orientation to change;
- A less developed or simpler technology;
- Lower levels of literacy and education;
- Enforcement of the status quo;
- Lower levels of communication and empathy.

Modern social systems are characterised by the antithesis of these factors. While these norms would certainly be background factors to be considered by a marketer, (and would be useful should he have access to a number of systems into which to market a new product) they would influence his choice of what use is a measurement of the system norms to a marketer with a product confined to a single market? In industrial markets the buying

decision is usually not made by an individual, but rather by groups of people within organisations, and the knowledge of the intra-firm norms are of high importance [Weignand, 1968]. No references could be found as to the effect of these norms on the diffusion process.

B. OTHER ROLES

Two roles of individuals in the system are particularly important; those of opinion leaders and change agents. Opinion leadership is the degree to which an individual is able to informally influence other's behavior or attitudes, and is a form of informal leadership, rather than being a function of the individual's formal position or status in the system. The most innovative members of the system may have dubious status, and so opinion leaders may play a more important role in the diffusion process.

Change agents are professionals actively involved in influencing innovation-decisions in a way desired by a change agency. In the marketing context, they are the salesmen, and industry organisations, aiming at promotion of an innovation.

Both opinion leaders and change agents are actively involved in the communication process, and can be viewed as communication channels used by a change agency, in addition to the media.

CHAPTER 3

DIFFUSION IN MARKETS

3.1 INTRODUCTION

The previous chapter outlined the general theory of diffusion of innovations. This theory has been used as a framework for the analysis of diffusion of new products in consumer markets. Section 3.2 will list some of the research findings in this field. Most research in consumer markets in this area has taken the form of an examination of the differences between the innovator and the non-innovator, in terms of demographic and psychographic variables.

Section 3.3 will outline some of the research into the diffusion of new products in industrial markets. The "innovator" is defined in this theory in terms of overt behaviour: the early adoption of the new product. In industrial markets this adoption is performed by firms, but the decisions are made by individuals, and each individual's role in the decision making process is not easily defined. While extensive research has been done on the demographic characteristics of innovative firms, there has been little research on the individuals involved in this decision-making. Marketing effort can never be directed toward the inhuman face of a company: it can only be aimed at individuals, and it therefore seems useful to examine the differences between individual innovators and non-innovators.

The methodological problem that arises here is the categorisation of individuals in industrial situations. The final section of this chapter proposes a strategy by which individuals can be categorised, and discusses its usefulness in examining the population of decision makers in the industrial market.

3.2 THE CONSUMER MARKET

Most studies relating to diffusion in the consumer market have concentrated on the characteristics of the innovator. In consumer markets this refers to the characteristics of an individual. Baumgarten [1975] proposed that it is in fact the individual who is both an innovator and an opinion leader, who is of importance to the researcher and marketer. He suggests calling this individual the "innovative communicator".

This sub-chapter will explore those characteristics found to be indicative of innovators and opinion leaders. The shear bulk of information on this subject makes a comprehensive listing of these factors impossible. For this purpose the reader is referred to Appendix A in Roge s and Shoemaker [1971].

Rogers and Shoemaker [1971] list 103 generalised characteristics of innovators. These relate to personality attitudes, demographics, communication behaviour and others. Similarly, the marketing literature has an exten' e list of characteristics. There does not appear to be agreement about the system of categorisation, and the following summary will be divided according to the headings personality and attitudes, demographics, and communication behaviour.

A. PERSONALITY AND ATTITUDES

Venturesomeness is defined as the willingness of the individual to accept risk in purchasing new products and has been found to be positively related to rate of adoption (Feldman and Armstrong, 1975). This was confirmed to be an important indicator by other studies (Darden and Reynolds, 1974; Donnerly and Ivancevich, 1974; Taylor, 1977; Danko and MacLachlan, 1983). Dogmatism is defined and "closed-mindedness", or a resistance to change, and appears to be the general reverse of venturesomeness, and has been found to be negatively related to innovativeness (Jacoby, 1971; and Coney, 1972). Jacoby asserts that dogmatism is functional, and relates to the level of threat and anxiety experienced by the individual. High dogmatics are characterised by a belief in authority, whereas low dogmatics are more likely to make independant judgments.

Opinion leadership is the degree to which an individual is likely to informally influence his peers. As discussed below, this attribute, when found in conjunction with innovativeness, is an important element in the informal communication process which is essential to diffusion. In many markets it has been found to be related to innovative behaviour (Feldman and Armstrong, 1975; Taylor, 1977; Darden and Reynolds, 1974, Armstrong and Feldman, 1976; and others).

Product (class) importance is the level of interest expressed by the individual in the product (class), and is positively related to innovativeness (Feldman and Armstrong, 1975; and Taylor,

1977]. Taylor concludes that this factor will be the most indicative of all. This raises an important issue of methodology in these studies: If research is carried out on a wide range of respondents including those for whom the product class has no importance whatsoever, it seems obvious to this author that this will prove to be the most indicative factor. A study into purchasers of, for example, personal computers [as per Danko and MacLachlan, 1983] will surely show that those individuals who have no interest in the product will be non-purchasers. The problems are: the definition and boundaries of the social system being investigated; and that interest is a continuous variable, and not an absolute level.

Other personality variables found to be indicative are personal competence [Feldman and Armstrong, 1975], inner-directedness [Donnerly and Ivancevich, 1974], and gregariousness [Baumgarten, 1975].

To what degree are these personality variables important in the diffusion process? There is disagreement on this point, and as to whether the relationship is in any way causal, or whether the variables merely correlate with more important factors [Jacoby, 1971; and Taylor, 1977]. The answer to this question may not even be of importance to the marketer, who is investigating a specific market, and is in search of information to facilitate the marketing strategy. A personality profile of the innovator will be at the least a useful input [Darden and Reynolds, 1974].

Rogers and Shoemaker [1971] also generalise that early adopters are likely to have a commercial orientation, a more favourable attitude toward credit, a greater ability to deal with abstractions, greater intelligence, and have higher aspirations than do later adopters.

B. DEMOGRAPHICS

Age has been found to be negatively related to innovativeness in some studies [Darden and Reynolds 1974; Darden and MacLachlan, 1983 and others], and unrelated in others [Rogers and Shoemaker, 1971]. The difference appears to be in the type of product being examined, although no confirming studies could be found.

Earnings are generally positively related to innovativeness in consumer markets [Danko and MacLachlan, 1983; Rogers and Shoemaker, 1971]. High earners have more resources to use in product selection, and are more able to absorb the risk of innovation.

Education level is generally related to innovativeness [Feldman and Armstrong, 1975; Danko and MacLachlan, 1983; and Rogers and Shoemaker, 1971]. One study found that education was negatively related to innovation amongst young buyers of male fashion [Darden and Reynolds, 1974]. It appears that social norms amongst the more educated may work against innovation in certain cases, for example the purchase of new fashions.

Other demographic variables found to be indicative are social

status, profession, and size of unit [Rogers and Shoemaker, 1971].

C. COMMUNICATION BEHAVIOUR

Innovators have been found to have different communication behaviour to late-adopters, both in terms of receiving and disseminating information [Rogers and Shoemaker, 1971]. This behaviour is of high importance to marketers [Darden and Reynolds, 1974].

Innovators have been found to seek significantly more information about the product class. This has been found both in terms of media exposure [Baumgarten, 1975; Darden and Reynolds, 1974; Danko and MacLachlan, 1983; and Feldman and Armstrong, 1975], and personal sources of information [Rogers and Shoemaker, 1971; Feldman and Armstrong, 1975; and Darden and Reynolds; 1974].

Innovators also share more information with their peers [Rogers and Shoemaker, 1971; Armstrong and Feldman, 1976]. Opinion leadership (see below), is a composite of the tendency to share information about the product class with peers, and the ability to influence these people.

In terms of media exposure, it is also probable that not only will innovators have a higher level of exposure, but that certain media sources will be of higher importance to the innovator, and objectivity of the source may be the most indicative factor [Armstrong and Feldman, 1976].

D. OPINION LEADERSHIP

Opinion leadership is the degree to which an individual is able to informally influence another individual's attitudes or overt behaviour in a desire[illegible] with relative frequency. The concept, and the role of opinion leaders, was first proposed by Lazarsfeld et al [1948]. As discussed above, the opinion leader fulfills an important role in the communication of innovations, and acts as a source of social pressure toward a particular choice [Glock and Nicosia, 1963]. This pressure can be either toward the acceptance or refusal of the innovation. It is likely that in traditional systems the innovator will be negatively disposed to innovation, which may threaten the status-quo, and so the society will ostracise the innovator, who is then unlikely to attain the status of opinion leader [Rogers and Shoemaker, 1971]. The correlation of innovativeness and opinion leadership is therefore important for the facilitation of diffusion.

As detailed above, most studies into consumer behaviour have found such a correlation. The fact that all studies found by this author relate to the American market may be relevant, as the level of traditionalism may be different in the South African industrial market. There are probably not many people who can be regarded as tradition-oriented in the USA [Donnerly and Ivancevich, 1974]. No deductive way of measuring and relating this social difference was found, although personal attitudes to change were measured.

Where a degree of correlation is present, it can be expected that

opinion leaders will have similar characteristics to innovators. Opinion leaders are nonetheless important enough to the marketer to be investigated in their own right [Corey, 1971].

Opinion leaders have been found to be more involved in activities related to their topic than non-leaders, as well as more informed, of higher social status, and to show higher levels of communication behaviour [Rogers and Shoemaker, 1971; Corey, 1971; Myers and Robertson, 1972; and Armstrong and Feldman, 1976].

This study used a generalised measure of opinion leadership, by self report (see below). To what extent is opinion leadership generalised, or to what extent can a leader in one area be expected to be a leader in other fields? King and Summers [1970] found that there is a significant level of overlap. This is highest where product categories are related [Meyers and Robertson, 1972].

Opinion leadership is not a simple one-way process. People who influence others are themselves influenced by others in the same topic area [Meyers and Robertson, 1972]. Activity in interpersonal communication and influence is widespread in consumer markets, with one study showing that only 31% of the population were not opinion leaders in any product category [King and Summers, 1970].

While opinion leadership generally coincides with knowledge, this is by no means exclusive. There is still a significant level of

interpersonal influence exerted by people with little knowledge in the area (Meyers and Robertson, 1972). Opinion leadership is more strongly correlated with interest in the product class.

E. MARKETING STRATEGY CONSEQUENCES

In the consumer market for personal computers, Danko and MacLachlan (1983), show that there is a case for the strategy of directing marketing efforts at the innovator and opinion leader. They state that most marketers direct their marketing mainly at the "fence-sitters", and claim that the above strategy can lead to greater success. Armstrong and Feldman (1976) confer with this observation, and suggest that it can lead to two different media strategies. Media demographically directed towards innovators and opinion leaders can be used. The marketer must be assured of the validity of the underlying process, and his ability to isolate these individuals. In addition, the multi-step model of communication implies that followers are not only influenced by opinion leaders, but that the media also plays a role.

A second media strategy would be to direct marketing efforts toward all potential customers, but to stimulate innovators and opinion leaders through direct appeals especially designed for these individuals. A study into early purchasers of the Mazda rotary engine models supported the second strategy. This implies that research must specifically aim at isolating the innovators and opinion leaders in the market.

The implications of these studies are that the innovators can

usefuliy be regarded as a market segment. If innovators are also opinion leaders, and a market strategy can successfully gain acceptance of a new product by the innovators, they are likely to influence the rest of the population to accept, and the rate of di`fusion will be maximised.

What if innovativeness and opinion leadership are not correlated? As stated above, it appears that this will not be the case in American markets, but is possible in a South African situation. The opinion leader can also be regarded as a friutful market segment, and market strategy can be directed at achieving new product acceptance amongst them first. In effect this strategy will make the opinion leader into an innovator.

3.3 THE INDUSTRIAL MARKET

The theory of diffusion of innovations has been shown to be a useful framework in conceptualising the diffusion of new products in consumer markets. In particular, the innovator and opinion leaders in these markets are fruitful market segments at which to direct marketing effort, and the characteristics of these individuals are important inputs to these strategies.

The broad thinking leading to this study proposes that this framework can also be usefully extended to industrial markets. Specifically, this study examines the characteristics of individual innovators in these markets. This sub-chapter will examine: the differences between consumer and industrial markets; the differences between innovators and others already explored in the literature; and the reasonableness of extending the framework.

A. DIFFERENCES BETWEEN INDUSTRIAL AND CONSUMER MARKETS

Webster (1984) summarises the differences between consumer and industrial marketing as follows:

(i) Functional Interdependence

Interdependence exists both between supplier and customer, and between marketing and overall corporate strategy. Overall customer-orientation, and understanding of customer needs is required;

(ii) Product Complexity

Products are more technically complex than in consumer markets, and greater supplier flexibility is required. The most important marketing decision is what market, or segment, to serve. Products are variables, and must be regarded as a package of benefits to the customer;

(iii) Buying Process Complexity

Complexity in the buying process reflects several factors: the influence of the formal organisation itself; the large number of persons involved; complex technical and economic factors; the environment in which the firm operates; and the large sums of money, and hence high risk, involved ;

(iv) Information Sources

In industrial markets representatives have been found to be most important at all stages, except awareness (Webster, 1970). In a study of purchasing agents in New England manufacturing firms, Webster asked the agent to rate sources of information. At the awareness stage, trade journals (90% of respondents) were found to be important, followed by trade shows (76%). While salesmen were regarded as most important in all other stages in the adoption - decision process, trade journals were found to be important at the interest stage, and engineers in other companies were important at the evaluation and adoption stages. This report seems to confirm the fact that although the manufacturer's salesmen are important at every stage, there is evidence that an informal word-of-mouth network operates in industrial markets.

The same researcher, in a series of informal interviews, found that there was little admission of direct communication between purchasing agents in different firms, and from this he concludes that word-of-mouth communication is not a common feature in this market. While testing the frequency of inter-firm communication, Webster does not measure the "value" of the information. Following this study Webster concludes that the diffusion theory may not be applicable to industrial markets.

B. THE DIFFUSION THEORY IN INDUSTRIAL MARKETS

Does the theory of the diffusion of innovations have any validity to industrial marketing?

Predictions of rates of innovation are not generally accurate [Webster, 1984]. More than 50% of first year predictions are either more than two times too high, or at least 50% too low. Both produce inefficient utilisation of capital. It must be realised that these figures of poor prediction refer only to successful innovations. In the UK, 92% of all new industrial products fail to survive for more than one year after introduction [Hayward, 1978]. Diffusion of industrial products is by no means a well understood phenomenon!

As discussed previously, Webster [1970] does not believe that evidence exists for informal word-of-mouth communication in industrial markets, and consequentially concludes that, without considerable re-working, the theory may not be valid [Webster, 1970]. Nevertheless, in his textbook on industrial marketing,

Webster [1984] devotes a chapter to the theory without express discussion of its lack of validity. Studies of diffusion can be divided into two camps; those which examine the process of diffusion, and those which examine the results (see section 2.1). If the theory is shown to be invalid, theory will have to concentrate on results, but this is likely to provide few clues as to the factors that influenced the organisational buying decision process [Webster, 1970]. It is obviously desirable that the theory be developed and adapted to industrial marketing.

This author's experience, both as an engineer and as a marketer of an innovative product, is that informal communication does take place, and this seems to be supported by the study reported in Webster [1970]. While structured information seeking across firm boundaries is certainly rare (and the willingness to report it possibly more rare!), there are many informal channels through which this communication takes place, such as professional organisations, and post-graduate study groups [Hill et al, 1975].

While the "proximity" needed for communication (in the multi-step flow communication model) is certainly difficult to demonstrate when the units of analysis are the buying centres of industrial firms, these units are not homogeneous, but are rather composed of individuals [Moriarty and Bateson, 1982] who experience both social and professional contacts outside of the work situation. In addition these individuals are often involved both actively (via the writing of papers) and passively (by being interviewed)

in communication in the trade media. One of the sub-objectives of the study undertaken here is to determine the relative importance of these informal communication channels amongst individuals in an industrial market. Similarly, the incidence of opinion leadership in this market will be examined.

In a study aimed at developing an approach to influence the firm's adoption of an innovation, Rabino (1983) suggested that theory should be built on a juncture of two streams of research: industrial buying behaviour and diffusion of innovations.

Munson and Pelz (1981) suggest a framework within which research in this field should operate. This involves four conceptual domains:

- The innovation. The type and content, and the perceptions of the actors;
- The actors involved. The source of the innovation, user organisations, decision makers, customers, and communication channels, including word-of-mouth;
- The stage in the innovating process;
- The originality level of a specific application. Whether the organisation is developing a first time solution, or whether the solution is one of several standardised designs.

These concepts can be seen to be based on innovation diffusion theory.

C. INDUSTRIAL BUYING BEHAVIOUR

Buying decisions are not made by organisations, but by individuals within those organisations. Most studies have concentrated on buying agents within the firm, whereas decision making is usually diffused through the organisation. Often the titles of individuals do not match their functional responsibilities [Reignand, 1968].

Those concerned with the responsibility may not be concerned with the same characteristics of the seller's product. Each industry is likely to have its own bundle of characteristics which it regards as important, and the varying concerns within each organisation, or the lack of understanding thereof by the seller, is a major barrier to diffusion [Hayward, 1978]. For this reason fresh studies for each industry may be required.

Whether industrial buying decisions are more "rational" than consumer decisions is a moot point. The influences on industrial buying behaviour are more varied, and behavioural science theories may not be as easily transferable to industrial situations [Webster, 1969]. Information flows and authority structures within the buying centre can significantly influence speed of adoption.

The basic motivation of the industrial buyer is a search for a relative advantage. The innovation will serve this motivation if it: leads to a reduction in the average cost per unit; leads to an increase in total revenue; or leads to an increase in average

revenue per unit (Webster, 1969). All of these factors will be modified by the perceived risk in the decision. The industrial decision maker is not merely facing the consequence of having bought an unwearable shirt: his employment depends on his ability to make the correct decision.

This personal risk component leads to a much more reticent approach to innovative decisions. Within buying centres those people who have decided against innovation are much more certain than those who decide for innovation, and a tendency exists for the latter to change his mind. Once decisions have been reached, the seller has great difficulty in getting the negative respondent to change his mind, and keeping the positive respondent from changing his (Weignand, 1978).

Extensive barriers do exist for the diffusion of innovations in the industrial market. Where a perceived relative advantage does exist, the buyer will seek information to re-assure him of his decision.

Besides the differences in perceptions of the innovation at the different levels of the organisation, at one level individuals will have varying tolerances to risk. They will also have varying strategies for information gathering and decision making, and possibly experience different environmental influences (Carduso, 1975). Decision makers who lack self-confidence are likely to conceive their jobs in fairly narrow terms, and to act conservatively. Those with more self-confidence are more likely

to have broad job concepts, and behave more innovatively.

An understanding of individual innovative behaviour within the decision making unit appears to be of some importance, and it is conceptually possible for the supplier to segment his market on psychographic lines [Carduso, 1975].

Within the organisation, decision making may be widely diffused, and it may be nearly impossible to determine influence patterns. Influence may in fact be wielded unknowingly by individuals, and so self-report may have an inherent bias [Weignand, 1968].

There appears to be some evidence that some equivalent form of diffusion takes place within the decision making unit. Some individuals will be more intrinsically innovative than others, and in order for an innovative decision to take place, these innovative individuals will have to sell the concept to their less innovative colleagues [Hayward, 1978].

D. CHARACTERISTICS OF INNOVATORS

Both Webster [1971; and 1984] and Mansfield [1970] found an inconsistent relationship between size of firm and innovativeness. Webster [1971] explains this in terms of the information requirements of the firms. Larger firms are more able to tolerate the risk of new product adoption, yet small firms are likely to lack the internal resources to gather information, and so will place higher value on the information

offered by vendors. Generally larger firms were found to be more likely to innovate, with their greater replacement needs, larger resources to absorb the risk, as well as their larger range of potential applications.

The majority of respondents to this study are from State or Semi-State organisations, and this offered problems of measurement in relation to general theory. Studies of American industries would not have the local problems of market distortion by large scale involvement by the State in the economy, and in certain industries in particular. Data of the overall size of State organisations is simply not available, and there is no reference point from which the impact of these data could be judged. Size of firm was here measured in terms of overall expenditure on housing, as subjectively stated by the respondents.

Both Webster [1984] and Mansfield [1970] found that other important indicators were total assets, debt-to-equity ratio, and their predicted growth in revenues. All of these factors suffer from the same problems of measurement noted above. Mansfield [1970] also found three other factors to be indicative. Firstly, more profitable firms have more cash and other resources and so are more able to cope with risks. In addition, as he found that more innovative firms are also more likely to be profitable, it is probable that profitable firms would have recently had positive experiences with innovation, and so be disposed toward continuing the trend. Webster states, however, that firms which have recently undergone extensive innovation are likely to "take

a break", to explore the results of the change.

Secondly, firms with younger management personnel are more likely to innovate, as they are less likely to be bound by traditional norms.

Finally firms which have a larger expectancy of benefit from the change are more likely to innovate, as could be expected. This is related to the "relative advantage" of the innovation. Decisions are not taken by single individuals in industrial firms, and research is unlikely to identify many of the more important individuals [Webster, 1971], and there is room for more imagination in defining the characteristics of innovators in these markets.

The perception of the members of the firm of the risk involved in innovation is a very important factor [Webster, 1971]. The ability of the firm to tolerate risk, and the willingness of its management to take risk, are two different but related concepts. All of the above components relate to the firm's risk tolerance, and Webster [1971] suggests the development of a standardised measure of managers' risk preference or tolerance. No studies could be found taking this factor further.

Mansfield [1970] shows that the risk involved in the adoption of new industrial products is considerable. The perception of this risk is strongly influenced by three other factors: (a) the

extent of uncertainty associated with using the innovation when it first appears; (b) the extent of the commitment required to try the innovation; and (c) the rate of reduction of the initial uncertainty regarding performance. The first and third of these factors are open to influence by change agents, and this emphasises the importance of the ability of sales personnel to provide credible, comprehensive information in order to reduce uncertainty [Denning, 1968; and Webster, 1984]. External, impersonal sources of information, such as trade journals, and reports from institutional investigators (eg. SABS) can also contribute [Levitt, 1975]. The second factor relates to the trialability of the innovation.

A related concept is the managerial "progressiveness" of the firm [Mansfeild, 1970]. Age, education, and R & D spending have been related to innovativeness, but no general measure of a firm's progressiveness has been advanced.

Venturesomeness also relates to the risk-tolerance of a firm's management (or decision making unit), as proposed by Webster [1969]. This will not only be a function of the "self-confidence" of the individuals involved, but also of the firm's liquidity, size, and the relative position of individuals in that firm.

Innovators' perceptions of the product being examined have also been shown to have significantly divergent from those of non-innovators. Hayward [1978] proposed that differences in rate of adoption between five innovations were best explained by

perceptions of the products by individuals involved in the decision. Comparisons of perception of adopters and non-adopters also showed which of these characteristics are of real importance to the market.

Individuals may have positive perceptions of characteristics of an innovation, but these characteristics may be of low importance to them. For a truly customer-oriented [Banting, 1978] strategy, the marketer should be interested in the relative importance of characteristics. Rabino [1983] tested this amongst two classes of professionals involved in decision making, and found notable differences. He proposed that these results should form the basis of the marketing strategy to promote the product.

2.4 THE RESEARCH QUESTION

A knowledge of the demographic and psychographic variables which differentiate the innovator from the rest of the population has been shown (above) to be a useful strategic tool in consumer marketing. The use of the general theory of diffusion of innovations as a basic framework of analysis has gained acceptance in this field. In industrial marketing, however, research has been mainly limited to result oriented studies, which do not provide the same depth of marketing information that process oriented studies do. The characteristics of innovative firms, or decision making units, have been the targets of most studies, as opposed to the characteristics of the individuals involved. Marketing effort can only be directed at individuals and not at companies. It would seem that an extension of the diffusion theory used in consumer marketing to industrial markets would be very useful. When studies have been directed at individuals (eg. Webster, 1970), it has generally been the purchasing agent who has been the subject. As discussed previously the decision making function can be diffused throughout the firm. Formal structure, or even the analysis of respondents themselves, can be misleading.

If the extension of the theory to industrial markets is potentially rewarding, why has so little research been done in this field? This author proposes the following reasons:

- Problem of definition: the "innovator" is described in

terms of overt behaviour. While the overt behaviour of the firm can be measured, it is individuals who contribute towards this behaviour, and so strict categorisation of individuals utilizing the same test, as is used in consumer markets, is not possible;

- Problems of measurement: time spans in industrial markets can be extensive, and the researcher may be testing behaviour evidenced ten or even fifty years ago. In many cases, accurate record of purchases are simply not kept, and even when they are, competitive circumstances may keep them unavailable to the researcher;
- Movement of individuals: there is no reason to expect that the individuals being tested have made life-long careers of their present employment. Their perceptions and attitudes to change and the product class could have been assimilated over a number of jobs with various companies, and so may not be reflective on the present firm's policy;
- Lack of background theory: the theory requires that certain mechanisms are present. Specifically it requires that the behaviour of individuals is a function of personal attributes, system effects, and an informal communication process. As yet there appears to be no evidence that an informal influence process exists.

Some researchers have not been deterred by these factors from using the theoretical framework [eg. Rabino, 1983: and Munson and Pelz, 1981]; usually the theory is combined in some way with that

of industrial buying behaviour. Nonetheless, no studies were found which specifically categorised individuals as innovators or otherwise, or acknowledged the problem. The only personality variable tested in industrial markets was the perception of the innovation. The research questions posed below have been arrived at in an attempt to fill the gaps in the theory as noted above.

A. CATEGORISATION OF INDIVIDUAL INNOVATORS

It is proposed that the definition leading to the categorisation of individual innovators be as follows.

> The innovator shall be that individual who perceives, as evidenced by self report, his organisation as having been one of the earliest adopters of the innovation.

This definition is useful in that it can be tested by self report with relative ease. While it lacks a direct link to overt action, such a link is not practicable (as discussed above). In a sense it assumes that past overt action of the firm is less important than the individual's perception thereof.

B. WHAT IS THE USEFULNESS AND REASONABLENESS OF THIS DEFINITION?

The usefulness and reasonableness of any new definition cannot be tested in a single study. The questions which the study aims to answer are as follows:

- Does the definition lead to a significant delineation of the population? In other words, when divided according to this definition, are the characteristics of innovators significantly different from non-innovators? If the answer is no, then the definition would be of no practical significance;
- If such differences are evident, are they significant in terms of the background theory? If the differences are similar to those shown in general diffusion theory, it could be a first step in demonstrating that the definition has similar usefulness to that used generally;

- Does the study show specific evidence for the existence of an informal communication network?
- What are the significant characteristic differences between opinion leaders and others? As discussed above, opinion leaders are in themselves regarded as an important market segment. Opinion leadership is acceptably, and generally, tested by self-report, and none of the problems of definition evident in innovativeness is present.

These four questions form the basis of the research study undertaken here.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 DEVELOPMENT OF HYPOTHESES

The research questions being investigated are:

- Using the new definition of innovators in industrial markets, in what way do the characteristics of innovators differ from the rest of the population?
- What is the correlation between innovators and opinion leadership?
- In what way do the characteristics of opinion leaders differ from the rest of the population?

A number of indicative characteristics are suggested by the literature. In order to assess which of these characteristics are potentially measurable within the population - purchasers or actors in the purchase of housing contracts - , ten unstructured interviews were undertaken with potential respondents. The main points to emerge from these interviews were:

- Respondents are likely to regard many specific questions as strategic, and so are unlikely to respond. Accordingly, questions were chosen in such a way that they would not be perceived to be strategically threatening;
- Many repondents are likely to regard personal questions

as unacceptable. Many of the characteristics shown to be indicative in consumer markets are personal. It is hoped that the results of this study will be directly useful in setting marketing strategy, and these personal characteristics would be most interesting;

- Many of the respondents work under time pressure and so the length of the questionnaire should be kept down;
- Other factors which were suggested as possible influences on innovative behaviour were: tendering behaviour (issuing of closed or open tenders, willingness to negotiate contracts, and willingness to accept alternate tenders); and organisational culture;
- Potential segments for IBS were seen as : building on problem soils; building contracts far from built-up centres (distant projects); fast contracts; low cost housing; and self-help housing.

The list of characteristics tested was reduced to the following:

- The decision making unit (DMU): number of people involved and the individual's relative importance in the DMU;
- Spending on housing;
- Tendering behaviour, as listed above;
- Potential seen for contribution by IBS, generally, and within the market segments;
- The reward (relative saving) required by the individual to accept the risk of purchasing IBS;

- The individual's perception of the organisational culture. Axes tested were: traditional - modern; structured - informal; established - growing, powerful - weak; warm - cold; leading - following; and careful - careless;
- How long ago the individual heard of, and evaluated the system;
- The individual's perception of the innovative class: compatibility; complexity; divisibility; and communicability. These attributes were tested in ten questions in the hope that data reduction could reduce the indicative dimensions;
- Personal demographics: age, education; profession; and earnings;
- Communication behaviour: observance of the innovative behaviour of other companies; membership of professional organisations, attendance of functions at these organisations; usage of journals relating to the industry; and importance of other sources of information, other professionals, journals, trade fairs, salesmen, and the general media.

In order to characterise individuals according to the definition of innovativeness, the model of the innovation-decision process was modified to an easily understood form, an eight-point scale from "We use them often" to "We have never heard of them". In addition respondents were asked how long ago their organisation first tried the systems. Respondents were then ordered according

to these two questions, and divided into quartiles.

In order to characterise repondents according to opinion leadership, the basic seven questions used by King and Summers [1970] was used with the same loadings, but altered to use a seven-point scale. Once again the respondents were sorted into quartiles according to this score.

Personal attitudes were measured using a 24-question standard questionnaire provided by Market Research Africa. This questionnaire is the result of the Sociomonitor study undertaken by this group, and normalised in the South African population. This questionnaire places the individual along two axes: innovator - responsible; and inward - outward motivation. The problem of measuring personal factors in this market has been noted, and it was hoped that this test would provide an externally meaningful test of personal attitudes. The Sociomonitor study is described in more detail in Appendix 1.

4.2 HYPOTHESES

The hypotheses specifically tested were as follows :

H1 - Innovators differ from the rest of the population in that they perceive that:

H1.1 Their organisation has more people in the DMU;

H1.2 They have higher influence in the DMU;

H1.3 Their organisations spend more on housing;

H1.4 They have different tendering behaviour;

H1.5 They see more potential for contribution from IBS
- generally
- in specific segments;

H1.6 Their organisational culture is different;

H1.7 The product class is more compatible, less complex, more divisible, more communicable, less risky;

H1.8 They have a higher tendency to observe the innovative behaviour of other firms;

H1.9 They have more education, earn more, are younger;

H1.10 They belong to more professional organisations, and attend functions more often;

H1.11 They make more use of journals;

H1.12 They regard other sources of information as more important (other professionals, journals, trade fairs, salesmen, general media).

H2 - Innovators are more likely to be opinion leaders

H3 - Innovators are more likely to be personal innovators

In addition all of the sub-hypotheses under H1 were tested for the groups - opinion leaders and personal innovators.

4.3 POPULATION TESTED

A population of 274 individuals involved in decision making was chosen by: access to marketing lists of two marketers in the housing market; telephonic contact with 20 organisations involved in the purchase of housing; and assistance from a number of industry organisations, including the National Association of Home Builders and the Industrial Building Association of SA. All of those tested were resident in the Transvaal, and the majority in the PWV area. A full list of organisations, and numbers of test subjects is included in an Appendix 2.

At the time that input of data was closed, 105 returns had been received, and 10 questionnaires had been returned as incorrectly addressed, or on the grounds of non-involvement in this market. Since this time a further 12 questionnaires have been returned.

A number of comments are relevant to this population. State organisations have a large impact on this market, and these organisations employ relatively larger numbers of people. Organisations involved in land development, although they are important players in this market, tend to employ few people, and rather make use of outside consultants. None of these comments have been quantified, but stem from comments made to this author during the collection of names for the study, and so should be seen as unquantified limitations on the research.

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