

## Diffusion model: Innovative idea to Laggards

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***Abstract:** Diffusion is the process in which a new thought is disseminated among various users. Consequently, the whole process of innovation proposal is separated into three sections. The earliest is the diffusion of innovation, knowledge and approval. Therefore, our work is grounded entirely on the operation of diffusion of innovation. In the first stage of the cognitive process of diffusion, there is increase in consumer knowledge of the merchandise. In the second stage, when the people become aware of the commodities, their curiosity increases. In the third level when customers adopt the product, there is segmentation of consumers. Thus, our subject is based on a model to explain the entire operation of innovation of new products and the stage when the product becomes unfashionable. If any product carries out performance in less time it means diffusion is fast. If the product takes excessive time for the process means the diffusion is slow.*

**Keywords-** Diffusion, Innovation, Decision making, Laggards

### Introduction-

#### Diffusion models-

The first diffusion model was written in the first book on this topic Diffusion of Innovation (Roger 1962) <sup>[1]</sup>. Roger reviewed existing ideas and summarized research findings on DOI (Roger 1995) <sup>[2]</sup> identified the research and divided it into eight categories. Knowing about the innovation, Rate of adoption, Innovation, opinion leader, Diffusion networks, and rate of adoption of a different social system, communication channel and consequences of innovation, this model fits the logistic growth model. (Frank M Bass 1969) <sup>[3]</sup> advocated forms of diffusion of innovation by innovators (potential Adopters) to imitation (Adopters) as a time element. Norton-Bass-model 1987) <sup>[4]</sup> contributed generalization of the diffusion model by incorporating both diffusion and exchange. Husky & Simon 1978) <sup>[5]</sup> had introduced advertising as a direct tool for disseminates information about the existence new merchandise. (Peterson and Mahajan 1978) <sup>[6]</sup> measured marketing efforts and extraneous variations on the product originated. Mahajan and Peterson 1985) <sup>[7]</sup> enclosed internal and external influence as a mixed influence model.

Robinson and Lakhani (1975) <sup>[8]</sup> refered effect of price on adoption. Mahajan and Mullar (1996) <sup>[9]</sup> suggested a model that simultaneously captures the adoption and substitution patterns for each successive generation of durable technological innovation and suggested to introduce a new generation until the maturity stage in the life-cycle of the current generation. Gatignon and Rebertsons (1985) <sup>[10]</sup> studied new idea, practice the adoption

of new merchandise and services through a social system. Roger's (1983) <sup>[11]</sup> model of diffusion is classical "bell shaped" normal distribution curve and each of the adaptors basis of demographic socioeconomic and personality characteristic. Mahajan et al (1990) <sup>[12]</sup> contended that data from the earlier stages could predict diffusion curve if diffusion is partly completed. Sultan et al (1990) <sup>[13]</sup> have analyzed that the awareness is generated through own experience not either analytical or empirical data. FM Bass (1987) <sup>[14]</sup> used diffusion and substitution to forecast industrial demand as well as market share of the various devices. DR Lehmann (1990) <sup>[15]</sup> used Meta analysis of diffusion model. Mahajan and Peterson (1985) <sup>[16]</sup> calculated rate of diffusion by accumulative number of potential adopters in a population and the rate at which adoption occurred. Mahajan and Sharma (1986) <sup>[17]</sup> analyzed procedures of three items market size, time of the peak and adoption level of peak time. Chatterjee & Eliashberg (1989) <sup>[18]</sup> analyzed a development of aggregate diffusion models of individual level adoption decision. Bass et al (2001) <sup>[19]</sup> analyzed that market potential parameters were being adjudicated a survey of stated intention. Goldenberg et al (2004) <sup>[20]</sup> established the ability of cellular automata simulation of bass model like individual level interaction to enhance understanding of aggregate behavior. Krishnan et al (2000) <sup>[21]</sup> used a modified bass model to demonstrate successful empirical modeling of diffusion at the object layer. Kumar and Krishna (2002) <sup>[22]</sup> generalized the bass model to take the cross country effect of diffusion. Vijay Mahajan et al (1980) <sup>[23]</sup> demonstrated the use of

feedback to make self-adoptive market response models.

### **A review of the literature**

Mahajan and Muller (1979) [24] assessed the distribution models of new product recognition by segmentation, market of customers in an untapped market, potential market and current market and analyzed the full flow of customer and rate flow of customers across these three discrete segments of the marketplace.

Bass et al (1990) [25] evaluated research schedules for composing diffusion models. We argue such research potential associated with five surprises of new growth. These are multiple adoptions, effect of consumer expectations, and exploration of recent developments in hazard models and understanding of diffusion processes at the micro (individual). These were accepted for interior control. One of the uses of diffusion models were forecasting the first-purchase sales volume curve, testing diffusion-based hypotheses, and to derive normative result. Eventually, several firms had used diffusion models for predicting the need for fresh merchandise.

Valente & Davis (1999) [26] summarized a technique to speed up the spreading of innovation with opinion leaders. They indicated that a more rapid diffusion occurs when the process is initiated by opinion leaders. Execution opinion leader considered three factors called recruitment, training location and timing of training. Yet the authority of interpersonal influence has analytically been incorporated in the scientific areas of behavioral promotion and diffusion.

Nutley et al (2002) [27] located the central ideas, examples and parameters within the evolution of improved research consumption, evidence based policy and practice implementation to evaluate whether the impressions from the field had been previously functional and aware of EBPP (evidence based policy practice).

Murphy and Donoghue (2009) [28] considered about the aims to search the perceived benefits of SWH (solar water heater) & means of reducing perceived barriers to adaptation among domestic consumer in New Zealand. Roger (2003) used adoption framework consisting of semi-structured questionnaire. Operationally, 5-point rating scale was used for recording information from household in New Zealand and explored benefits, perception and attitudes which raised awareness and reduced perceived barriers to overcome independence advice in financial conditions.

Peres et al (2009) [29] disclosed that the diffusion process of raw product and services were more complex and influenced by word of mouth communication, network externalities and social signal. We focus on social networks, network externalities, takeoffs, saddles and technology

generation. However, it was concluded that innovation diffusion is the cognitive operation of market diffusion of new products and services.

Liyanage et al (2012) [30] assessed the interrelation of knowledge and dissemination of innovation and suggested a model to launch a correlation between the two.

### **OBJECTIVE**

- 1) The first objective is to make the customer aware of innovation through different diffusion processes.
- 2) The second objective is to inculcate and confirm the adoption process of innovation in customers.
- 3) The third objective is segmentation of customers on the basis of adoption of innovation.

### **Innovation**

According to Australian Government official website [31] Innovation generally refers to changeable or creates additional successful procedure, products and thoughts, for business. Businesses that innovate to generate additional useful effort processes for better productivity and functioning. Innovation can be a channel for the expansion and accomplishment of customers, and assist to adapt and grow the sales. Being innovative does not mean to invent; innovation can indicate altering our marketable activity mould and adapt to alterations in our situation to carry superior products or services. Successful innovation should be integral with strategy and vision, where we bring forth an atmosphere for advanced thinking and creative problem solving. Businesses that innovate to create new effective effort processes can achieve better productivity and performance. Innovation regularly allocates time and budgets for special tasks such as new product development or implementing extensive research & development strategy. Small and medium sized businesses not constantly divert resources to full-time R&D Innovation covers each aspect of business innovation with products, services or business operations. If we contract into account innovation in business, we could see huge positive impacts (Glasgow 2013) [32].

### **Diffusion of innovation by interpersonal channels**

Interpersonal channels were more influential to turn or modify strong attitudes obtained by an individual. In interpersonal channels, two or more individuals who interact are similar in certain attributes, such as opinions, education, socioeconomic condition, but the spreading of innovations requires at least some degree of heterophony, which is "the degree to which two or more individuals who interact are different in certain attributes." (Rogers, 2003, p. 19)(3) [33]. Interpersonal influence are systematically incorporated in scientific fields of behavior,

promotion and diffusion. These forms are significant to diffusion efforts measured to promote the demand for societal change. Social network analysis can be used to design more appropriate and perhaps more efficient diffusion of innovation (Valente 2006) <sup>[34]</sup>. Homophiles are the level to which pair of individuals who correspond are alike. The similarity can belong to opinions, instruction, socio economic condition. Communication is usually further useful when source and recipient are homophiles. Heterophony is the place to where pair of individuals, who relate, are dissimilar in definite property. Heterophilous networks regularly attach two cliques. Homophiles accelerate the spreading procedure, for diffusion process help to pass communication relations that are at slightest heterogeneous (Berger et al 2013) <sup>[35]</sup>. **Change agent** act as bridges among technical expert and their customers, without being an associate of any group, their capacity for utility together is crucial. It is suggesting that they are mainly resourceful when they work in business with opinion leaders (Rogers 1995) <sup>[36]</sup>. Change Agent provides the Communication Link among users and non-users of an innovation facilitate the flow of innovations change agents are those who can promote others to take part in the commencement. Change agents take on leadership role with groups of concerned users of an innovation. (Teaching with technology 2005) <sup>[37]</sup> It was empirically proved that opinion leaders persuade the consumer decision-making process through diffusion of positive word of oral cavity. As a result, they agreed and opinion leader's manipulated the assessment of unprocessed innovation and hence determine the speed of adoption. (Dearing, 2009) <sup>[38]</sup>.

### Diffusion of innovation in mass media

There are number of channels of mass media all the way through which diffusion of innovation takes place. These are TV, magazines, papers, etc. With exposure of media they will position significantly on similar issue. (McCombs 1993) <sup>[39]</sup>. Mass communication occurs when the ground evaluation of people, send a communication to a bulky unidentified and more often heterogeneous audience through the consumption of focused communication media (McCombs and Shaw 2001) <sup>[40]</sup>. The mass media provide various purposes in our social society. The media provides news and information. The media pass on the data to follow, select, read, and criticize it. The media reflects our own feelings, values, and norms by cultural transmission function. Mobilization refers to the part of media for promoting society's attention, especially in times of emergency (Wright 1960) <sup>[41]</sup>. The primary knowledge with reference to an invention comes generally from mass media in anticipation. Formerly a product becomes usual when customers rely frequently on face-to-face recommendations from peers, which are social media, blogs that can cause such an influential force on marketing. Pioneers and early adopters

compel on innovation in bulk because they are viewed by experts as role models (Huebsch and Media) (2014) <sup>[42]</sup>. In the former stages of consciousness and facts, mass media channels accomplish extremely large audience quickly, probably plays a larger purpose. The mass media channel that is expected to be much superior, functions than it bears in what went before (Wright and Bennetts) (2006) <sup>[43]</sup>. Information about the innovation must spread through one or more channels in order for acceptance to grasp place of employment. The info may be encouraging or harmful and further or less truthful, suitable, and correct. Different information channels may be more effective at different phases in the process, and for different subgroups. Mass media has typically been the principal channel for public exposure, and various theories of mass media effect are relevant. Local media may be more efficient in some physical and ethnic contexts. New media online and social networking provides novel ways for diffusion and sharing information about inventions. Many ideas (such as rumors and gossip) spread quickly through interpersonal channels and social networking, and are persuasive and engaging (Greenhalgh 2004) <sup>[44]</sup>. Mass media channels are all those means of broadcasting messages that imply a mass medium, such as wireless, TV, newspapers, and so on, which enables a source to accumulate an audience of many. The establishment and change of strongly held positions, notwithstanding, is best accomplished by interpersonal channels. Interpersonal channels involve a face-to-face exchange between two or more masses. The channels of communication employed by the customer in different phases of the innovation-decision process are really effective. In case of mass media sources, TV is the major route of data employed by the majority of customers. It supplies to reduce uncertainty through solving the individual (Sakail et al) <sup>[45]</sup>.

### Consumer Awareness-

Consumer awareness means the individual is menace to the invention, but lacks complete information about it. The awareness that an innovation exists in knowledge of its key properties, and understanding of how the innovation relates to the current practice (E. Roger 1995) <sup>[46]</sup>. The awareness process spreads by infection through the social network as follows. Social media is useful for awareness efforts as they are capable to discover and target a specific group of people. (Colapinto et al 2012) <sup>[47]</sup>.

### Diffusion process of awareness of adoption

**Knowledge-** Process of knowledge transfer had been interconnected to innovation diffusion process in a choice of phases (Liyanage 2012) <sup>[48]</sup>. A successful innovation diffusion process might without difficulty acquire a knowledge transfer process. Knowledge transfer and innovation diffusion exercise can often go wrong if the parties

involved are unwilling to share knowledge due to issues of confidentiality, cultural difficulties and also due to fear of losing the competitive edge (Rogers 1971)<sup>[49]</sup>. The core questions addressed concerning an innovation were 'what,' 'why,' and 'how the users correctly use an invention. This is a significant variable in the innovation-decision procedure and increases even more importance in cases of complex innovations. If the consumer had appropriate knowledge and accepts knowledge before the testing and adoption of the innovation, it increases the likelihood of its realization. Information includes precept of the innovations and address the questions of how and why the invention installation take place. Deficiency of knowledge may show the way to mishandling of an innovation and later discontinuance of the alike. But being equipped with all this knowledge does not guarantee the adoption of the innovation as it also depends on the side of the individual towards it (Chatterjee 2014)<sup>[50]</sup>.

**Persuasion-** The persuasion step occurs when the person has a negative or positive feeling in the counsel of the innovation, but the influence of a favorable or unfavorable attitude on the way to an innovation does not at all indicate the room to an adoption or rejection (Rogers, 2003),<sup>[51]</sup>. The soul sees his or her attitude after he or she knows about innovation. Persuasion is when the decision makers become psychologically concerned to feel impressive more or less toward the society. Earlier innovation received or past experience with similar technology affect the attitude towards innovation (Sahin and Ismail 2006)<sup>[52]</sup>. Persuasion depends on attitude about the innovation (Kocak 2013)<sup>[53]</sup>. The persuasion stage follows the information point in the innovation-decision procedure (Pardeshi 2014)<sup>[54]</sup>. At this point, an individual start attracting with the innovation. These innovation attributes include relative advantage, compatibility, complexity trial ability and observability (Liu, Yu 2012)<sup>[55]</sup>.

### **Decision**

The decision-making unit decides either to refuse or acknowledge the introduction. More often than not the choice to accept and reject would be established on testing face. External parties might be touched on providing a prospect to exhibit the innovation. Decision making to evaluate the innovation (Sarosa et al 2004)<sup>[56]</sup>. If an invention has a partial trial basis, it is usually taken more quickly, since most individuals first want to inspect the innovation by an individual and then approach to an acceptance decision. On the other hand, refusal is possible in every point of the innovation-decision process] (Jonathan E 2013)<sup>[57]</sup>.

### **Execution**

The assignment when incorporates with innovation into regular use is called the execution Stage. This extremely unexciting and time-consuming method. The concern was also being judged at this time to

agree on prospects. During this stage, re-invention may take home. Re-invention refers to the process by which an individual modeled a technology to improve and convince his requirements. This prescription may also absorb the technology for a different task from the technology's innovative purpose (Deibel, et al 2011)<sup>[58]</sup>.

### **Conformation**

The individual finalizes his/her decision to persevere in putting on the innovation. This story is both intrapersonal and interpersonal. The Confirmation Stage makes innovation-decision fixed and looks for funding his or her decision. The individual tends to seek reinforcement for his or her decision. Thus, attitude becomes more significant at the confirmation stage, depending on the Support for adoption of the innovation and the attitude of the soul is important. In this stage the individual finalizes his/her decision to carry on the invention and may operate the innovation to its fullest prospective (Roger 1962 5th ed, p. 282)<sup>[59]</sup>.

### **Process of adoption to laggards**

**Innovators-** are those consumers' who initiates to go and buy an innovative product or service offer. They obtain the new product for the reason that they desire new ideas and concept, and look for product and service innovations. They were far above the ground with confidence, and were continuously willing to test out new inventions. They had right to use information in relation to such innovative assistance, and were organised to purchase because they caused the awareness and preference to buy and hold the purchasing power and the consumer (Nptel 2012)<sup>[60]</sup>. People who desire inspects the innovations were adventurous and attracted in innovative thought. They were very willing to consider risks, and regularly evolve new estimate (Dieckhaus, 2014)<sup>[61]</sup>. They were very enthusiastic to test fresh ideas. This quest leads them out of a local circle of peer networks and into more cosmopolitan social relationships. Communication practices and friendships among a clique of innovators are common, though the geographical distance between the innovators may be considerable. Being an innovator has several prerequisites. These include control of substantial financial resources to absorb the possible loss owing to an unprofitable innovation and the ability to understand and apply complex technical knowledge. The innovator must be able to cope with the high degree of uncertainty about an innovation at the time that the innovator adopt. He or she desires the chance, the rash, the daring and the speculative. The innovator must also be willing to accept an occasional setback when one of the new ideas he or she adopts proves unsuccessful, as inevitably happens. While an innovator may not be appreciated by the other members of a social system, the innovator plays a substantial role in the diffusion process: that of launching the new idea in the social system by importing the innovation from

outside of the system's boundaries. Thus, the innovator plays a gate keeping roles in the flow of fresh minds into a social system (Rogers, E.M. (2003) <sup>[62]</sup>. Adventurous character and willingness to try new things, to remove the risk involved in new experiences (Gomes et al 2011)<sup>[63]</sup>. Rogers identifies several additional characteristics dominant in control of substantial financial resources to absorb the possible loss from an unprofitable innovation. The ability to interpret and use complex technical knowledge, the ability to do with a high degree of doubt about an innovation (Kaminski and June 2011) <sup>[64]</sup>.

**Early Adopters**-are appreciated and more local than innovators. It is from this category that the change agent should involve locating opinion leaders. These persons are adventurous, but adequately skeptical to recognize good innovations from poor ones. Because opinion leaders had further managed on the diffusion effect than persons in any other adopter category, it is persons in this category that the change agent attempts to persuade to adopt. The early majority tends to be approximately 34% of the population, and will support a new product after realizing its accomplishment effectively by both "innovators" and "early adopters" and their understanding individually. Masses in this sector were with a reduction of prosperous and less cultured than innovators and early adopters, but were agreed to take ability with a new product. (Investopidea 2014)<sup>[65]</sup> The first sizable segment of a population to take on an advanced applied science. Tends to be about 34% of the population, and will adopt a new product later on seeing it practiced successfully by either by "innovators" and "early adopters" that they know personally.. Companies use the diffusion of innovation theory to evaluate how extensive it will involve a fresh product to be espoused by the population. "Innovators" and "early adopters" tend to taste a new product out comparatively quickly, but it may take a while for the early majority to experience soft enough with the technology to build a purchase (Investopidea 2014) <sup>[66]</sup>

### Early Majority

The early majority adopts new ideas just before the average member of a social system. The early majorities interact frequently with their matches, but seldom hold leadership positions. The early majority's unique position between the very early and the relatively late to assume makes them an important nexus in the distribution process. They provide interconnectedness in the system's networks. The early majority may deliberately, for some time before completely adopting a new idea. Their innovation-decision period is comparatively longer than that of the innovator and the early adopter. "Be not the first by which the new is tried, nor the last to lay the old aside" (quoted from Alexander Pope at the beginning of this chapter),

might be the early majority's motto. They work along with a deliberate willingness in adopting innovations, but seldom go. E. Roger (2003) <sup>[67]</sup> The third category within the Diffusion of Innovation consisting of one-third of the overall market who represent the origin of the investment company market and who are mainly characterized as linkers of new products but prefer to wait until they have had positive opinions for other (e.g., Early Adopters) before purchasing. (Know this .com 1998) <sup>[68]</sup> This group is slower to test new products, inserting into the grocery store, merely after their peers have actively embraced the product. They are far more pragmatic and less technology-driven than the previous groups. They are looking for modest productivity improvement, and they care about the longevity and reputation of the company providing the product. They usually represent 39 percent of the marketplace. Pave (2014) <sup>[69]</sup>

### Late majority

The late majority adopts new ideas following the intermediate member of a social system. Commendation may be together an economic necessity and the answer to increasing network pressures. Late majority does not get over until most others in their social organization had acted thus. They can be convinced of the utility of new ideas, but the pressure of peers is necessary to prompt acceptance. Their relatively scarce resources mean that the uncertainty about a new idea must be brought out before the late majority (Roger 2003) <sup>[70]</sup>. The late majority has embraced new ideas just after the average member of a plan. Like the early majority, the late majority formulates one-third of the member of a system.

### Laggards

Laggards do not rely on group norms and values, just like Innovators. Their past closely influence their current decision process. By the time Laggards adopt an innovation it had been possibly obsolete and put back by something brand new and economical (Amy Swanson 2014) <sup>[71]</sup>. They suspect and feel separated from a quickly varying company. Marketers and advertisers tend to pay no attention to Laggards in view of the fact that they are not promoted by advertising or personal selling and will simply purchase a new product, After at the monthly price Lieven and Gino (2001)<sup>[72]</sup>. It's a higher aged, low-educated segment with a low income. Every bit the late majority, they also indicate a low, medium-usage. The laggards were extremely risk-averse ( Wolske and Bievensue) (2010) <sup>[73]</sup>.

### Conclusion-

This study is based on the diffusion model in which total process of diffusion model is introduced. This process is separated into three parts. In the first part it shows the surgical process of diffusion from the Innovation of any

product and services to the awareness of consumers. This consciousness is caused by both interpersonal and mass media. Further interpersonal is done with homophiles and heterophiles. Homophiles means when a person's is know, each other and heterophiles are done when people not known each other. Word of mouth cavity plays a very significant part in this type of consumer consciousness. Consumer awareness is also done by Mass media by different channels like TV, papers, radio, internet, magazine. In the second part of the paper discussed the process of after awareness to adoption of product and services. It is executed with knowledge, persuasion, decision, Execution, confirmation. In the Knowledge stage consumers are considered to prior condition and characteristic of the decision making unit. Persuasion stage perceived the characteristic of the innovation. Decision stage finalizes the decision of adoption and Rejection of the invention. In the execution stage either technology is also being judged at this time to see if it meets expectations. In Confirmation stage, individual finalizes his/her

decision to persevere in putting on the innovation. Along the third stage in which consumer is segmented according to preference of choice of innovation after the decision of adoption. In the world-class stage, there are innovators, they are those consumers' who are the first to go and buy a new product or service offering. Second stage earlier adopters are those who are willing to bid for a chance with a new product. In the third stage, earlier majority these are those people who adopt new ideas just before the average member of a social system. On the next stage late majority where customer adopt new ideas just after the average member of a social system. By the time Laggards adopt an innovation it has been possible unfashionable and replaced by something new and inexpensive. In the end, we reasoned that it's a total process of Innovation of new merchandise and end with unfashionable and replace the product. If any product carries out performance in less time it means diffusion is fast. If the product takes excessive time for the process means the diffusion is slow. .

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