

Analysis of Physicians' Technology Acceptance Literature in Changing Indian Pharmaceutical Marketing Context: A Markus and Robey's Causal Structure Approach

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ABSTRACT

The Internet adoption has been viewed as user acceptance phenomenon. The user technology acceptance phenomenon has been studied from various perspectives and examined in context of different technologies. It may be viewed from individual and organisational user perspective. However only few researchers have examined physicians' technology acceptance as a phenomenon. In India, the "me-too" pharmaceutical promotion strategies have shifted the focus towards the modern medium of pharmaceutical promotional methods. Internet is one of the most prominent tools among these modern means of pharmaceutical promotions. Therefore it becomes essential to understand physicians' internet adoption pattern which plays a key role in Indian pharmaceutical marketing context. This study systematically analyses the scholarly literature related to physicians' technology acceptance. Meta-theoretical framework proposed by Markus & Robey (1988) was used to analyze the scholarly literature related to physicians' technology acceptance phenomenon. The findings of this study revealed that physicians' technology acceptance phenomenon has been viewed as an individual's user acceptance caused by technology imperative. It has been examined by adopting variance theory as a logical structure. The analysis has also revealed that Technology Acceptance Model (TAM) proposed by Davis (1986) has been used as representative, robust, and prominent model that examined the physicians' technology acceptance phenomenon for various technologies like electronic health records, telemedicine technology and smart phones. The study proposed two propositions and suggested integration of IDT and TRI constructs with TAM constructs that also underlines contribution of this study.

Keyword: Pharmaceutical Marketing, Physicians Technology Acceptance, Technology Acceptance Model, Innovation Diffusion Theory, Technology Readiness Index

INTRODUCTION

The number of Internet users has grown extremely in last ten years. All over the world about 2.4 billion individuals are using the Internet. The Asian region contributes 44.8 percent of this Internet user population and India contributes 12.72 percent of Internet users to these 44.8 percent (Internet World Stats, 2012). The Internet has been emerged as an all-encompassing technology in the healthcare sector because of the enhanced penetration (Kaisere; 1995 and Silberg et al.; 1997). The results of

previously published survey data have mentioned about enhanced penetration of Internet in healthcare sector. According to these surveys stake holders of healthcare sector like physicians, patients, insurance organizations, pharmacists and hospitals have been increasingly using the Internet for searching professional and personal information (American Medical Association 1997, 1999 and 2000 and Canadian Medical Association 1999). These surveys also reported that the Internet has been adopted by the physicians' as a preferred medium for exchanging ideas through e-mails and for information

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searching professional and general information related to medical advances in specific diseases, travel bookings and information about personal and healthcare products.

Wu & Wang (2005) reported that the Internet technology has become advanced and emerged as a sophisticated medium for advertising, shopping, investing, and banking. It has enhanced social interactions and become part of day to day lives of individuals. The usage of emails, social networking sites, and information seeking through Internet has increased considerably in the past few years. The enhanced penetration of Internet has changed traditional methods of marketing communications for various sectors and the pharmaceutical industry is no more exception to it. Buckley (2004) mentioned that the adoption of Internet for marketing communication has changed the pharmaceutical marketing process.

The pharmaceutical marketing process in the Internet era is presented in Fig. 1.

Masood, Ibrahim, Hassali and Ahmed (2009) have mentioned that besides traditional detailing; incorporation of advanced Internet-based techniques of pharmaceutical promotion like e-detailing, Internet based drug promotions engagement through blogs, online healthcare forums and social networking websites would lead to business success and help pharmaceutical marketers in changing technological advancements.

The CEGEDIM, California (2010) report found that the trends of pharmaceutical promotions were changing and the prescription drugs have been promoted to physicians'

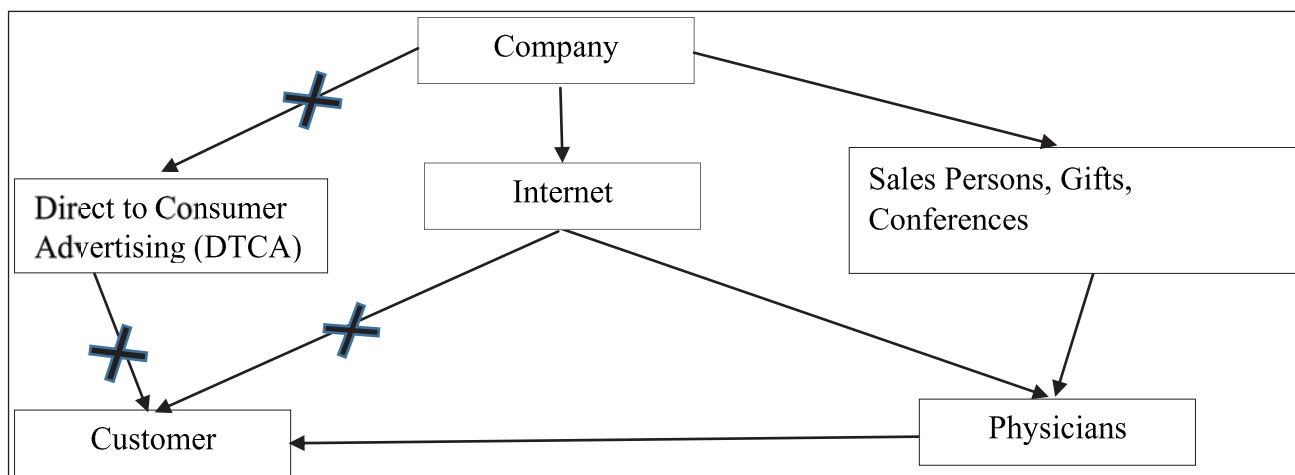
with the help of newer medium of promotions like e-detailing. The report underlined that out of the total pharmaceutical promotional spending of \$24 billion; approximately \$327 million was spent on new media. This report had also highlighted about potential of Internet for engaging physicians for pharmaceutical promotions. The Organization of Pharmaceutical Producers of India (OPPI) has recognized the technological developments happening across the globe and incorporated Internet as a medium for pharmaceutical promotion.

The definition of pharmaceutical promotion published by Organization of Pharmaceutical Producers of India (OPPI Code of Pharmaceutical Practices, 2012) mentions pharmaceutical promotion as, "any activity undertaken, organized or sponsored by a member company which is directed at healthcare professionals to promote the prescription, recommendation, supply, administration or consumption of its pharmaceutical product(s) through all media, including the Internet and mobile SMS."

This definition indicates that the pharmaceutical promotions are activities directed at healthcare professionals and Internet is one of the mediums that could be used for promoting prescription. This definition further informs that the Internet has emerged as a medium of pharmaceutical promotion and physicians are key elements of pharmaceutical marketing.

Therefore, the knowledge about adoption and usage pattern of Internet among Indian physicians would help the pharmaceutical marketing companies to better promote their products over Internet to the target customers i.e.

Figure 1: The Pharmaceutical Marketing Process (Buckley, 2004)
 ('X' means legally not allowed in India)



physicians.

INTERNET ADOPTION AS USER ACCEPTANCE PHENOMENON

The Internet adoption has been key research theme of Information System (IS) research and studied by numerous researchers from various disciplines. The emerging role technology like Internet and social media in marketing has enhanced interest of marketing researchers in studying this phenomenon. The previous IS researchers have studied this phenomenon from various perspectives and examined it in different contexts viz. for various technologies and for different users like individual and organisational users. A previously published review (screened from 526 abstracts) emphasizing on physicians technology acceptance mentioned that very few studies (18 Studies) have been conducted in last ten years (1996-2006) out of which only seven studies had used TAM model as a theoretical background for examining technology adoption (Yarbrough and Smith; 2007). Another review (Ketikidis, Dimitrovski, Lazuras, and Bath; 2013) that studied acceptance of electronic health record (EHR) reported that researchers had applied modified or extended versions of TAM or a combination (of TAM) with other technology acceptance models to measure physicians' acceptance of technology. This review revealed the predictive power of TAM enhances when it is modified, extended or combined with constructs of others theories.

Considering these technological developments and recent developments in pharmaceutical marketing in Indian context; this review has made an attempt to organize the scholarly literature related to physicians' technology acceptance and systematically analyzed it by applying Markus and Robey's Causal Structure (1988) Methodology.

OBJECTIVES AND METHODOLOGY

It has been reported by Markus & Robey (1988) and Sun & Zhang (2006a) that proper understanding of theoretical structure provide methodological rigor by strengthening research strategy and techniques. Sun & Zhang (2006) reported that better conceptualisation and examination of a phenomenon is an outcome of three essential steps: i) careful exploration of underlying theoretical structure,

ii) examination of various inconsistent relationships, and iii) understanding limitations of the most frequently used model. Markus and Robey's causal structure framework is a good tool for careful exploration of theoretical structures. This approach helps researchers in being better informed about past and existing theoretical structures (Sun & Zhang, 2006). The objectives of the present study are mentioned below.

Objectives

1. To analyze the state of art literature available on physicians' technology adoption for deriving propositions for studying physicians' internet adoption phenomenon in Indian context.
2. To examine and evaluate the available literature related to physician's technology acceptance phenomenon by using Markus and Robey's causal structure.

Methodology

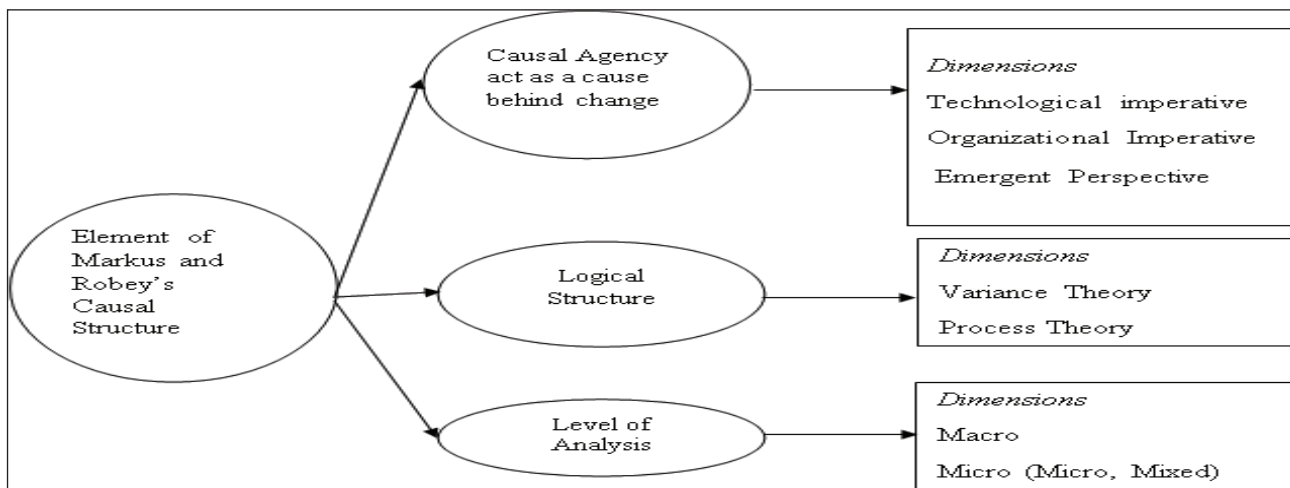
It has been observed during initial screening of literature that the physicians' technology acceptance has been reviewed by applying consumer behaviour approach (Eger, Godkin & Valentine, 2001) and the Markus and Robey's causal structure has not been adopted to analyze the literature related to same. Therefore to address this gap a systematic literature review was conducted and meta-theoretical framework proposed by Markus & Robey (1988) was adopted to analyze the scholarly literature related to physicians' technology adoption.

Firstly, Markus and Robey's framework (1988) along with its three dimensions of the causal structure are explained. The second sub-section elaborates about the process of collecting and selecting the scholarly literature related to physicians' technology adoption.

About Markus and Robey's Causal Framework

Markus & Robey (1988) reported that conceptualisation of "better theories" required more 'attention' as it was an outcome of awareness about i) availability of various theoretical options that examine a particular phenomenon, ii) the advantages and disadvantages of these options, and iii) dimensions and categories of the theoretical structure. These three dimensions form the content of

Figure 2: Markus and Robey's Causal Structure (1988)

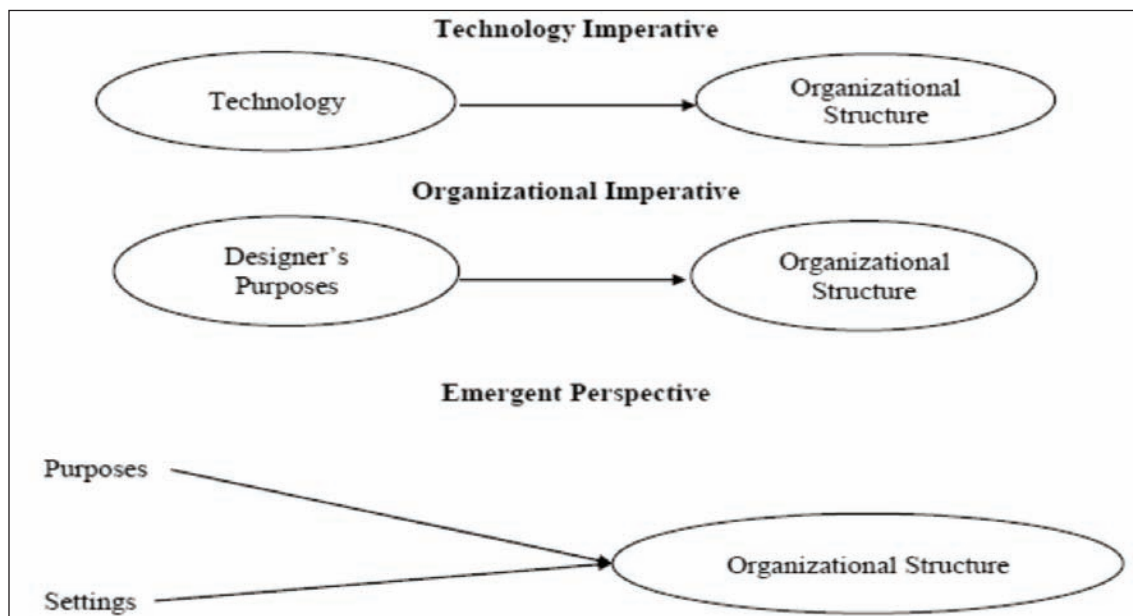


theory and the general structure of theory. Further, the conceptualisation becomes difficult when inconsistencies among the constructs are reported. This issue can be sorted out by analyzing the available scholarly literature on the basis of causal structure and not on the substance of the theory. The Markus and Robey's approach is based on the causal structure of theory which considers three elements causal agency, logical structure, and level of analysis respectively. These three elements also have other dimensions which are presented in Fig. 2.

About Causal Agency

Markus & Robey (1988) have conceptualised three conceptions of "Causal Agency" by building upon the previous work of Pfeffer (1982) and termed these three conceptions as technological imperative, organisational imperative, and the emergent perspective respectively. The technological imperative considers the technological changes as a cause for change whereas the organisational imperative considers motives and actions of the organisation acts as reason for change.

Figure 3: Markus and Robey's Causal Agency (Markus and Robey, 1988)



In case of emergent perspective it is the interaction between technology and individuals and organisation and individual cause the change. The impact of these has been diagrammatically presented in context of organisational structure by Markus & Robey (1988) (Fig.3). Sun & Zhang (2006) reported that the technological imperative focused on determining aspects of technology and hence ignored the role of human actions in developing and adopting the technology. In contrast, the organisational imperative emphasized on human actions and reported that human actions determined the technology attributes for an organisation, the individuals' choice also played a key role in adoption of technology for organisational context. Further, Sun & Zhang (2006) mentioned that the emergent perspective treated introduction of technology as a catalyst which initiated various series of causes and effects which resulted into adoption/ use of technology and other outcomes. Thus the causal agency provided a basic criterion for classifying the scholarly literature related to physicians' technology adoption.

Table 1: Differences between Variance Theory and Process Theory (Markus & Robey, 1988)

<i>Parameter</i>	<i>Variance Theory</i>	<i>Process Theory</i>
Role of time	Static	Longitudinal
Definition	The cause is necessary and sufficient for the outcome	Causation consists of necessary conditions in sequence chance and random event play a role
Assumption	Outcome will invariably occur when necessary and sufficient conditions are available	Outcomes may not occur (even when conditions are present)
Elements	Variables	Discrete outcomes
Logical Form	If X then Y; If more X then more Y	If not X, then not Y

About Logical Structure

The logical structure considers variance theories and process theories. These two theories were analogues to cross-sectional and longitudinal methodologies respectively (Markus & Robey, 1988). The variance theories were known as "factor model" that studies the relationships between predictors and outcomes empirically. The variance theories assumed that variation in predictor (or independent) variable was a cause behind the variation occurred in outcome (or dependent) variables.

The variance theories measured a level of outcome with a level of predictor. The variance theories failed to explain "how outcomes occur" which was explained by process theories (Sun & Zhang, 2006). The differences between these two theories are presented in Table 1.

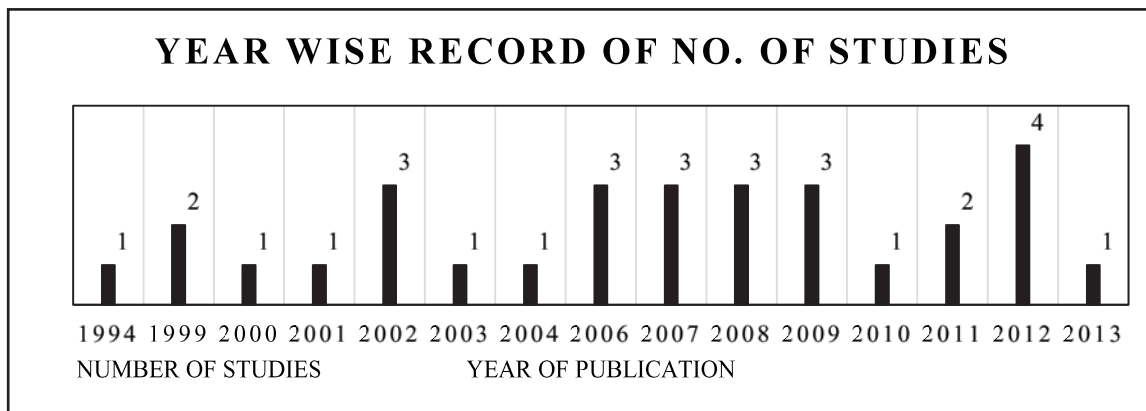
About Level of Analysis

Markus & Robey (1988) have reported that level of analysis is third parameter of causal structure; which has been considered as third criterion for evaluating the literature studying physician's technology acceptance in case of this study. The level of analysis is done at individual, organisational, and society level. In the analysis when the large scale collectives like organisation or societies are considered, the analysis is known as macro level analysis and the analysis which is based on properties of individuals is known as micro level analysis. The macro level analysis analyses the phenomenon without considering individuals beliefs, attitudes, intentions, and preferences whereas the micro level analysis focuses on the individuals which are considered as more active in comparison with large scale collectives. Further in case of technologies like office automation the focus is on individual as well as on organisation; in such cases the mixed level of analysis has been adopted. Even though the mixed level of analysis conceptually consists of both macro and micro level of analysis, the mixed level of analysis is "methodologically individualist" in nature (Markus & Robey, 1988).

Methodology Used for Collecting Literature

Available databases like Emerald, EBSCO, Proquest, were searched with to key search terms "Technology Acceptance" and "Physicians" for collecting scholarly literature related to physicians' technology adoption. Boolean operators "and" and "or" were used to collect the literature. The advanced search options were also used to collect the data. This has resulted into total 3324 (Emerald, 512, EBSCO, 140, Proquest, 2672) search results. The abstracts of these search results have been reviewed for initial screening to check the relevance of the study. This initial screening has resulted into 30 highly relevant studies consisting of both qualitative and quantitative studies. These studies were ranging from 1994-2013 and majority of (20 studies) the studies are from last seven years (2006-2013) (Fig. 4).

Figure 4: Year Wise Record of Scholarly Articles



The quantitative studies have been used for the evaluation and were evaluated by applying three parameters reported in Markus and Robey’s framework (1988).

ANALYSIS

The selected scholarly literature related to physicians’ technology adoption has been analysed by using causal structure framework proposed by Markus & Robey (1988). The three dimensions of causal structure framework causal agency, logical structure and level of analysis (mentioned in previous section) have been used

for examining and evaluating these studies. An overview of these studies has been presented in Table 2.

OUTCOMES

This systematic evaluation conducted on the basis of Markus and Robey’s causal structure (1988) has revealed that

1. *Technology imperative is the prominent causal agency that impacts physicians’ technology adoption.*

Figure 5: Analysis of Studies Related to Physicians’ Technology Adoption

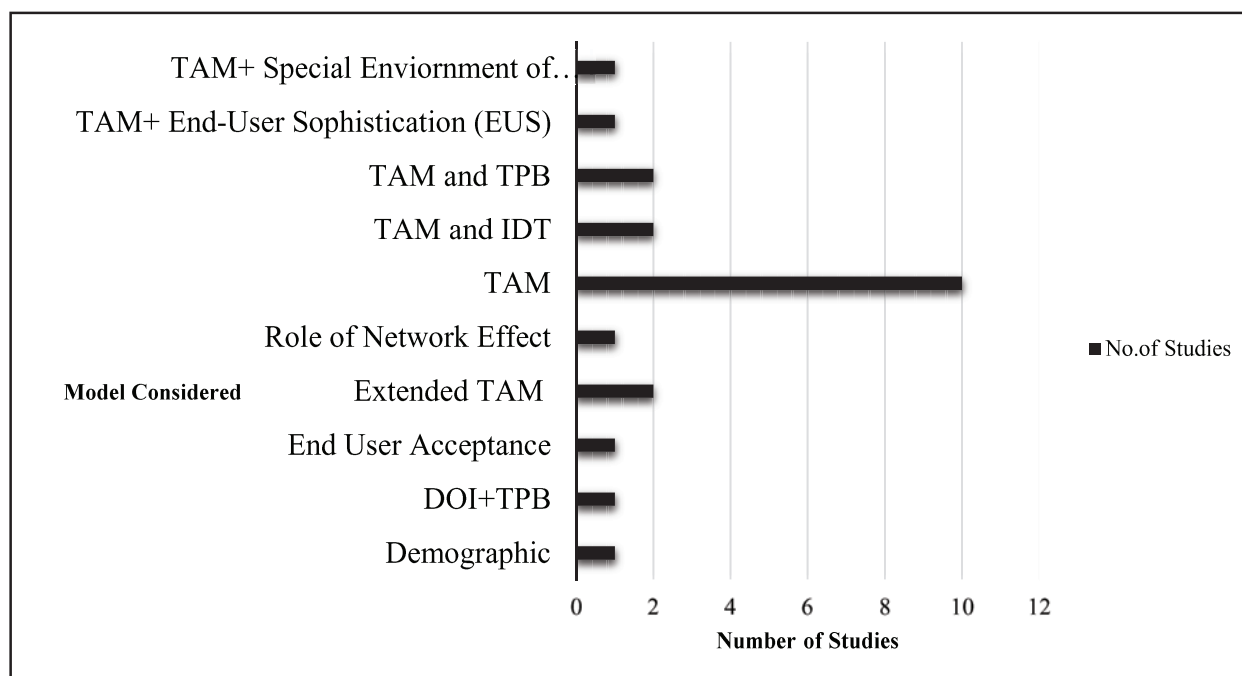


Table 2: Overview of Prior Research Related to Physicians' Technology Adoption Using Theoretical Structure Analysis

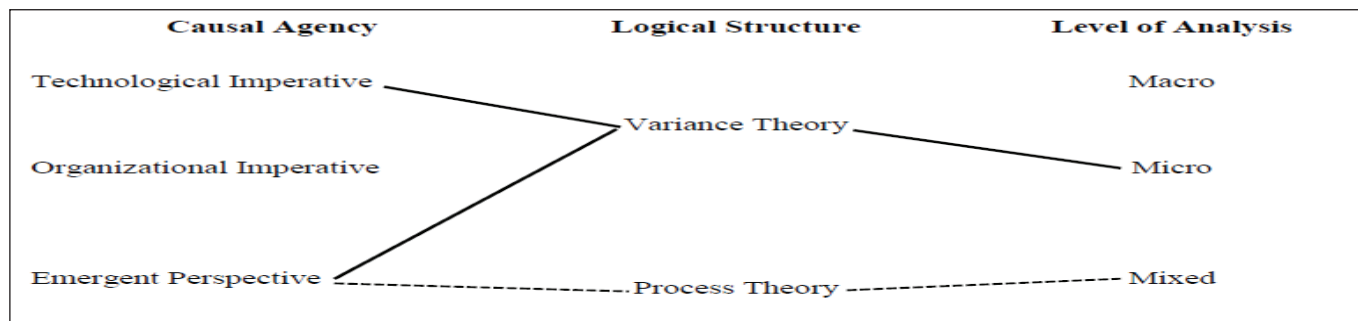
No.	Author, Year	Causal Agency	Logical Structure	Level of Analysis
1	Dixon & Dixon, 1994	Technology Imperative	Variance theory	Micro
2	Hu, Chau, Liu Sheng, & Tam, 1999	Technology Imperative	Variance theory	Micro
3	Dansky, Gamm, Vasey & Barsukiewicz, 1999	Technology Imperative	Variance theory	Macro
4	Dixon & Stewart, 2000	Technology Imperative	Variance theory	Micro
5	Chau & Hu, 2001	Technology Imperative	Variance theory	Micro
6	Chau & Hu, 2002a	Technology Imperative	Variance theory	Mixed
7	Chau & Hu, 2002b	Technology Imperative	Variance theory	Mixed
8	Chismar & Wiley-Patton, 2002	Technology Imperative	Variance theory	Micro
9	Chismar & Wiley-Patton, 2003	Technology Imperative	Variance theory	Micro
10	Tulu, Burkhard, Richard & Horan, 2006	Technology Imperative	Variance theory	Micro
11	Han, Pekka, Matti & Markku, 2006	Technology Imperative	Variance theory	Micro
12	Park & Chen, 2007	Technology Imperative	Variance theory	Micro
13	Ella Carter, 2008	Technology Imperative	Variance theory	Micro
14	Barki, Pare, & Sicotte, 2008	Technology Imperative	Variance theory	Micro
15	Walter & Lopez, 2008	Technology Imperative	Variance theory	Micro
16	David B. Meinert & Dane Peterson, 2009	Technology Imperative	Variance theory	Micro
17	Ayers, et al. 2009	Technology Imperative	Variance theory	Micro
18	Banerjee & Dash, 2011	Technology Imperative	Variance theory	Micro
19	Tiago, Tiago, & Silva, 2011	Technology Imperative	Variance theory	Micro
20	Escobar-Rodríguez, Pedro & Romero-Alonso, 2012	Technology Imperative	Variance theory	Micro
21	Wirtz, Mory, & Ullrich, 2012	Technology Imperative	Variance theory	Micro
22	Kostopoulos, Rizomyliotis & Konstantoulaki, 2012	Technology Imperative	Variance theory	Micro
23	Wan, Hong Kit, Buhari & Muzaini, 2012	Technology Imperative	Variance theory	Micro
24	Nuq & Aubert, 2013	Technology Imperative	Variance theory	Micro

- Physicians' technology acceptance phenomenon has been studied by *considering variance theory as a prominent methodology*.
- The analysis has also highlighted that physicians' technology adoption is considered as *individual's technology acceptance phenomenon* and has been *analyzed by adopting micro-level analysis*.
- It has been observed during the review that *TAM model and extensions of TAM model* has been *predominantly used* for examining physicians' technology acceptance phenomenon (Fig.5).

- It has been observed that majority of the studies (total 8 out of 30) have examined physicians technology adoption in context of electronic health records followed by telemedicine technology (4 studies) and smart phones (2 studies).

These outcomes of the evaluation can be summed up as the physicians' technology acceptance as an outcome of technology imperative which is individual's technology acceptance in nature and has been examined by conducting micro level analysis.

Considering the information presented in Fig. 5, it could be clearly concluded that more than half of the studies

Figure 6: New Approach for Studying Physicians' Technology Adoption

that have studied physicians' technology acceptance have used the Technology Acceptance Model (TAM) or extended TAM model. The TAM model or extensions of TAM deals with technology imperative and study the impact of antecedents like perceived ease of use and perceived usefulness on attitude, behaviour intention, and actual use of the technology (Sun & Zhang, 2006).

DISCUSSIONS

The outcomes of the literature review have been evaluated by comparing with a previous study (Sun & Zhang, 2006) and proposed a new approach for examining physicians' technology adoption. The approach proposed in the present study suggests that the physicians' technology adoption phenomenon needs to be viewed as individual phenomenon. This phenomenon could be examined by considering emergent perspective and technology imperative and applying variance theory as a logical structure. The difference between new approach and approach adopted by Sun & Zhang (2006) is presented in Fig.4. The solid lines suggest new approach and dotted lines suggest approach proposed by Sun & Zhang (2006).

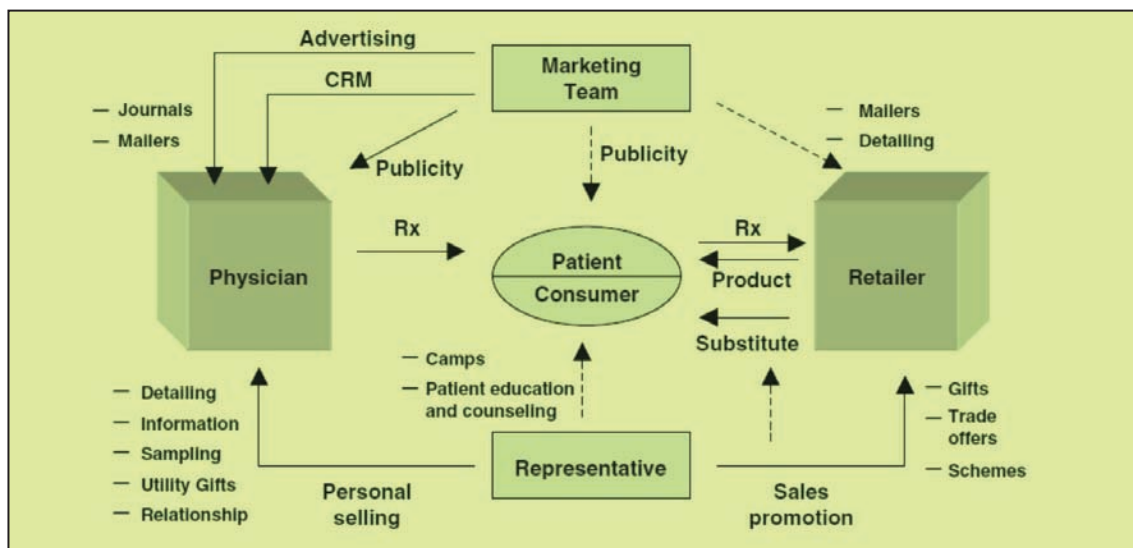
It could be observed from the review of scholarly articles conducted that TAM has been predominantly considered as a theoretical foundation for examining physicians' technology acceptance phenomenon. Further, the variance theory was predominantly used logical structure to examine physicians' technology adoption phenomenon. Markus & Robey (1988) mentioned that it was comparatively less robust when compared with process theory. They mentioned that it could be made stronger by incorporating constructs from process theories like innovation diffusion theory.

The outcomes also indicate that majority of the studies have considered the variance theory, that deals with the one way relationship between the antecedents and outcome. This approach has certain limitations related to predictability and generalisability (Markus & Robey, 1988) as the longitudinal studies conducted by previous research scholars had reported changing effect of antecedents (Venkatesh & Davis, 2000). These issues of generalisability and predictability may be addressed by blending process theories like innovation diffusion theories along with the existing theories (Markus & Robey, 1988).

Rogers (1983) defined 'adoption' as "a decision to make full use of an innovation as the best course of action, and conversely, rejection is a decision not to adopt an available innovation" and mentioned that the user acceptance needed to be studied as a decision making process where the features of technology influence the adoption decision of the individuals. Rogers (2003) reported that individuals having similar attributes like educational qualification who have "mutual subcultural language" are considered as "homophilous" individuals of a social system".

This approach can be adopted in context of physicians who have similar attributes like specialty and educational qualification and their adoption as a decision making phenomenon.

The technology acceptance model (TAM) and innovation diffusion theory (IDT) explain individual's decision making process involved in technology acceptance considering role of perceived beliefs and innovation characteristics in the user acceptance respectively. Further, these have been considered as the most influential models in comparison with a number of existing theoretical

Figure 7: Differences between Triangle and Pyramid Model (adopted from Parasuraman, 2000)**Figure 8: Pharmaceutical Marketing Process (Bhangale, 2008)**

adoption models because of their predictive power. The past literature (Markus & Robey, 1988; Sun & Zhang, 2006; Zhang, Guo & Chen, 2008) also reported that the technology imperative may be taken into consideration by incorporating innovation attributes (Innovation Diffusion Theory-IDT).

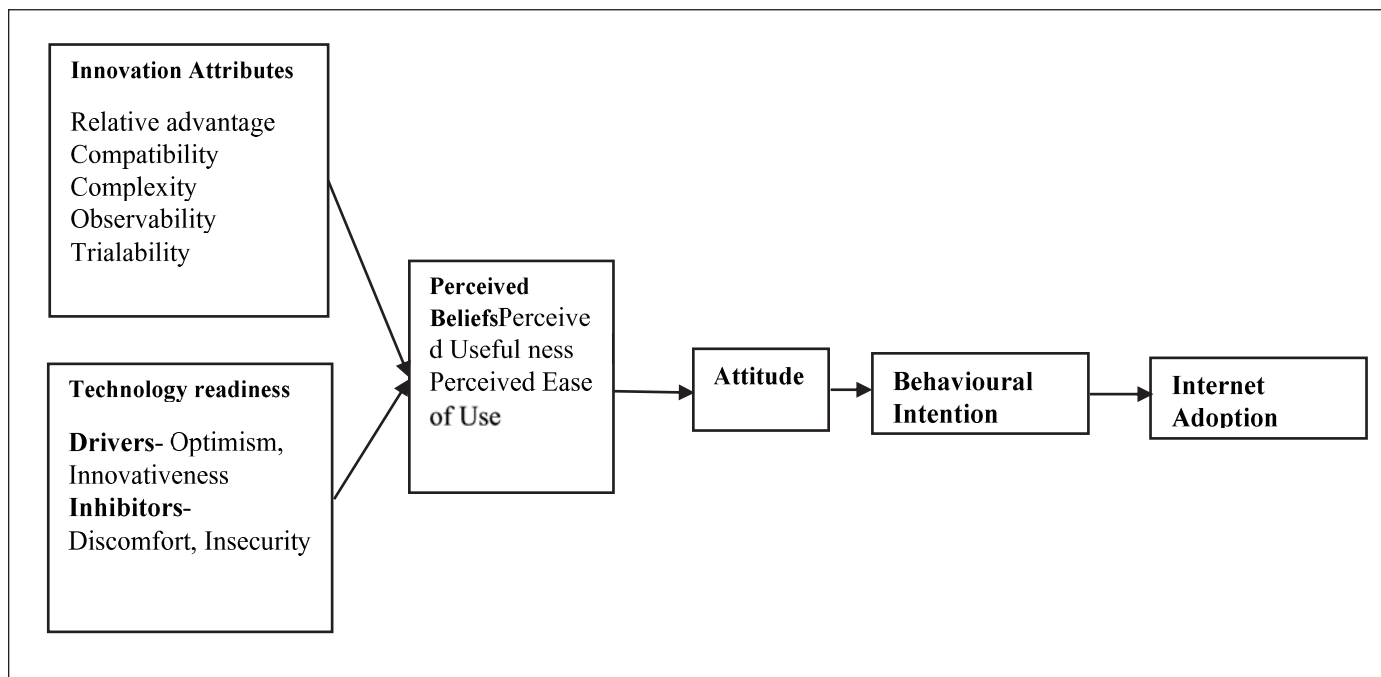
Therefore, considering these references the researcher derives first proposition in context of physicians' Internet adoption as:

Proposition-1

The physicians' Internet adoption can be viewed as a decision making phenomenon that gets influenced by features of the technology and outcome of interaction between the technology features and perceived beliefs of the individuals.

Parasuraman (2000) reported that marketing's traditional domain and structure has experienced a change because of introduction of technology that has brought sophistication in marketing and promotional methods. The fundamental ways of customer-company interactions have been transformed because of this sophistication in almost all sectors. The traditional pharmaceutical marketing process (Fig. 8) has been studied for better understanding.

According to Fig. 7, the triangle model has considered two key dimensions of marketing which are internal marketing and interactive marketing. The internal marketing views service personnel as 'internal customers' and prepare these internal customers through training, motivation and rewards for better service outcomes. The interactive marketing emphasizes on impression management related service encounters. These internal and interactive marketing formats proposed in the triangle model of

Figure 9: Diagrammatic Presentation of Propositions

marketing by Berry (1981) are involved in traditional pharmaceutical marketing process.

Parasuraman (1996) has reported about the limitations of triangle model as it does not capture the emerging role of technology. The pyramid model captures the emerging role of technology by considering considers technology-company, technology-employee and technology-customer links (Figure 7). Considering enhanced penetration of new into day to day life of individuals; Parasuraman (2000) has emphasized on two key links (technology-employee and technology- customer) of pyramid model. Parasuraman (2000) mentioned that these technologies causes both positive and negative feelings which are outcomes of paradoxes like “control/chaos, freedom/enslavement, new/obsolete, competence/incompetence, fulfills/creates needs, assimilation/isolation, engaging/disengaging and efficiency/inefficiency” (Mick and Fournier, 1998).

Parasuraman (2000) reported that attitudes and beliefs are good predictors of people’s propensity to accept and use a technology and the combination of positive-negative feelings trigger the acceptance or rejection of technology. Considering these feelings which form a hypothetical technology belief; an individual’s propensity to embrace the technology and use technology can be examined and individual’s technology readiness index can be calculated.

Parasuraman (2000) also reported that mental enablers and inhibitors form an overall state of mind that collectively determines an individual’s tendency to involve and use of new technology in home and at work. These factors are “optimism (a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives) and innovativeness (a tendency to be a technology pioneer and thought leader) are drivers of technology readiness and discomfort (a perceived lack of control over technology and a feeling of being overwhelmed by it) and insecurity (distrust of technology and skepticism about its ability to work properly)” act as inhibitors (Parasuraman, 2000).

The outcomes of the present literature review also indicate that majority of the studies have made efforts to identify antecedents of behaviour intention, attitude, and perception (perceived ease of use and perceived usefulness). This indicates that physician’s technology acceptance phenomenon is an outcome of physician’s attitude, perception, and behavioural intention towards the technology. Therefore the mental enablers and inhibitors proposed by Parasuraman (2000) can be used as antecedents that may impact individual’s perceptions (perceived usefulness and perceived ease of use). Considering these references a second proposition can be derived.

Proposition 2

Mental enablers (optimism, innovativeness) and inhibitors (discomfort and insecurity) form an overall state of mind of physicians that may collectively determine a physician's tendency to involve and use internet in home and/or at work may impact the physician's perceived beliefs i.e. perceived usefulness and perceived use.

Based on these two propositions, a logical framework can be proposed which examines the physicians' technology adoption in general and internet adoption in specific as a decision making and checks impacts of technology features and individual's propensity on the perceived beliefs attitudes and behavioural intentions (Fig. 9).

CONCLUSION

The outcomes of analysis of the literature suggest that physicians' technology adoption phenomenon is predominantly individual phenomenon and is examined by applying variance theory as a logical structure. The same methodology can be adopted to evaluating physicians' Internet adoption in Indian context. Also, the physicians' technology adoption phenomenon occurs because of the changes in technological environment, therefore the impact of technology specific factors are needed to be considered. The organisational imperative has not been reported as a causal agency as per as physicians' technology adoption is concerned. Hence it should not be considered for evaluating physicians' Internet adoption in Indian context. The emergent perspective deals with the purposes and settings. The acceptance of technology may occur because of profession specific purposes as well as the supportive settings. Therefore the present study suggests to consider the emergent perspective while examining physician's Internet adoption. The study also emphasizes that considering the nature of physicians' technology adoption phenomenon as explored by adopting Markus and Robey's causal structure, the complementary nature of TAM and IDT and role of individual's propensity elaborated in the second proposition may further be researched for developing a new integrated model.

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