SYNOPSIS FOR THE THESIS

Factors Influencing the Prescribing behavior of Medicines by Doctors: A Study on Anti-Allergic Drugs.

Doctoral Thesis Submitted

In partial fulfillment of the requirements for the award of the degree of

DOCTOR OF PHILOSOPHY

In

MANAGEMENT

By

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1.1 Introduction: The Indian Pharmaceutical Market (IPM) is the 3rd largest in the world in terms of volume and the 13th largest in terms of value. Currently, IPM is valued at about 20 billion USD and is expected to touch 100 billion USD by 2020 with a CAGR of 20%. Branded generic drugs are the ones that are bought by patients based on a prescription from the concerned physician and form 70–80% of the market. Considering that a prescribing physician can select from multiple alternative drugs with different prices, the prescribing behaviour of the physician plays a vital role in making healthcare affordable to the common man without compromising on the efficacy of the drug. It has been observed in practice that, besides product-related and company-related factors, which are influenced by the marketing efforts of the companies, personal factors of the prescribing physician also have an influence on the prescribing behaviour of the physicians. However, most of the research that has been done so far on prescribing behaviour has focused primarily on product-related factors. Besides, demographic factors like the profile of the patients also affect the prescribing behaviour. In view of this, it is proposed to take up research that focuses on a comprehensive range of factors, which include person-related aspects.

The Researcher has been working in sales and marketing roles in the pharmaceutical industry for the last 18 years and has first-hand experience in observing physicians' prescribing behaviour. He is keen to do in-depth research on this topic, which will help all the stakeholders like regulators, government agencies, industry, and as well as patients towards delivering value to the patient with improved access for all.

1.2. Research Motivation:

Most studies related to factors affecting physician's prescribing behavior have taken place in several countries, focusing on the influence of drug/product Quality, price, availability, promotional activities, the impact of detailing and quality of medical representative, and brand loyalty, as parameters.

However, apart from (Karagianni D et al, 2012) and (Alabbadi I et al, 2013) from Greece and Jordan to the best of the researcher's knowledge, limited attention has been devoted to studying internal factors constituting the physician, whose interaction with the external factors are enabling the physician's prescription behavior.

Hence initiating a research study, which decodes the physician's internal makeup and their interaction with the external factors, which lead to physician-specific prescription behavior, from an emerging

market country from the Asian subcontinent like India which is dominated by branded generics, with wise diversity in culture, will help in understanding and identifying the relationship among these influencing factors affecting the physician's prescribing behavior, when prescribing anti-allergic drugs, from specialist respiratory physicians comprising of ENTs and Chest Physician's taken, as an example in this study.

The output of this research will help policymakers towards taking appropriate measures, frame guidelines ad interventions for better environmental conditions, and educational interventions towards improving physicians' efficiency and effectiveness for their better diagnosis and treatment.

For marketers, the output will enable in crafting of physician-specific marketing initiatives right from communication, and engagements for a predictable physician's prescribing behavior in their promoted product favor, laying a foundation for Physician-patient centric care. The main goal of this proposed research work is to analyze the effect of factors like Physician professional factors, Product related factors, Product Promotion factors, and physicians' personalities on physician prescribing behavior in the Indian set-up.

1.3 Review of Literature:

How does a physician take a prescribing decision?

Clinicians' drug decision on medication falls under 3 groups (Varsha G et al., 2017). They're innovator drugs, branded generic drugs, and a generic version. Innovator medication is first discovered and developed by a pharmaceutical company. They're approved by the FDA by submitting a New Drug Application along with data regarding evidence of characteristics of preparation form, manufacturing, chemistry, stability, effectiveness, safety, labelling, and packaging. After the permission from FDA, the innovator company can only introduce this innovative new medication for a period of patent protection (about 20 times or as specified).

The brand-name drug is generally retailed at a high price to recover charges incurred in the invention and development of medications. The chosen channel for promoting innovative medications are clinicians and druggists.

As per, (Mahmoud MA et al., 2016), a branded drug medication has a greater influence, relative to generic drugs, on physicians in prescribing to patients. Physicians prefer to prescribe branded medicine to patients due to several reasons. This includes

a) Physician's clinical experience for a great amount of time.
b) Patient's financial position for affordability.
c) Trust between Patient and Physician

Ethical drug promotion in the country by a pharmaceutical organization is the way of promotion to physicians which comes under the strict preview of DCGI and the same can be undertaken by the promoter in various ways. They include

a) Detailing doctors by medical representatives.

b) Mailing brochures and literature to doctors or pharmacists.
c) Advertisement in health care journals.
d) Symposiums and Society Meetings
e) Clinical meetings & public relations campaigns.

(Bandi V et al, 2017) in the review indicated the essential factors under which a physician takes a prescribing decision toward curing the patient from a pathological condition. In this regard, the role of a physician is very dominant in India. Pharmaceutical companies operate through a dedicated, qualified, trained field force for serving the entire value chain partners comprising of Stockists towards ensuring brands supply, Chemists for ensuring brands availability towards physician's Prescription to the patient for the promoted brands aiming recovery, improvement in Quality of life and health of the patient.

Medical representatives (MRS) put effort into and try to influence the prescription pattern of physicians in favour of their promoted branded generics over the available alternatives with the help of scientific communication dissemination in various forms through their time-bound visits to physicians. (Avadhut AP, et al. 2014) their research indicated the physician's acceptance of technology-enabled product promotion through iPads over conventional promotion, this has helped the marketers with the physician's information (both Personal and Professional) enabling them to identify the physician's needs and come up with solutions at the fingertip. As a result of which the market has become highly fragmented and competitive.

The Organization of Pharmaceutical Producers of India (OPPI) has recognized the technological developments happening across the world and incorporated the Internet together with the well-liked medium of product promotion to physicians by Medical Representatives of the appointed organizations.

OPPI Code of Pharmaceutical Practices, 2012 has defined pharmaceutical promotion with the publication by the Organization of Pharmaceutical Producers of India, which mentions pharmaceutical promotion as, "any activity is undertaken, organized or sponsored by a member company which is directed at healthcare professionals to market their product with physicians endorsement, channel availability through all media, including the web and mobile SMS." this means that physician's technology acceptance phenomenon is an outcome of physician's attitude, perception, and behavioral intention towards the technology.

Drug Type	Agencies / Regulatory Apprivak FDA / DCGI	Clinical Studies CTRI	Composition Approval USP/BP/IP	Recommendations by Societies	Advocacy Groups	Pharmaceutical Companies
Innovator Drug Branded Generics	Approvals	Study registration	Dosage form details	Regional/ Zonal / National Conferences	Neutral bodies , work for Agencies	Manufacturing products as per Protocols / standards . Mantaining the product quality with certificate of analysis for release in to the Market for Patiets usage.
	Labelling	Study results display	Formulation details	Workshops on latest / practical learnings	Epidemiological studies	Promotion of exisitng Products and Introduction of new products focusing on Patientes benefits
	Packaging	Regulation of the study	Dosage form details	Consensus Development / Release	Current Practices / Recommendations	Promotion led by Mktg and Sales Team. Marketing team supporting sales team with materials, KOL connect. Working on suggestions received from KOLs and sales team.
	Efficacy		API standards	Updates in the chosen fields	Reglating the Standards	MR is the centre of Brand Promotion to the Physician by a Smart individual with regular visits discussing /updating physician for the promoted brand (its benefits) over alternatives for physician's prescription as suggested by Marketing team.
	Safety		Excepient details	Courses / Recongitions	Addressing grivences	Brand promotion through Detailing, Brochure, Samples, Compliments with Brand Names on them
	Adverse events Profile		Shelf life details	Collaborations with other societies	Patients and Physician's expectations	offering Personalized services, sponsoring for CMEs, Conferences, workshps
	Age of Use		SOP details	Collaboration with Industry on the Projects		Conducting disease screening, awareness initiatives alogn with the physicians.
	Monitoring for availability with standards with regular inspections.		Inter-action details	Setting up an interface for Physician-industry collaboration and Coordination.		Ensuring across the pharmacies at adequate level with a proper distribution channel and following to the OPPI code of conduct

Factors influencing the Physician's prescribing behavior:

Studies on factors influencing the physician's prescribing behavior were conducted by researchers across the world, both from developed and developing countries, as the dynamics are either different or continue to evolve in a changing regulatory environment, leading to an increase in healthcare costs for patients (insured or uninsured). Hence, for health and economic reasons, it is imperative to study the factors affecting the physician's prescribing behavior, which continues to change to influence their prescribing decision of a particular branded drug among available alternatives.

The pharmaceutical market is a complex system in which several stakeholders put their interests. Product diversities and geographical coverage push organizations to establish their strategy on an individual level (Dickov et al, 2011). At the time of the physician's prescription decision, contextual factors consisting of drug attributes, cost-benefit ratio, and Physician's habit Persistence (representing a set of circumstances or facts) are present during their prescribing process were also found to get modulate the level of uncertainty, in influencing their prescribing decision.

(Dickov et al, 2011) stated that the pharmaceutical market is a complex system in which several stakeholders put their interests. Product diversities and geographical coverage push organizations to establish their strategy on an individual level.

(Murshid et al,2016) indicated that at the time of the physician's prescription decision, contextual factors consisting of drug attributes, cost-benefit ratio, and Physician's habit Persistence (representing a set of circumstances or facts) that are present during the physician's prescription decision are found to modulate the level of uncertainty, may influence the physician's decision thereby explaining the theoretical linkages between marketing strategies of pharmaceutical firms, contextual factors and the decision of the physician regarding drug prescription.

(Luminița Michaela Ion) their research has indicated that physicians' suitable prescription is influenced by several factors that act on the decision to prescribe medication, such as drug characteristics (quality, price, and availability), the patient's state, the prescriber, and (Alvanzo, et al, 2003) further confirmed that physicians professional background and are often besieged with information, regulation, and suggestions for their prescribing decision

(Saroj Kr Datta et al, 2013) their research confirmed that pharmaceutical marketing is often more sales-driven than marketing-driven due to the more attention being paid to the execution parts of marketing, leading to a lack of market research exercises towards determining promoted brand identity and physicians' perception about the same towards their prescribing decision.

(Alabbadi I, et al, 2013) showed that physicians are always continuously exposed to various tools deployed by pharmaceutical organizations to get their brand prescribed to patients. Their research has shown that along with awareness of the price of the drug, patients caring nature towards meeting their expectations, and their personalities were also stated to have a statistically significant positive effect on physicians prescribing behaviour.

(Hansen et al, 2016) Their systemic review of the factors influencing successful prescription decisions by physicians confirmed that multiple factors were influencing prescribing behavior of physicians, such as external factors, coordination and collaboration among medical team members, line of reporting, and patient plus individual factors.

(Hailu et al, 2021) their research study from Ethiopian hospitals showed that nearly two-thirds (55.9%) of physicians demonstrated their influence on their prescribing behavior through promotion strategy, product strategy, place strategy, and price strategy adopted by pharmaceutical organizations in their drug prescription habits. The summary of studies along with details represented below in the table.

No	Tag	Title	Author & Year	Gist	Linkage to Research
1	Journal Research Article	Investigating the Factors Affecting Doctor's Prescribing Behavior in Jordan: Anti-Hypertensive Drugs as an Example European Journal of Social Sciences. Vol. 38 No 3 May 2013, 380 – 391.	Abulhaj. Abbasi I (2013)	Strong correlation confirming physician's prescribing behavior concerning factors.	Provided background for hypothesis on Physician's Prescribing behaviour.
2	Journal Research Article	*Conceptualization of branding: strategy based on the Indian pharma sector. International Journal of Pharmaceutical & Healthcare Marketing, Vol. 7 No. 2, 2013, 175-198,*	Nath Sanyal, S., Datta, S.K.& Banerjee AK, (2013).	Significant correlation confirming Physician's Prescription decision concerning elements of a brand in a branded generic from India.	The impact of emotional branding apart from a scientific understanding of the drug, in the presence of alternatives influencing the physician's Prescribing behaviour, needs to be assessed.
3	Journal	Moderating effects of	Mohsen Ali	Physicians'	The impact of

	Article	contextual factors on the relationship between pharmaceutical marketing strategies and physician prescription decision: A review. Tropical Journal of Pharmaceutical Research July 2016; 15 (7): 1559-1568	Murshid, Zurina Mohaidin & Goh Yen Nee, (2016)	Prescription behavior is influenced by marketing efforts in developing countries.	marketing efforts with contextual factors needs to be assessed in the physician's prescribing behaviour in the Indian context.
4	Systemic review	Factors Influencing Successful Prescribing by Intern Doctors: A Qualitative Systematic Review Pharmacy (Basel). 2017 Jun; (2): 32.2-9	Christina R, Hansen, Colin P Bradley & Laura J Sahm, (2016)	Significant correlation confirming physician's prescribing behavior is influenced by multiple factors	The existence & impact of educational interventions on physicians' Prescribing behavior needs to be probed in the Indian context.
5	Research Article	Social and behavioral theories and physician's prescription behavior. Sustainability, 12(8), 3379.	(Ahmed RR et al, 2020)	Research showed that marketing efforts, patient characteristics, drug characteristics, cost-benefit ratio, and physician persistence were, followed by trustworthiness.	Background to the study. physician's psychological and behavioral factors to comprehend the physician's decision to prescribe the drugs. questionnaire-based on literature research has been adopted as TPB, SR theory, and Persuasive theory did not consider personality in their model. Hence incorporating our study will share the dynamics of the prescription process.

The physician's personality is one of the factors influencing the prescribing decision, according to research from Jordan (Alabbadi I, et al., 2013). (Ahmed RR et al, 2020) the model explained the prescription behaviour among urban physicians and demonstrated that factors like marketing efforts,

patient characteristics, drug characteristics, cost-benefit ratio, and physician's persistence, are followed by trustworthiness.

About the physician's psychological and behavioral factors to comprehend the physician's decision to prescribe the drugs. However, the predictive control of TPB, SR theory, persuasive theory, social power theory, and agency model does not consider personality in their model.

Understanding the role and impact of each one of their personality traits in the presence of external factors with each other will help a lot towards a better understanding of physician's prescription behavior (Saroj Kr Datta et al., 2013) research from India demonstrated that emotional branding influences physician's prescribing decision apart from the scientific understanding of a drug.

Hence, Understanding and identifying the most influencing personality traits of the physician, eliciting feelings as well as other crucial aspects will enable better understanding with a significant correlation establishing the relationship between emotions and their relation to the physician's personality.

(Murshid et al, 2016) Their research study reaffirmed that the factors affecting the physician's prescription behavior expressed the need for further investigation on the extent of influence of contextual factors like drug attributes and physicians' persistent behavior towards the prescription choice of a drug. (Hansen et al, 2016) in their systemic review, confirmed the influence of multiple factors on physician prescribing behavior in a complex operating environment, and highlighted that apart from addressing the presumed knowledge gap of physicians, the research emphasized one need and deployment of educational interventions which are physician-specific and unique, derived from their natural make-up, of which personality is made up of. Understanding the role and impact of each one of their personality traits in the presence of external factors and their interplay with each other will help a lot towards a better understanding of physician's prescription behavior (Saroj Kr Datta et al., 2013) research from India demonstrated that emotional branding influences physician's prescribing decision apart from the scientific understanding of a drug.

(Hailu et al, 2021) 55.9% of Ethiopian physicians displayed to get influenced by promotion strategy, product strategy, place strategy, and price strategy adopted by pharmaceutical organizations in their drug prescription habits. However, measuring the impact and influence of individual pharmaceutical marketing mix strategies that influence physicians in taking a prescribing decision will enable the understanding of the role and impact of physician's makeup, which leads to the formation of behaviour followed by the habit of choosing a branded drug among alternatives available in the market.

Hence, Understanding and identifying the most influencing personality traits of the physician, eliciting feelings as well as other crucial aspects will enable better understanding with a significant correlation establishing the relationship between emotions and their relation to the physician's personality.

Literature reviewed-an overview: A detailed literature review was undertaken, to capture the contributions made to date, broadly covering the various aspects involved in the topic. The details of the literature review in terms of different sources of information like journals, articles, systemic reviews, meta-analyses, Ph.D. Theses, books, seminar proceedings, etc., are presented in the table below.

Summary of topic-wise literature survey						
No	**Broad Topic**	**The Type of Literature reviewed**				
		Research Articles	**Theses/ meta-analysis**	**Books / Seminar proceedings**	**Total**	**Relevant to topic**
1	Physician's Prescription behavior	72	8	02	82	25
2	Physician's Professional factors link to the prescription decision	35	04	01	40	28
3	Physician's Personality factor linking to Prescription behavior	33	02	01	36	26
4	Product-related and Product Promotion factors link Physician's prescription decisions.	71	5	2	78	36

1.4 Research Gaps :

A research gap is an interruption of the knowledge in the field of research of the chosen study. Every research project must attempt to fill in some piece of information missing in the literature. If gaps are not identified, the study cannot be considered novel research.

The gap refers to the area that has not yet been explored or is under-explored. The gap could be in terms of size, type, location of population, research method, data collection and/or analysis, or other research variables or conditions.

- The competition in the pharmaceutical market in India implies that practicing physicians are exposed constantly to various competing stimuli, thus regular, the study of factors affecting the prescribing behavior of physicians is essential for all stakeholders especially pharmaceutical marketers, this information can help policymakers to identify the measures needed to improve the effectiveness of health policy and consequently it can contribute towards a greater economic and clinical efficiency and effectiveness in Indian health care system.
- As most studies related to factors affecting physician's prescribing behavior have taken place in a limited number of countries, for example in the United States, the United Kingdom, Canada, Finland, Italy, Iran, Turkey, New Zealand, Malaysia, Singapore, Malaysia, Slovenia, Romania, Greece, Cyprus, Bangladesh, Pakistan, Ethiopia, Saudi Arabia, Jordon, conducting a study of this type in India among specialists- will help in understanding the factors that affect the physician's prescribing behavior and give more insights to a better understanding of the relationship and impact of these factors when prescribing anti-asthmatic drugs taken as an example.
- Understanding the role of a physician's personality traits with a valid instrument and its impact on prescribing decisions in the presence of other external factors, towards undertaking interventions or measures which can enable physicians with better decision making, improving the relationship and trust from patients and collaboration with all the stakeholders across the value chain.
- These factors can be further enhanced in the Indian context with a relatively sufficient targeted specialist physicians sample size with a clear geographic demarcation pertaining to practice, set-up along with the place of practice.

- Better understanding the level/ extent of physician-pharmaceutical company interactions and their impact on patient welfare, among Indian specialist physicians is challenging, and important, leading to optimal resource allocation to utilization and improving the healthcare access to more patients through rational prescribing behaviour habits from physicians.

1.5 Research Hypothesis:

The proposed study will test the following hypotheses. The base premise of these hypotheses is to understand and analyze the factors affecting the prescription behaviour of medicines by physicians in and around the Hyderabad region by taking anti-allergic drugs as an example.

3.4.1 Hypothesis formation for Physician's Professional Factors:

$H1.1_0$ = There is no influence of Physician's Professional factors on physicians prescribing behavior.

H1.1a = There is an influence of Physician's Professional factors on physicians prescribing behavior.

3.4.2 Hypothesis formation for Product-Related Factors:

$H2.1_0$ = There is no influence of Pharmaceutical Product related factors on Physician's prescribing behavior.

H2.1a = There is an influence of Pharmaceutical Product related factors on physicians' prescribing behavior.

3.4.3 Hypothesis formation for Product Promotion Factors:

$H2.1_0$ = There is no influence of Pharmaceutical Product Promotional factors on Physicians prescribing behavior.

H2.1a = There is an influence of Pharmaceutical Product Promotional factors on physicians' prescribing behavior.

3.4.4 Hypothesis formation for Physician's Personality Trait Factors:

$H4.1_0$ = There is no influence of the Physician's Personality trait component factors namely affiliation, Altruistic, commerce, Hedonism, power, recognition, science, security, or tradition, on Physicians prescribing behavior.

H4.1a = There is an influence of the Physician's Personality trait component factors namely affiliation, Altruistic, commerce, Hedonism, power, recognition, science, security, or tradition, on Physicians prescribing behavior.

1.6 Scope of the Research:

The Scope of the research study defines the borderlines within which the research study will be undertaken by engaging the respondents with their responses. Though the scope of the research is limited, the findings could be generalized,

- **Content wise scope**: The research study is limited to examining and identifying the most important factors influencing the prescribing behavior of medicines by specialist respiratory physicians.
- **Geographical Scope**: - The scope of the research study is limited to the inclusion of specialist respiratory physicians from the metro city of Hyderabad (in and around) followed by Warangal city and towns like Nizamabad and Karimnagar, all located in the state of Telangana state of India.
- **Scope in terms of the Nature of the Practice:** The research study has included specialist respiratory physicians comprising ENT and Chest, practicing in their clinics, government hospitals,

or in a corporate hospital with both types of treatment facilities namely Primary care and secondary care.

- **Gender-wise scope:** The research study has included both male and female, respiratory physicians from both ENT and Chest specialties from the metro city of Hyderabad followed by Warangal city and towns like Nizamabad and Karimnagar.
- **Sample-wise scope:** The research study has been conducted based on the responses received from the estimated sample size of 171 respondents comprising both male and female specialist respiratory physicians with various types of practice as described above from the chosen geographical boundaries.

1.7 Research Methodology:

The research design refers to how the experimenter, backed by a robust literature review, puts together a combination of multiple approaches and constituents of research in a logical manner and highlights the overall blueprint of the research. so that the result of the research problem is efficiently addressed.

It principally answers the question of "how" to conduct exploration using a particular methodology.

In relation to the present study, the concept of both descriptive and inferential research design has been used. As stated, the main objective of research design is to formulate the matter under investigation in a more précised form from an operational point of view, the present work also attempts to identify and formulate the subject matter under study more precisely.

The study also attempts to find out and manifest the correlation between physician's prescribing behaviour/ component factors influencing the physicians.

The present study has espoused a check exploration design as it's an effective approach to collecting information from many individuals (Bernard & Bernard, 2013). In this method, the data is collected from a sample, and through the process of conception, it's related to a much broader section of the population

(Warwick & Lininger, 1975). With physician's prescribing decision is a complex process with multiple stakeholders playing their roles and various factors influencing physicians to take a prescribing decision. Most of the earlier studies conducted by various researchers toward understanding the factors influencing the physician's prescribing decision have adopted a questionnaire-based approach.

(Karagianni D et al, 2012); Alabbadi et al,2013) and have made useful contributions to the knowledge of the factors affecting the physician's prescribing behaviour, especially on the role of the Physician's Personality.

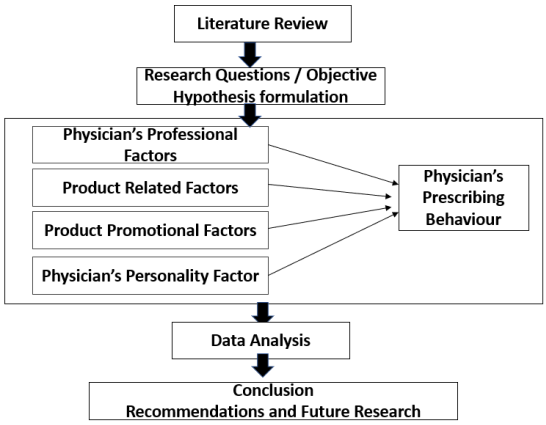
To date, a few theoretical models have been employed in prescription research, like attitude-behavior models like the Reasoned Action Theory and the Planned Behaviour Theory.

(Godin et al,2008) reported that the theory of TPB has some drawbacks and (Lee HJ et al, 2015) indicated that the TPB model does not take the emotional approach into consideration. As a result

(Conner et al,1998) suggested the incorporation of emotional variables as a valuable approach to modifying behavioral theories.

Hence a validated personality instrument has been integrated as a part of the quantitative approach which has been validated by the descriptive approach. Statistical tools, techniques, and scales were employed on the collected data towards drawing conclusions along with the significance of the findings.

The present study attempts to study both the internal and external factors influencing physician's prescription decisions as shown in figure.



(Figure 3.6) Conceptual Model Framework :
adopted from Abulhaj et al(2013) European Journal of Social Sciences, 38(3), 380-391.

1.8 Research Data Analysis: The Chapter begins with the test of consistency and reliability from the responses obtained through a questionnaire with the help of Cronbach`s alpha. Towards achieving the objectives of the study, data analysis was performed on the data after coding and cleaning. Suitable statistical tools were used to facilitate examining, transforming, and analyzing the data. One of the aims of conducting data analysis was to provide both descriptive and inferential statistical analysis of the data, thus transforming the data to make it possible to obtain quantifiable, objective, and easy-to-interpret results.

As a part of the descriptive statistical analysis, the central tendency and variation of the data were analyzed with KMO, and Bartlett's test of sphericity was performed for testing the variance proportion followed by factor analysis to reduce the number of variables that best explain the maximum variance for data reliability. Inferential statistical analysis was performed to validate the model fitness by performing regression analysis (ANOVA) and t-Test for hypothesis testing by using SPSS 21 Version, which has been conducted individually with all the factors with an objective towards identification of the effective or ideal components forming the factors that are individually affecting the physician's prescribing behavior.

This was followed by the formation of a single aggregate of factors (corresponding to the physician's professional factors, product-related factors, product promotional factors, and physician's personality traits) along with their impact on the physician's prescribing behaviour decision.

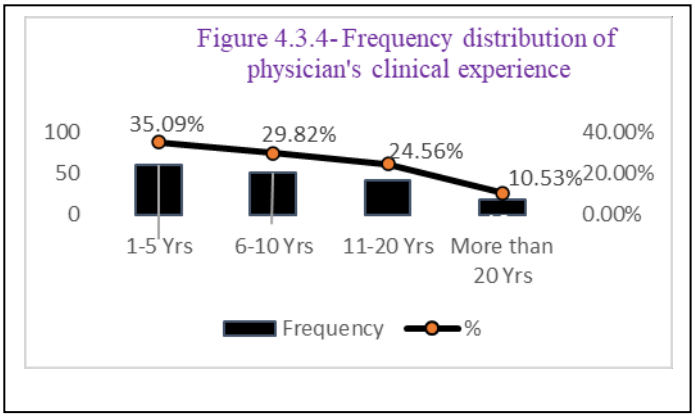


Figure 4.3.4- Frequency distribution of physician's clinical experience
100
50
0
35.09%
29.82%
24.56%
10.53%
40.00%
20.00%
0.00%
1-5 Yrs
6-10 Yrs
11-20 Yrs
More than 20 Yrs
Frequency
%

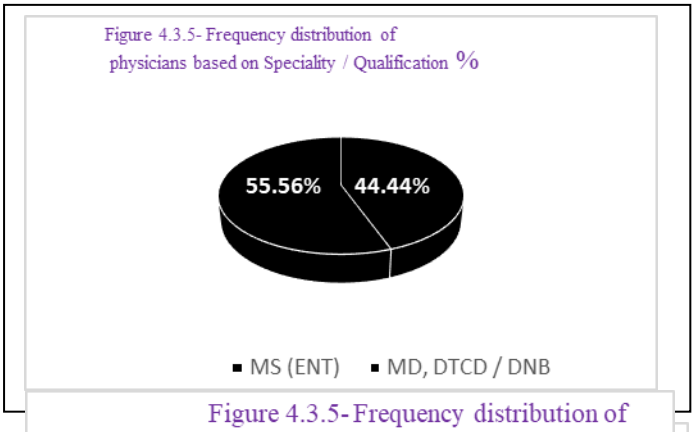


Figure 4.3.5- Frequency distribution of physicians based on Speciality / Qualification %
55.56%
44.44%
MS (ENT)
MD, DTCD / DNB

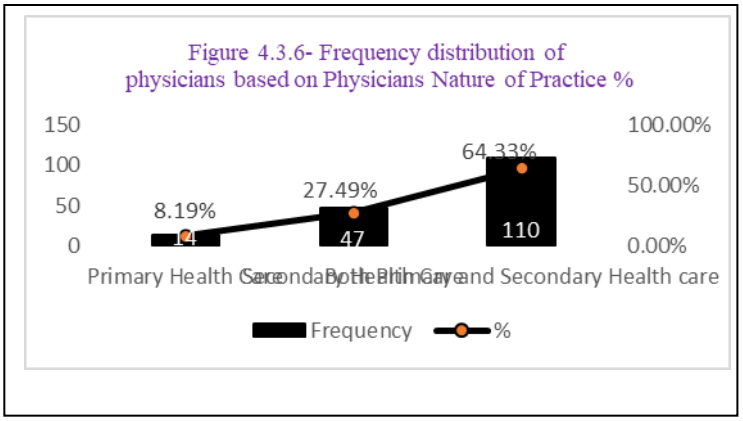
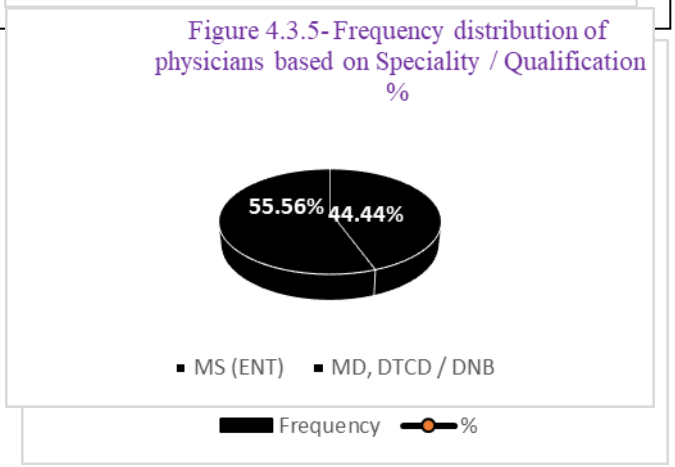


Figure 4.3.6- Frequency distribution of physicians based on Physicians Nature of Practice %
150
100
50
0
8.19%
27.49%
64.33%
14
47
110
100.00%
50.00%
0.00%
Primary Health Care
Secondary Health Care
Primary and Secondary Health care
Frequency
%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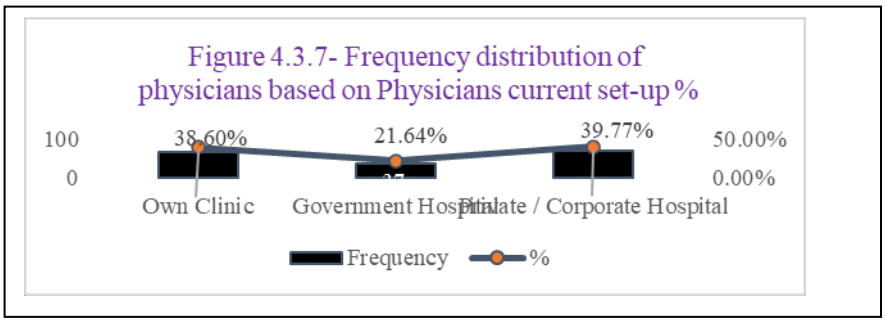


Figure 4.3.7- Frequency distribution of physicians based on Physicians current set-up %
100
0
38.60%
21.64%
39.77%
50.00%
0.00%
Own Clinic
Government Hospital
Private / Corporate Hospital
Frequency
%

As shown below, coefficient determinants of *R*, *R*2, and R2 – Adj were shown. In model 1, after entering all independent variables, R is equal to 0.701 which describes a relationship between independent variables and dependent variables. R square is equal to 0.491, this is reflecting that 49.1% percent of changes in the dependent variable (as Physicians Prescription) is being described by these independent variables namely physician's professional factors, Pharmaceutical Product related factors, pharmaceutical product Promotion factors, and Physician's personality.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701	.49	.452	.56288

The model has demonstrated a large effect size, which is in line with guidelines for social/behavioral sciences in interpreting by Cohen (1992) and Jacob Cohen, in his 1988 text, Statistical power analysis for the behavioral sciences (2nd ed.).

1.9 Findings of the Research: On the basis, of the research undertaken and the data analysis performed in the previous chapter, the following findings have been recorded.

- ✓ Our conceptual model has described 49.1% changes in the dependent variable (a physician's prescription) as being described by these independent variables, namely the physician's professional factors, pharmaceutical product-related factors, pharmaceutical product promotion factors, and the physician's personality. The model has demonstrated a large effect size, which is in line with guidelines for social and behavioral sciences interpreted by Cohen (1992) and Jacob Cohen, in his 1988 text, Statistical power analysis for the behavioral sciences (2nd ed.).
- ✓ There was a significant impact of the physician's professional factors on their prescribing decision. The components comprising the factor include.
- ✓ physician's level of education, clinical experience, and colleague's experience in choosing the ideal evidence-based therapeutic solution, that best meets the patient's requirements.

o This is possible with a physician's desire for continuous improvement and know-how from his qualification, followed by their clinical experience using either the brand containing the active ingredient in an ideal dosage form or interaction with colleagues as a part of knowledge or clinical experience sharing.

- ✓ There was a significant impact of product-related factors on their prescribing decision. The components comprising the factor include,
- ✓ Safety, efficacy, and dosage superiority of the drug, followed by the cost of the drug to the patient, along with the patient's expectations, were found to influence the physician's prescribing behavior.
- ✓ A physician prescribes branded drugs as they offer the promise of safety, and affordability over existing alternative brands that guarantee patient adherence and compliance leading to patient recovery.
- ✓ There was no impact of product promotion factors, although there was a trend that could not reach a significant level. Product promotional factors included are,

- The medical representative’s relationship and frequency of visits with the physician are important for promoting the branded drug.
- Brand promotion, represented by the organization's literature and brochures, aims to increase the share of voice for the brand, followed by engagement through conference sponsorship for gaining knowledge in the field, towards implementing in their clinical practice for their patient benefit with aim of increase in prescriptions support for the sponsored company brands.
- Product promotional tools like Brand Samples and gifts with the brand name printed on them being presented to the physician showed a trend but could not reach a statistically significant level.

  - Hence, to conclude, product promotional factors are not influencing physicians' prescribing decisions.
  - This can be attributed to the fact that, most of the therapeutic options available in the form of branded drugs are being promoted by various organizations, that either lack innovation in the dosage form or fail to create a different perception, which is the outcome of marketing efforts led by a dedicated sales team. As a result, physicians tend to assume "that the marketed branded drugs are similar.".
  - Hence, the pharmaceutical organization should aim with consistent medico-marketing efforts, at regular intervals, towards creating a strong brand perception, with year-long medico-marketing initiatives in place which revolve around the disease, for whose management, the lead brand is created.

  There was a significant impact of three personality traits of a physician which influence them taking a prescribing decision of a brand over the available alternative brands. The traits include,

  - Altruistic trait, commerce trait, and security trait.
  - Physicians' altruistic nature is owing to their patient care, helping nature towards building trust among each other for better disease management. Also, because of the physician's friendly nature with the patient, the patient even opts for word-of-mouth publicity for the physician among relatives/colleagues/community, and society at large, leading to an increase in footfall for the physician's consultations and an improvement in practice.
  - Physicians' business nature is found to influence their prescribing decisions in their clinical practice.
    - This is because life is full of uncertainties. As a result, most physicians wish to be secure with respect to their monthly remuneration, either earned through private practice or through consultation charges from a corporate hospital, within the limits of the law.
    - This will ensure physicians maintain their self-esteem, and secure lifestyle with dignity, respect, and honor in society.
  - As physicians learn more about self-awareness, they are found to be more serious about their profession and tend to spend more time delivering services to their patients meeting their expectations. As a result, physicians spend a limited amount of time with family and avoid going on vacation as it may affect their clinical practice.

- The above findings are important because most of the brands in this segment are assumed to be similar by physicians, thereby, physicians have ample options to choose from based on their professional requirements and patients' status along with their expectations.
- Physician's helping nature of recommending the best available treatment, based on patients' expectations for their recovery reflects their inherent values and ethics, which are being followed towards exercising their professional duties in their clinical practice either from their own clinic or working for a hospital.

The service rendered by the physician comes at a price to the patient as the former needs to take care of personal needs with respect to security purposes and financial needs in the case of running an establishment, which falls under commerce purpose.

Although the human element is involved while performing the service, there is a presence of a financial element that acts as a source of motivation in the form of gain, which is expected in terms of profit either from patient's service charges or from the dispensed medicine charges, apart from the extra financial incentives offered by pharmaceutical organizations towards prescribing and dispensing of their brand to meet their operational expenses in their clinical practice and personal expenditure, in leading a standard and respectful life in the society.

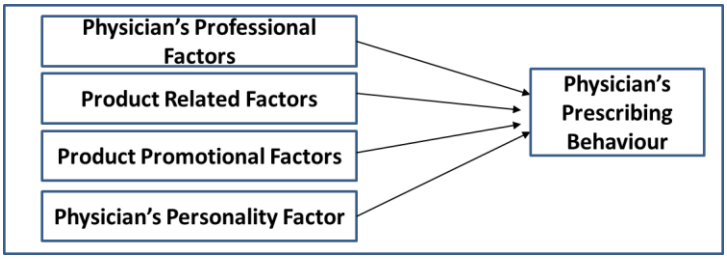
The presence of these three traits in physicians. reflects the pseudo-altruistic theory. Though gain/profit is essential for a physician's survival, there should be a balance between the gains obtained from services vs external gains. Efforts should be made by all the stakeholders involved in the entire value chain including the pharmaceutical organizations towards promoting trust, thereby laying a strong foundation for physician-patient-centric disease management and improving the standards of the healthcare ecosystem.

1.10 Conclusions from the Research：

This research study has several important conclusions. From a theoretical perspective, the present study provides an important empirical step toward understanding the factors influencing a physician's prescribing decision.

As previously stated, the literature in this area has mainly focused on the impact of external factors on physicians' prescribing decisions. As everyone is not created the same, the same applies to physicians, as each of them is created unique. This makes understanding the role and impact of a physician's personality traits around the entire dynamics of a physician's prescribing decision not a simple one as perceived earlier thereby leaving the GAP around these complexities unanswered, although attempts are being made.

The study shows an empirical analysis of the integral factors that are important determinants of a physician's prescribing decision. The analysis consists of a comprehensive mix of all the factors, including the components of a physician's personality traits, that are influencing physicians to make a prescribing decision for a particular brand among the available options in the presence of both external and internal environmental factors, as shown in our research model as shown below.



The validated model includes both internal and external factors of physicians' prescribing decisions (as shown above figure). The findings of our research can be adopted among specialist physicians, managing a chronic condition.

The findings of this research bring out the significance of various factors especially components of a physician's personality whose effect on a physician's prescribing decision was not tested before.

The model used in this study could be used as a starting point for models to include various other factors that have not been tested or evaluated before. Hence, the present study adds to the domain of physicians' prescribing behaviour research.

1.11 Research Contributions: In the present study, however, based on the literature review, relevant factors were identified and subjected to their assessment among respiratory specialist physicians, comprising ENTs and chest physicians, in and around Hyderabad, India.

The reason for selecting specialists is due to their inclination towards adopting newer / modified branded dosage forms, thereby setting a trend for other specialists like consultant physicians (CP) and general practitioners (GP) to follow, in their prescription protocol while managing a chronic patient with a similar clinical condition in their practice.

At the same time, in addition to the impact of external factors on their prescription decision, factors internal to the physician were also assessed on their prescription decision as every physician is unique by their nature. Some of the findings of the present study showed newer insights/deviations from the proven impacts of earlier studies. New aspects that were not tested and studied previously have also been identified in this study as shown below in the table.

Factor	Description of the statement	Previous studies finding	Our study findings	Contribution to literature
No-1	Influence of physician's professional factors on the physician's Prescribing behaviour	Yes	Yes	Collaboration with the team, learning from own clinical experience or from experts for improving precision in practicing medicine.
No-2	Influence of pharmaceutical product	Yes	Yes	Emphasized the importance of Product

	related factors the physician's Prescribing behaviour			related factors, considered for prescribing behaviour.
No-3	Influence of pharmaceutical product Promotional factors on the physician's Prescribing behaviour	Developed world -Yes Developing world- NO	No	Although previous Indian studies have shown the positive impact of product Promotional factors, however, our study clearly emphasized the important elements constituting the product promotional factor and confirmed although a trend was seen towards influencing but could not reach out to a significant level. This shows compliance of finding to that of the findings from the other developing countries.

(Mamas Theodorou et al.,2009) their survey conducted in Cyprus and Greece confirmed that in addition to physicians' attitudes, the clinical effectiveness of drugs forms one of the most important factors for consideration among physicians for prescribing a drug to patients.

Physicians know from their clinical experience that the old drugs are not always inferior in terms of clinical effectiveness to the latest ones, which may be priced higher for creating s superior perception among physicians. (Fickweiler F et al., 2017) in their systemic review comprising 49 studies investigated the effect of physicians' interaction with the pharmaceutical industry and their impact on physicians' attitudes and prescribing habits.

The interaction between physicians and professional sales representatives, representing the pharmaceutical industry was found to be significantly higher among junior residents, with offerings ranging from promotional material, invitations for dinners and CMEs, free access to journals, and Physician samples. Physicians mostly at the junior level perceived Professional Sales Representatives as their important sources of education through their CME events in comparison to their senior counterparts.

However, most studies have shown that physicians don't believe that PSR interactions impact their prescribing behavior. The review further confirmed that there was a strong correlation between the number of gifts and the belief that PSR interactions did not influence their prescribing behavior. Concerning the impact of various types of gifts like conferences and symposiums, physician's samples, anatomical models, studies, and sponsorship to conference travel confirmed that physicians considered themselves immune to the influence of gifts and insisted there was no impact on their prescribing behavior.

(Sharifnia SHA et al.,2018) their study conducted on Iranian physicians found that environmental factors and pharmaceutical advertising have no effects on physicians' prescription behavior, while the product characteristics, patient's condition, and insurance coverage majorly affect the prescription.

(Mohsen Ali Murshid et al.,2017) conducted a systematic review of the prescription decision in developed Vs developing countries and studied the influence of medical representatives and promotional tools on physicians' prescribing decisions has found that the influence of promotion tools on prescribing varied in developed countries.

Five studies found a positive influence, whereas four studies reported a small effect and one study found a negative influence. In developing countries, the size of the effect also varied, five studies found a positive influence of Promotion tools on drug prescribing behavior, five studies found a negligible or small effect, and one study found no association.

The marked differences that were observed between developed countries and developing countries concerning the effectiveness of medical representatives. In developed countries, they are valued as a reliable source of information by physicians, whereas they are found to be less reliable in developing countries. Sample drugs are more generally seen as an important promotional tool for prescribing in developed countries than in developing countries.

1.12 Contribution for Researchers: The findings of this research bring out the significance of various factors, especially components of a physician's personality, whose effect on a physician's prescribing decision has not been tested before. The model used in this study could be used as a starting point for models that include various other factors that have not been tested or evaluated before.

Components of a physician's personality traits that are influencing physicians in their prescribing decision for a particular brand among the available options, in the presence of both external and internal environmental factors. The findings are employable among specialist physicians treating chronic conditions and contribute to a better understanding of physician prescribing dynamics in the studied segment.

Hence, the present study adds to the ongoing research on physicians' prescribing behavior. It would be possible to apply this model to a greater number of specialist physicians, for a clear-cut understanding of the dynamics explaining the physician's prescribing behavior.

This present study contributes to the study of the factors affecting the physician's prescription behavior belonging to a similar specialty.

Contribution to regulatory bodies: The model developed in this study can be used for assessing the impact of both external and internal factors on physicians' prescription of medicines thereby promoting better healthcare practices that are in line with policies governing the healthcare ecosystem. The model contributes vital inputs to be included towards formulating guidelines for their strict adherence by all the stakeholders, namely physicians, and pharmaceutical organizations for developing a pharmaceutical code of conduct toward deployment of better promotional tools aiming for the best patient care and healthcare practices aiming better standard of care to the patients. Some of the suggestions include,

- Although every drug is being analyzed internally for its quality standards Vs the specifications and released by regulatory authorities, the same either should be validated at regional drug Research and analysis labs, for ensuring quality standards or getting the internal analysis done by the organization being endorsed for the drug release into the market. This will make the system vibrant and will curb the circulation of sub-standard drugs and spurious drugs getting introduced into the market.

- The organizations should undergo audits yearly by the expert committee (members from DCGI / CDSCO/ Regional drug research lab) towards validation and validity of process or procedures adherence internally by the organization.
- DCGI in co-ordination with NIPERs, should initiate courses in all the domains constituting the drug manufacturing process, validation, and analysis, for all the fresh employees of the organizations with certification, valid for a definite time frame (Approximately 3 years) which needs to be renewed by clearing the examination which focuses on the required knowledge. This will enable the organization to retain skilled employees, which will be in line with the current industry practices.
- This will bring the industry working professionals to further work on their identified areas of expertise and areas of improvement, which calls for attention, which can be acquired by enrolling through the developmental programs conducted by NIPER'S across the nation in a phygitel model (combination of both physical and digital mode) and getting certified for the same after completion with a validity period of min 2-3 years, post which renewal should be undertaken, as a continuous improvement process.
- This will bring consistency in the practices across all the organizations and will help in developing a system that will be vibrant with an assurance of quality standards being adhered towards delivering value to the patient.

Contributions for academic institutions, Physicians, and Pharmaceutical Organizations: The theoretical aspects and literature review covered in this research facilitated the construction of this framework model comprising factors impacting physicians' prescribing decisions. This model incorporated both internal and external factors that a prospective marketer deals with, at the time of the physician's prescription choice of a brand, promoted by the marketer over other existing brand options. Towards achieving this, we propose the creation of an apex body, bringing all the functions together, right from drug manufacturing to all stakeholders involved in the value chain(sales, marketing) and finally physicians.

Contribution to physicians: The model can be used to assess physicians' motivation and confidence levels, right at the time the beginning of their carrier and can yield a useful result, for initiating a successful clinical journey by adopting practices like their own clinic, joining a corporate hospital, and Joining government services.

- Through personality assessment, physicians can identify the extent of their preparedness, and interventions along with the action plan, for adoption, which coincides with their area of interest, offering better and distinguished care for patients and prosperity for all.
- As physicians come under the purview of the medical council present nationally with their affiliates across all the states, MCI can play an important role in developing, and conducting physician-centric training initiatives or certification courses led by experts in their domains, which are practically led by evidence and clinically relevant interventions based, comprising of latest updates/ techniques, for implementing in their clinical practice for patients' recovery and benefit.

The same can be concluded with a certification along with a validity period, post which, physicians irrespective of specialties should appear for their renewal exam to continue their clinical practice.

- This process will enable in setting up of a unified and standard clinical practice protocol among physicians leading to better collaboration of patient management with improvement in QoL.

Contribution to pharmaceutical organizations: For pharmaceutical marketers, the model can unleash the factors that are affecting physicians' prescribing decisions based on which the Physicians can be segmented, targeted with appropriate positioning of the brand vs competition, and improve the precision of employing the right marketing mix.

This will lead to optimal utilization of the available resources and will lead to the development of an efficient marketing mix for a greater influence on physicians prescribing the promoted brand over the other available brands in this competitive environment.

To realize the marketer's potential, we propose setting up an apex body comprising experts in this field, towards standardizing marketing practices across the industry, with the help of conducting various initiatives in collaboration with experts from the industry, institutes, or agencies.

The proposed apex body of marketing excellence can calendarize various types of marketing development programs based on experience. This will enable the marketers from various organizations to enroll and attend to apply the learnings (which are also a part of their improvement key performance indicators) towards brand building.

We propose marketing licensing/Renewing examination for all pharmaceutical marketers based on their experience once in 3 years towards reaffirming their standards and working on areas of identified improvement areas, as discussed above. This will motivate the marketer to deliver their best for creating assets towards building an organization.

Finally, we propose, that the above certification should be made mandatory for all individuals aspiring to undertake marketing as their career. The time of eligibility can be either during the final year of B. Pharmacy, Pharm D, and MBA final year students, for their proactive planning.

1.13 Limitations of the Research

- The study has been conducted with physicians responding to self-reporting questionnaires for the survey. The respondents' replies might have included some biases.
- The study involved a specialist respiratory physician in and around Hyderabad who manages chronic conditions that call for treatment for a longer duration. Hence, the application of the model to acute conditions may demonstrate different results.

- Physicians of the study involved physicians of both genders, practicing in their own clinics or a hospital, working in the government hospital/medical college, working in the corporate hospital or in a private medical college, in and around Hyderabad was part of the study.
- Our research is the collection of responses from 171 respiratory physicians.

1.14 Scope of future work :

The scope of research has always been the guiding force in establishing the boundaries within which the process of meeting the objectives of the research is to be exercised. Though the research has been taken among specialists treating a chronic condition, the findings can be generalized to other super specialists operating in the chronic segment.

Following are some of the important points describing the scope of the research undertaken.

- The present research was conducted to assess the impact of various external factors and factors internal to the physician, on prescribing behaviour. The factors were the result of a literature review.

However, there is scope for further research. Some of the related segments, in which future research could be conducted are mentioned below.

- The study has involved respiratory specialist physicians, whose treatment will be for a longer duration of time owing to the chronicity of the condition. A similar study can be undertaken with physicians who manage acute illness with the goal of validating our proposed model and arriving at a comprehensive model, explaining the physician's prescribing behaviour across the geographies.
    - The study was undertaken involving respiratory physicians in and around Hyderabad. Similar studies across geographies, like across state capitals or Tier 1 cities can further enhance or identify the factors influencing the physician's prescribing behaviour. This could be a welcome addition to the literature towards arriving at the comprehensive model, that best explains the factors influencing physician's prescribing behaviour.
- As Human decisions are subconscious in nature and even develop over a period, the same holds true for physicians for selecting a drug over the existing alternatives, as promoted by MRS of various organizations, with an aim to get a prescription for their product. However, physicians' prescribing decision often tends to be involuntary and are conditioned into a specific form, right from their graduating days, leading to the formation of behaviour which indicates the presence of cognitive element in the entire dynamics of their decisions. Hence we propose to conduct research by pharmaceutical organizations or agencies, on the elements corresponding to neuroeconomics and its implications for prescription generation from physicians.

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