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NEW TYPOLOGY OF ONLINE SCIENTIFIC RESEARCH AND MULTIDISCIPLINARITY

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Abstract. *he well-known www (world wide web) or Internet and the history of education and research specific flows in the academic universe, multidisciplinary and online research interactions are the most important topics for this paper. After a brief interrogative introduction, a conceptual section follows and defines the Internet and online research paradigm, together with a brief conceptualization of multidisciplinary. Some usual classical types and the modern typology of the scientific research are generally confronted, inside the second and the third major sections. A brief example based on crowd research and some final remarks underline the future of online scientific research, concluding this article, as a paper designed to open the workshop entitled ARFYT VII.*

Keywords: *online research, classical research, Internet, WorldWideWeb (www), research network, online methods, online techniques, software, typology of online research, crowd research.*

1. INTRODUCTION

This paper about the typology of online scientific research and multidisciplinary becomes possible because of the (pre)existence of the Internet, used not only as scientific research and academic education net but also as the new language of modern communication. An investigative approach is based on a fundamental beginning question.

What the Internet and online research really are? Some characteristics of the modern Internet, “*such as immediacy, immateriality, relatively free and uncontrolled flow of communication*” [1] are very important to understand the importance of the new typology of online scientific research and the impact of multidisciplinary. An extensive list of equally important questions anticipates and outlines the contents of this first article of ESMSJ [9 (2)].

From all these questions, the authors selected only a few of them intense associated and derived each from the other. How does the Internet change the sense of online research and what online research really means? What is the content of the concepts of trans- inter-, cross- and multidisciplinary? What are the main techniques, methods, and types of online research? Can qualitative, quantitative, or mixed online research be continuously improved? How intense, decisive, or significant is the influence of multidisciplinary for contemporary online research? What are the real prospective or most possible anticipations for

permanent and prodigious online research? Can online research survive and coexist with the development of technologies like the Internet of things, AI, robots, and with the complex multidisciplinary?

2. INTERNET AND TRANS-, INTER-, CROSS-, AND MULTIDISCIPLINARITY

If oneself intention is to describe the meaning of the Internet, one can substitute this word, somehow in a limited way only, with the acronym of WorldWideWeb (www or W3), a “*wide-area or hypermedia information retrieval initiative aiming to give general access to a large universe of documents.*” [2]

The modern Internet (www or W3), was invented in 1990 by a British scientist, named Tim Berners-Lee, working at CERN in Switzerland an acronym for an European project that kicked off in 1953, still alive and including 22 member states even nowadays [2-4, 6-8]. Tim Berners-Lee has written three proposals of his invention, the first one in March 1989, the second one in May 1990, and the final proposal in November 1990. Only after the third proposal written together with Belgian systems engineer Robert Cailliau, the Internet became a solved management problem [4].

Any kind of the Internet history must be revealed probably like the Internet itself, not only confusing as its real sources are but also overwhelming as impact. Nikola Tesla, in the 1900s, was the first scientist who believed “*world wireless system*” be possible and imagined this virtual world, and Licklider (well-known as Lick in computer scientists universe at MIT) became the man who has extended or inference this idea as Intergalactic Computer Network, after six decades, in the 1960s. In 1972, ARPAnet (Advanced Research Projects Agency Network - created and funded by the US Department of Defense) has invented the electronic mail, and the computer scientists Robert Kahn and Vint Cerf put together blueprints for the first Internet protocol [3]. The Internet original purposes have been employed first by physicists and after that by the social work professionals, especially those in academic settings and professional associations from universities to economic companies, and even from scientific, to art groups [1-2].

The Internet is often described as “*organized chaos.*” One can use a simple figure (Fig. no. 1),

placing inside it one subordinate descendant line to describe finally two major academic flows of words revealing the synthesis of the real history of the Internet in-between education and research.

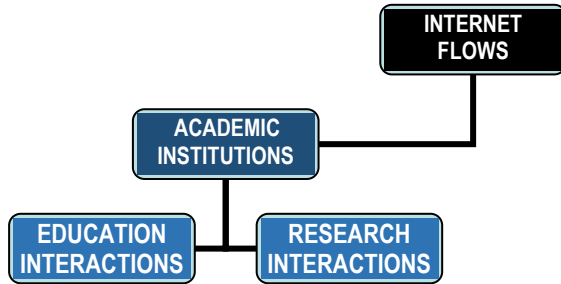


Fig. 1. Two major flows of Internet in universities

The real Internet history traced linkage among the different areas of communication, from academic to military sectors, from engineering actions to online social interactions, from theory in education to practice in research domains [5]. The present use of the Internet is nothing like the original notion anticipated by his creative designers Tim Berners-Lee and Robert Cailliau because the extended evolution of education and research flows in a different manner, comparing with the vast array of the commercial sector. New word *online* in dictionary meaning is similarly extended from technical source as “available through a system and especially a computer or telecommunications system (Internet)” to more general significations like *connected to, served by or even start to be used or becomes available* [9]. History of all these concepts means the same old things: change and adapt. Internet facilitates and resize better the dimension and importance of trans-, inter-, cross-, and multidisciplinary. Internet becomes a place of reunion for all these specific educational and research attitudes.

The terms trans-, inter-, and multidisciplinary have a common origin, as revealed in the education and research also, from the conceptualization of the discipline and science [10-14]. “*Transdisciplinarity appears along with disciplines or sciences, and sometimes even over them, being considered a superior form of interdisciplinarity.*” [10].

“*Interdisciplinarity designates newly established relationships between several disciplines and, beyond its aim, nuanced and diversified, compared to unidisciplinarity, be it open, it involves phenomena, concepts, and general laws that are common to several disciplines*” [11].

Crossdisciplinarity investigates phenomena from different sciences based on common methods and even common models, it analyses and highlights, in a varied context, multifaceted issues and diverse opportunities for knowledge of different sections of reality using the same investigative methodology [12]. “*Multidisciplinarity involves continuous and simultaneous application of the thinking of several sciences, and also involves the study and research*

of a domain of reality being achieved from several angles, descended from the multiplied thinking of several sciences simultaneously. Both the researcher and the researched area or the area of reality under multidisciplinary scrutiny will ultimately be richer, depending on the outcome of the research.” [11]

“*Multidisciplinarity can exist in double forms like simple and complex multidisciplinary. Both forms do not mean mere juxtaposition or coexistence of several disciplines in the same area of reality, but rather a passage, through one permanent informational and methodological transfer from one discipline to another, and to transdisciplinarity also. Maximizing or to-the-extreme development of the trend of multidisciplinary aims at the complete and complex dilatation of scientific knowledge, meaning a vast dissolving of sciences into a single one, a complex fusion into a huge single science or an universal discipline*” [11], and into an infinite research universe (more probably into a multiverse of researches).

3. CLASSIC AND MODERN ONLINE SCIENTIFIC RESEARCH

Discussions of the classic typology and of online research typology is explicitly designed to deal with the most important forms in which research purposes are primarily fulfilled. All the classical solutions have identified types of online research, in which the research itself plays a central role. This classical typology, therefore, does not attempt to address all day-to-day researching activities which occur inside and outside universities, but to offer solutions to real life’s problems.

The diversity of the typological criteria has generated two classic categories of the scientific research grouped by the way to adapt or to connect with reality [15]: A) basic (fundamental) research seeking generalization, aiming at basic processes, attempting to explain why and how things happen, trying to get all the facts, reporting in technical language of the topic etc.); B) applied research (individual studies or study cases without the aim to generalize, studies identifying variable which makes the desired difference, experiments trying to explain how things can be changed, experiments trying to correct the facts which are problematic or false paradoxes, etc. These two classical types of research are both split in accordance with a classical paradigm (scientific concepts laws, techniques, methods, models, and procedures) in: 1) the normal research; 2) the revolutionary research. Another criterion of classification of both basic and applied research is the type of data, and this divide both into i) quantitative research (numerical, non-descriptive, applying statistics or mathematics and based on quantities or numbers); ii) qualitative research (non-numerical, descriptive, applying to

reason and using words); iii) mixed research (a mixture of variables, words, and images etc.).

The diversity of classical research identifies many other types of scientific investigations like: a) *exploratory research* (identifying key issues & variables); b) *descriptive research* (studying and answering fundamental questions such as “what and how”); c) *explanatory research* (understanding and explaining interactions and relationships); d) *longitudinal research* (studying trends, cohorts, panels, etc.); e) *cross-sectional research* (gathering data during hours, days, weeks, months etc.); f) *action research* (improving the quality of activity in the social world); g) *policy-oriented research* (focusing on the way to solve/ prevent a problem); h) *taxonomy research* (categorizing the units into groups etc); i) *comparative/confrontation research* (identifying similarities/differences between units); j) *causal or factorial research* (establishing cause and effect relationship among variables); k) *theory building and testing research* (formulating and testing new theories) etc. A new typology of online research means new associations of online methods with Internet technologies entirely or partially under the control of researchers (research control created with specific software). The example of two timelines representing a brief history of qualitative online research [16], identifies similarities between Internet technologies and online research methods offer a good image of scientific research evolution (Tabel no. 1)

Table 1. Confrontation between online social research methods and Internet technologies

Internet technologies (1900-2010)	Online research methods (1900-2010)
(1900s) Nikola Tesla imagined “world wireless system”	Classic research methods
(1960s) Licklider’s vision for a “Galactic Information Network”. or “Intergalactic Computer Network”	
(1973) The first mobile phone (Martin Cooper-Motorola). (1979)The first automated cellular network (Tokyo-Japan).	
(1989)The invention of World Wide Web by scientist Tim Berners-Lee together with systems engineer Robert Cailliau. (1990)The public release of World Wide Web (www or W3),	(1986) The first online survey (Kiesler& Sproull) (1989) Invention of first package for data analysis
(1995) Internet Explorer and first video-conference (1996) Instant messaging services (1997) Google and the first weblog (blog)	(1993) Rheingold uses the term cyberspace (1994) Asynchronous interview online (e-mail) (1995) <i>Journal of Computer-Mediated Communication</i> (1996) Online interview methodology

(2003) Myspace (2004) Mozilla Firefox (2004) Voice Over Internet Protocol (VOIP) phone service (2004) Facebook (2006) Twitter (2007) iPhone (2008): Google Chrome (2010) iPad	(2000) Association of Internet Researchers (2001) <i>The Internet Research Handbook</i> (2002) <i>Classic Internet Research Methods Standards for internet-Based Experimenting</i>
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Source: Excerpt from [16]

Internet and online phenomenon diversified research not only as specific tools, techniques, methods and models, but also as types of research. *Online research methods (ORMs)* and *Internet research* are new ways in which researchers can collect data via the Internet and practices of using Internet information, based on new tools like web search engines, meta-search engines, web directories, search services etc [17].

New online research means also to use other *new online sources* like Digital Researcher, Inquisitive Learning, Internet Archive, Seventh Framework Programme, Internet Research Journal, Source Evaluation, Web Literacy, Reliable Sources etc. [18-19]. A new and evolving field of research is the field of *online research methods*. This is relatively related to existing research methodologies but re-inventing and re-imagining all of them in light of the new technologies and new conditions of the Internet. Thus, one researcher can appreciate the value of new online methods like autoethnography, cyber-ethnography, code list/codebook, axial coding, case study research, constant comparison, data saturation, discourse analysis, frame analysis, interviewing vulnerable populations, metaphor analysis, online ethnography, online content analysis, online focus groups, online interviews, online qualitative research, online questionnaires, thematic analysis/interpretive thematic analysis, social network analysis, web-based experiments, online clinical trials, etc.

The new typology of online scientific research means not only online meetings, online surveys, or the famous doing fieldwork without a field, and especially beginning to experiment online, etc. In fact, the new online research typology develops all the classic solutions and amplifies the importance of Internet and software. First of all, new researcher must identify the adequate online meeting to have indeed a successful online research and select finally one from the six most common types of meetings: 1) Status Update Meeting (SUM); 2) Information Sharing Meeting (ISM); 3) Decision Making Meeting (DMM); 4) Problem Solving Meeting (PSM); Innovation Meeting (IM); 6)Team Building Meeting (TBM). One researcher from Project management can improve all meetings using the online kickoff meeting (KOM), as it appears in the 6th edition of the PMBOK Guide. KOM is a new online tool and technique of the “Develop Project Management Plan” process.

Another researcher can use *online seminar* like research meeting organized online to inform a group of researchers about a specific topic, or to teach a specific skill to be used in a future scientific investigation. Sometimes is better to use one online workshop when the real intention is to have more hands-on and group activities (seminar and workshop being used somehow interchangeably).

One university or one research institute can use alone or together with a symposium as an opportunity for them to exhibit some of their latest results, as well as others in the common area of investigation. Also, one leader or many managers can organize one online conference as a large meeting open to all researchers attending an important or major event.

Multidisciplinarity and crossdisciplinarity offer the most important facilities for online research, because of their characteristics encouraging complex relations and methodological priorities first of all.

4. CROWD RESEARCH

Research has so far mainly been perceived as primarily exceptional individuals' endeavour instead of collective activity. In most science branches it resembles closed innovation funnel more than the open innovation. We can make a parallel with the business innovation and observe its most important phases: i) innovation; ii) proof of concept; iii) manufacturing; iv) distribution and sales [20]. Innovation can be perceived as the formulation of a hypothesis. It is backed up by the previous research (standing on the shoulders of giants, as the famous Newton quip described). In almost every case, the same person or a small team will continue on the line of the hypotheses, develop a research design and perform a pilot research, which can be loosely coupled with the proof of concept. The third phase of manufacturing can be illustrated with empirical proof of the hypotheses on the basis of gathered data. In the fourth phase, the idea is "distributed and sold" in a form of a research report, article of text fit for publication in the research journal. All the phases are classically perceived as the activities of the individual genius, or at least someone close, investing their effort within a laboratory or a research institute. If that effort is collective, we envision a closed, small team which Krakhard, Nohria, and Eccles find as a team bounded by the strong ties [21]. That paradigm imprinted its image on the size of the average research team. In the quantification of the research results, points per researcher are scaled - down if more than a specified number of coauthors wrote the article (which is can be three, five, or more, depending on the research discipline).

In the business environment, closed innovation is perceived as an obsolete concept, and based on the pioneering works of Chesbrough [22, 23] a

concept of open innovation is developing. In that concept, the "funnel" of innovation is open, filled with holes. Be it the "fuzzy front end", development or the commercialization phase, engagement from both outside-in, as well as from inside-out is encouraged.

If one analyses the concept of the wisdom of crowds, propagated by James Surowiecky [24] we can ask a question if the research is really a privilege of the selected few, trained for the process, or the growing strength of online communities, especially amplified during the COVID -19 epidemics can open at least some of the phases of research for the different actors. For example, in the "fuzzy front end" phase ideation is the main value and output. Brainstorming of ideas can help the development of hypotheses. In this phase, experts from practice, even manual workers can give a substantial contributions, even if not trained in the research methodology. However, their current engagement is limited, at best. An interesting example of collective effort in science is the Foldit multiplayer game [25], which produced serious results in the research. All that points us toward the interesting idea of Vaish and associates [26], that the research process can be extended beyond a selected few. Based on the concepts of open innovation, liquid publishing, open access, and multidisciplinarity, COVID-19 might provide a chance to transform research (mostly research publishing industry) its business model and paradigm.

5. SOME FINAL REMARKS

Online research is now a broad term. Here, it is used to mean "action of researching everything or just something up" on the Internet (www or Web). It includes any research activity, where a topic and a problem are identified, the tools and software are detailed, techniques and methods are made to actively gather information for a furthering understanding and appliance. Online research may include diminished human efforts and maximize final results, offer both theoretical and pragmatic analysis with a better-certified concern for quality or synthesis.

The state of wirelessness raises a further challenge for postdigital typology in classical and online research. It concerns all the similar aspects from tools and software to methods and techniques, from online data and sources to investigative signals and interrogative detection and validation of hypothesis etc.

An important question for the typology of research is the degree to which it can respond to the developments of new online research activities. A new question will arise from the pragmatic point of view: How does the typology of online research help us to explore the natural, social, economic, educational systems, reflecting all technological,

social and cultural developments, the evolution of information and communication in scientific research? During pandemic time, a period of time when the needs for a prompt response and online researching are prevailing, of particular importance is the question if is online research widely pressed by incertitude and lack of experience? The answers can offer all young researchers the opportunity to engage with new online research opportunities at all points of the phenomenon, multiplying all possible research settings, whilst at the same time providing them with systemic solutions that can support and formally acknowledge human wisdom and knowledge.

The typology of online research analysed in this paper needs to be extended against a wide range of other possible settings or details in different domains of Internet of things, theoretical and applied, qualitative, and quantitative research systems. The typology of online research offers young researches also a useful way of thinking for looking across boundaries of theory and practice and using transdisciplinarity. The typology presents especially an accessible vocabulary for exploring our current research techniques, methods, models for preparing future changes. In the long term, the typology of online research will focus probably on key aspects derived from or coupled with Internet, like robots and Artificial Intelligence (AI). A new typology of online research helps every researcher to frame his thoughts around a new kind of multidisciplinary, sometimes even around a new type of holistic attitude, based on flexible and systematic opportunities to enlarge and understand not only human life but the entire universe.

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“E-COMMERCE BUSINESS” OF HOME APPLIANCES AND FACTORS AFFECTING CUSTOMER’S SATISFACTION

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Abstract: Indian market is going digital as the country’s digital population is amounting to approximately 688 million active users as of January 2020, we can say that we are in digital era. Growing use of the Internet in India provides a developing prospect for E-marketers with relation to home appliances also as home appliance segment is one of the fastest-growing industries in the Indian market. So, this research paper is an attempt to explore the factors affecting customer satisfaction level towards online shopping for home appliances, so that any home appliances marketers can focus more on these factor to successfully take their business online. Primary data was collected from 210 respondents using a convenience sampling technique with the help of a structured questionnaire the same is finalized after conducting a pilot study and the data is analysed using SPSS and Excel. The factor analysis is performed for identifying the factors, the MRA and One way Anova test has been used for hypothesis testing. Result of this research reveals that there is a significant impact of reviews, offers & discount, the shopping experience on influencing customer satisfaction to purchase home appliances online, and there is a significant difference in the sense of security among consumers paying through different modes of payment. It is expected that this study will help online retailers in India to plan successful strategies for increasing their e-commerce business and they can build better relations with consumers.

Keywords: Online Shopping, Home Appliances, Customer Satisfaction

1. INTRODUCTION

“Online shopping or e-shopping is a form of electronic commerce which allows consumers to directly buy goods or services from a seller over the Internet using a web browser. Alternative names are: e-web-store, e-shop, e-store, Internet shop, web-shop, web-store, online store, online storefront and virtual store”. The country’s digital population is increasing and effecting the modern business world. These days why people prefer online platform is because it’s easier now to find the most variety of all products, by easily typing in the product or item that a customer is looking for. No worry about the location because logistic companies are providing

best of their service, so it’s helps in making sure that products would be available to any and all destinations in the world. In fact, there are more and more advantages and benefits to online shopping and why people choose to do this type of shopping over traditional shopping. The growing use of Internet in India provides a developing prospect for E-marketers and increase competitive business environment.

Home Appliances are electrical & mechanical machines which helps in accomplishing some household functions, such as cooling & heating, cooking or cleaning. Some of the home appliances are Microwave, Clothes iron, Kettle, Water purifier, Vacuum cleaner, Air conditioner, Oven, Dishwasher, Television, washing machine, Refrigerator. The home appliance segment is one of the fastest-growing industries in the Indian market and it is basically driven by both large appliances and small appliances. The main key factor for growth in this industry are increased affordability, focus on energy-efficient products, increasing digital penetration and busy lifestyles. A number of researcher have investigated Customer behaviour and Customer Satisfaction in relation to buying products online. So, this empirical study, which was done during Covid-19 Pandemic in 2020, is an attempt to explore the factors affecting customer satisfaction level towards online shopping for home appliances and how there is a sense of security among consumers paying through different modes of payment.

2. RESEARCH METHODOLOGY

2.1 Objectives

PRIMARY OBJECTIVE:

1. To analyse the various factor affecting the online shopping of home appliances.
2. To identify factors that customer consider while purchasing home appliances online.

SECONDARY OBJECTIVE:

1. To study the effect of after sale service, reviews, offer and discount, mode of payment and security, shopping experience on customer satisfaction.
2. To study the behaviour of online customer of home appliances.
3. To study the importance of security while choosing mode of payment.

2.2 Data collection and data analyse

The descriptive research design type of study is done by collecting data with help of convenience sampling method. The data has been collected with the help of a questionnaire the same is finalized after conducting a pilot study. The questionnaire has been prepared with the help of developed scale, reliability and validity have been checked before the administration of the study. The factor analysis is performed for identifying the factors, the MRA and One way Anova test has been used for hypothesis testing.

3. LITERATURE REVIEW

Customer Satisfaction: “Customer satisfaction is a summary psychological state when the emotions surrounding disconfirmed expectations are coupled with the consumer’s prior feelings about consumption experience” [1]. Researcher studied to identify the factors that may influence customer’s online shopping satisfaction. The study has concluded access to online shopping has truly revolutionized and influenced our society as a whole. The use of technology has opened new doors and opportunities that enable for a more convenient lifestyle today [2].

Reviews: Online product reviews affect purchasing behaviour in many ways. It helps company to generate plenty of reviews and manage them effectively. Researcher with the help of expectation-disconfirmation theory, they have analyses the effect of online reviews on customer satisfaction. The study concludes that (1) the confirmation of the success of expectation-disconfirmation theory to assess customer satisfaction, (2) the support of the importance of online reviews in online shopping [3].

H1: There is a significant impact between reviews and customer satisfaction.

Offers & Discount: Online shopping websites provide various offer discounts and promotions to attract online shoppers. Researcher studied examines influence of deal proneness on Indian consumers' online shopping behaviour. The results indicate that Indian consumers are not influenced by deals, offers or other promotional tools being used by online retailers. Promotions may not be necessarily viewed by consumers as an important attribute while purchasing products or services online [4].

H2: There is a significant impact between offers and discount and customer satisfaction.

Security: Cybersecurity is one of the most important ecommerce features. Without the proper protocols, online store owners put themselves and their customers at risk for payment fraud. Resercher has done explorative study of the novel design and security that contribute to consumers’ adoption of an integrated, single platform payment system encompassing card, Internet and mobile technologies in the ASEAN. The results suggest that

design, security, perceived usefulness as well as perceived ease of use are significant factors that contribute to consumers’ intention to utilize a single platform payment System [5].

H3: There is a significant difference in the sense of security among consumers paying through different modes of payment.

After Sale Service: After sales services include all matters that companies selling goods to the customers are doing to create greater value of goods and services. Like services warranty, commodity services shipping, installation services, supplying parts goods, repairs services. Researcher have analysed availability of service centres for the online shopping of electronic items. In the survey conducted most of the customers are not benefited and even not satisfied with service after sales of online shopping products [6].

H4: There is a significant impact between after sale service and customer satisfaction.

Shopping Experience: “Online shopping experience moderates the effect of the perceived usefulness of behavioural intentions [7]”. Researcher has examined the determinants of online purchasing intention towards household appliances among Malaysians in the Klang Valley. which found that the online shopping experience has a significant influence on purchasing intention [8].

H5: There is a significant impact between shopping experience and customer satisfaction.

Mode of Payment: E-Commerce businesses have a number online payment methods to consider along with COD (cash on delivery), each promising to provide an intuitive and secure checkout experience. A good online payment gateway makes the process simple and intuitive so you capture most of those sales rather than losing them. Researcher has researched to identify the determinants of consumer satisfaction towards online shopping in China. Their study indicated that website design, security, information quality, payment method, e-service quality, product quality, product variety and delivery service are positively related to consumer satisfaction towards online shopping in China [9].

H6: There is a significant difference in sense of Satisfaction among consumers paying through different modes of payment.

4. DATA ANALYSIS

4.1 Frequency distribution

Table 1 was drawn to understand the socioeconomic background of the respondents and it was found that out of the total sample (n=210) 55.24% consisted of male and 44.76% of female. Further we have divided the age group in four categories and we found that more than half (66.19) of respondents were 18-25 years of age, while (9.05%) belonged to the age group of 26- 30, (4.76) respondents belonged to the age group of above 36 years of age. We then found out that most of the respondent purchased from

Flipkart (44.76%) then from Amazon (31.90%) then from the companies (18.10) and then (5.24%) from others.

We have categorized from where our respondent review for the products most of the time they take review from Retailing Website (48.57%) then from the independent site (27.14%) then from their family and friend (20.48%) and (3.81%) from other source. We have also categorized the frequency of shopping online of respondents in four categories i.e. During festive season, monthly, Occasionally, and yearly. It was observed that almost half (45.71%) of respondents were having Occasionally, (20.95%) of respondents were having During Festive Season, (18.10%) of them were having Yearly and (15.24%) of them were having Monthly online shopping.

Factors	Category	Number of respondents	Percentage
Gender	Female	94	44.76
	Male	116	55.24
Age Group	18-25	139	66.19
	26-30	42	20.00
	31-36	19	9.05
	Above 36	10	4.76
Online Shopping Website	Amazon	67	31.90
	companies Website	38	18.10
	Flipkart	94	44.76
	Others	11	5.24
Review source	Family and Friend	43	20.48
	Independent Website	57	27.14
	Others	8	3.81
	Retailing Website	102	48.57
How often do you purchased home appliances online	During Festive Season	44	20.95
	Monthly	32	15.24
	Occasionally	96	45.71
	Yearly	38	18.10

4.2 Measures Reliability and validity assessment

4.2.1 RELIABILITY ANALYSIS: Cronbach's alpha, α (or coefficient alpha), developed by Lee Cronbach in 1951, measures reliability, or internal consistency. The value of Cronbach's alpha is more than .8, we can say that the consistency of the variable in the scale is good and constructs are reliable.

3.3.1 Anova

Table2: Coefficients table of MRA to accept or reject Hypothesis.

Model	Unstandardized Coefficient		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.0	.041		.00	1.
OD	.24	.054	.242	4.5	.00
R	.27	.061	.266	4.2	.00
SE	.42	.058	.423	7.3	.00
ASS	-.0	.042	-.004	-1	.93

INTERPRETATION

- Alpha value (0.05) is more the P value of Review (.00) we will reject the null hypothesis. So, there is a significant impact between reviews and customer satisfaction.
- Alpha value (0.05) is more the P value of Offer and Discount (.00) we will reject the null hypothesis. So, there is a significant impact between offers and discount and customer satisfaction.
- Alpha value (0.05) is less the P value of After Sale Service (.929) we are fail to reject the null hypothesis. So, there is no significant impact between after sale service and customer satisfaction.
- Alpha value (0.05) is more the P value of Shopping Experience (.00) we will reject the null hypothesis. So there is a significant impact between shopping experience and customer satisfaction.

4.3.3 One way Anova Analysis

(a) between Security and Mode of payment

Test of Homogeneity of Variances

Table3: Test of Homogeneity of Variances of Security and Mode of Payment. The p-value (0.171) > Alpha 0.05 suggests that the assumption of homogeneity of variance is held true, group variance is statistically not significantly different.

Security

Levene Statistic	df1	df2	Sig.
1.688	3	206	.171

Table4: ANOVA Test for Security and Mode of Payment, the p-value = 0.00 < Alpha 0.05, suggest a significant difference among consumers paying through different modes of payment. Therefore, we reject the null hypothesis. So there is a significant difference in the sense of security among consumers paying through different modes of payment

Security

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	30.455	3	10.152	10.185	.000
Within Groups	205.323	206	.997		
Total	235.779	209			

(B) Between Customer Satisfaction and Mode of Payment

Test of Homogeneity of Variances

Table5: Test of Homogeneity of Variances of Customer Satisfaction and Mode of Payment. The p-value (0.562) > Alpha 0.05 suggests that the assumption of homogeneity of variance is held true, group variance is statistically not significantly different.

Levene Statistic	df1	df2	Sig.
.685	3	206	.562

Table 6: ANOVA Test of Customer Satisfaction and Mode of Payment, the p-value = 0.286 > Alpha 0.05, suggests no significant difference among consumers

paying through different modes of payment. Therefore, we fail to reject the null hypothesis. So there is no significant difference in sense of Satisfaction among consumers paying through different modes of payment.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2.662	3	.887	1.269	.286
Within Groups	143.978	206	.699		
Total	146.640	209			

5. FINDINGS

This research conducted a conclusive study of determinants which have been studied by previous researchers that Review, offers, and Discount, After-Sale Service, Mode of Payment, and Shopping experience have an impact on consumer satisfaction and this research also study that if there is any association between Security and Mode of payment Selection while purchasing Home Appliance from the aspect of online shopping. In my study we can see there is a significant impact of Review on Customer Satisfaction and this is supported by established Literature Picazo-Vela (2009) And in my study, we can also see a significant impact of Offers and Discount on Customer Satisfaction and this is also supported by literature Rakesh & Khare (2012). My research shows there exists no significant impact of After-Sale Service on Customer Satisfaction while purchasing home appliances online and my results is supported by findings of the D. Mary Prema, IIR. Kinsa Jenifer (2017). We can also say that there is no significant difference in sense of Satisfaction among consumers paying through different modes of payment and this result is supported by finding of Guo et al.(2012). In my study, we can see the significant impact of shopping experience on Customer Satisfaction and my results confirm the findings of Azween Abdullah(2018). My research also shows there is a significant difference in the sense of security among consumers paying through different modes of payment an and this finding is supported by Lai (2016).

6. DISCUSSION AND CONCLUSION

In this study, we found that various factors have an impact on Customer Satisfaction and the choice of online payment while shopping Home appliances online. These factors are reviews, Offers and discounts, Mode of Payment, Shopping Experience, and Security and we can also say that Security can be one of the major factor for Customer to Choose a particular Mode of payment and they are conscious to make online payment and share cards details online. From my study I have found out that Choosing a particular Mode of Payment doesn't affect customer satisfaction. In this study, we also find out that there is no impact of after-sale Service on Customer Satisfaction. So it can be concluded

that respondent may or mayn't got satisfied after sale service while purchasing home appliances online. There is a significant difference in the sense of security among consumers paying through different modes of payment (Lai, 2016). The study suggest that security can lead to affect the consumers' choice to use the particular mode of payment. 66.19% respondent was from age group of 18-25 years. 48.57% respondent collect information from Retailing website followed by Independent Website (27.14%). 45.71% respondent purchase home appliances Occasionally from online followed by During Festive Season (20.95%). Most preferred online website of the respondent is Flipkart (44.76%) than Amazon (31.90%).

Study Implications

Many theoretical and managerial insights can be drawn from the model which will be discussed in detail in the following sections.

Theoretical:

The study has a multi-fold theoretical contribution in the emerging areas of online shopping, customer satisfaction, review, Offers and discount, shopping experience, security, and mode of payment.

The growing use of the Internet in India provides a developing prospect for E-marketers with home appliances and also Online shopping allows consumers to directly buy home appliances from a seller over the internet using a web browser or a website. That's why there is an increasing interest among scholars on various factors that increase customer satisfaction related to online shopping (Wang & Liem Le, 2016), and also the major concern for most of the customers is related to security while selecting the mode of payment (Lai, 2016). The result of this research enriched the theoretical body of knowledge related to the factors that affect customer satisfaction and choice of mode of payment while purchasing Home Appliances online.

Managerial

Through empirically testing the key logics, this research seeks to provide managers with strategic tools that drive customer satisfaction and their security concern in online shopping of home appliances. Online retailers need to thoroughly consider all these determinants of customer satisfaction and customer security concerns that make them choose a particular mode of payment for their business planning in the online business environment. Also, online retailers need to incorporate these determinants into the process of evaluating the level of consumer satisfaction as part of the corporation performance measurement and Organizations will be able to utilize the study information for developing various services and deals that impact the consumer's satisfaction and solve their security-related issues for E-payment system and also fulfil their objective of corporate social responsibility.

Limitations

Due to the Covid-19 pandemic situation, it was difficult to motivate respondents to provide true information and opinion on each question as this research is fully dependent on the online form. The Sample used cannot be representative of the entire population of the country, thus it's difficult to conclude about the whole population purchasing home appliances online. This research is also limited because it investigates the situation of a restricted amount of respondents.

Suggestions & Further Research Directions

It is highly recommended that future researchers consider a more number of the respondent representing multiple types of customer. The study looked at factors like reviews, after-sale service, offers and discounts, security, mode of payment, and customer satisfaction, so future researcher can consider other factors like price, comparison etc. Future researcher may consider culture aspects also of buyer. However, the findings of this research are the foundation for further study.

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CUSTOMER SATISFACTION WITH ONLINE SHOPPING

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Abstract. *Online product shopping is a big challenge for companies nowadays. Unlike other products that can be bought online, fashion products are more complicated to present in an online store. In addition to that, new trends in this area indicate a change in consumer behavior, which is directed by the current reduction of permitted physical contact (Covid-19) towards shopping "from home". This paper analyzes the different attitudes of consumers when making decisions about e-purchasing fashion products. In addition, research was presented that aims to examine the factors that positively affect the satisfaction of fashion clothing customers in online stores. Data collection was performed by a survey and it included 82 respondents. The results of the research indicated several factors that affect the satisfaction with online shopping of fashion products, among which are the age of respondents, saving time in online shopping, the possibility of purchasing brand names that are not available in retail stores in the Republic of Serbia, as well as a larger selection of products. The results of the research enable a better understanding of consumers and the identification of some of the key elements of their satisfaction with the online shopping. While our sample is of fashion products shoppers, proposed constructs and relations can be extended towards different contexts, e.g. acquisition of wide array of goods online, or acquisitions of services like online consulting, teleworking or online teaching.*

Keywords: *online shopping, customer satisfaction, fashion products, research*

1. INTRODUCTION

The development of digital media has changed the way of life, habits, and behavior of people in the modern world. As a consequence of globalization, and under the influence of digital media, consumerism is spreading more and more, while having big effects in all aspects of the lives of society. Thanks to the advancement of information technology, consumers today are well informed and have the opportunity to easily, in a very short time, compare several similar offers, that inducing; price,

quality, range, and many others without having to spend some time and visit retail outlets. Also, they are becoming more accustomed to the online environment and less concerned about security risks and online privacy. Another feature that can be seen in modern consumers is the increased level of expectations from companies, all because of the ability to have an extremely large selection and unlimited availability of all data in one place.

Accordingly, manufacturers and sellers make great efforts to respond to the demands of the modern environment, striving to attract and encourage consumers to buy their products through various marketing activities and strategies. However, it appears that manufacturers will adapt products to the needs, desires, and habits of consumers and what makes them satisfied. A satisfied customer is a prerequisite for the success of the company. It is a category that has been in focus for decades, and in modern business, it is a topic that is more current than ever. In essence, it represents the inevitable theoretical and rhetorical concept of modern management. In an increasingly competitive market, where companies are "fighting" for customers, consumer satisfaction is treated as a key indicator or element of a successful business strategy. Therefore, it is considered an important indicator of business performance and is part of many management models and tools.

Also, consumer satisfaction is an integral part of the shopping process. This process consists of several stages through which a typical buyer goes through a purchase decision. The first phase of the buying process is the customer's perception of the product or the perception of the need that the product can satisfy. The next steps are research and evaluation of alternatives, followed by a purchase decision [1]. Therefore, for the buying process itself to begin, the consumer must have a need for a product. On the other hand, shopping is not just about meeting needs. The customer buys out of desire, which most often occurs as a result of certain product information through various marketing campaigns.

Customer behavior is a complex category because it is influenced by personal (values, beliefs, attitudes, perception, motivation, and knowledge), social (family, reference groups, individual

influences, social class, culture, and subculture), and psychological factors (information processing, learning, change of attitudes and patterns of behavior). The study of consumer behavior is essential, as it helps businesses to improve their marketing strategies and management activities. It helps to understand the way consumers think about different brands and products and what makes them happy.

This paper analyzes the factors that affect consumer satisfaction when buying textile and fashion products online. The aim is to identify the factors that contribute to consumer satisfaction and to propose specific marketing activities based on them, which in practice should lead to better results of online fashion stores. More specifically, it will be investigated the influence of the size and diversity of the assortment offered on the satisfaction of consumers, as well as whether there is a difference between respondents of different demographic characteristics.

2. THEORETICAL BACKGROUND

Consumer satisfaction with online shopping is the subject of several scientific disciplines, such as psychology, sociology, consumer behavior, sales management, and digital marketing. In the available literature, the definition of consumer satisfaction differs in many ways. Some authors define satisfaction as a phenomenon that indicates a situation in which the performance and benefits of a product exceed customer expectations [2]. The overall mood of the consumer before, during, and after the purchase can be satisfied or unsatisfied. Customers are constantly in the active process of valuing purchased products while integrating those products into their daily spending activities [3].

Whether the customer is satisfied, it will primarily affect the company's profit and then incensement of the production, employment growth, a better image, but also the reputation of the company. Satisfaction or dissatisfaction with the purchase is much more than the current feeling. It is based on the perception of the value of the product, which has two views: the appropriateness of the use of the product, i.e. the extent to which it provides what is expected and reliability, and the extent to which the product is error-free [4]. In addition, the value represents the difference between the total expected value and the total costs incurred during the purchase of a particular product [5]. It is the value of the product for the customer requirement satisfaction.

The expected value for the customer is most often associated with factors such as appearance, functionality, design, and color of the product, as well as the image and reputation of the company, the quality of additional services, and after-sales activities [6]. In addition, the price of the product

and the time that the customer has to spend to find the most suitable product from available displayed products, based on the available ones are cited in the literature as extremely important factors in the purchase process [7].

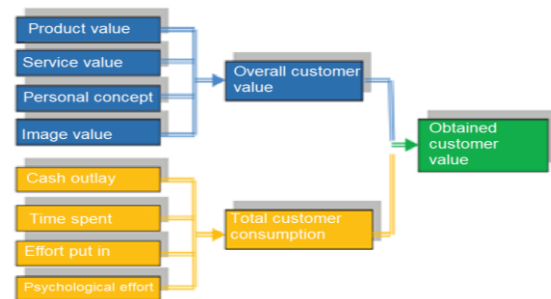


Fig. 1 Obtained and delivered customer value [8]

In the process of assessing consumer satisfaction with e-shopping, it is essential to define needs, capacities and contributions to consumer satisfaction. [9] suggests the following steps in achieving consumer satisfaction:

1. Identify consumer segments and the most important characteristics they believe products and services should possess
2. Identify consumer requirements for each target market
3. Incorporate consumer requirements into the tasks and specifications of the marketing plan
4. Define the steps in the process of implementing the planned activities
5. Assess the ability to meet consumer requirements
6. Apply for the program, i.e. embed consumer values in products and services
7. Evaluate the results and identify steps to improve the program

In order to effectively manage consumer satisfaction, it is necessary to measure and evaluate it. It is a demanding and complex process, as it stems from consumer expectations, but it does not diminish the importance of clear insight into customer feedback in terms of their satisfaction with the product or service. Especially since the level of consumer satisfaction directly affects the company's business results, whether it is manifested through increased consumer loyalty, or whether it is further product recommendations.

Consumer satisfaction is the ultimate goal that all manufacturers and sellers strive for because satisfaction with shopping in most cases leads to its repetition [10]. A satisfied customer will rarely and much harder decide on a change, but in most cases, he/she will remain loyal to the company.

Decades ago, the fashion industry survived in local stores with significantly less recognizable brands. People adapted the products from the catalog to their wishes, turning them into custom

made clothes. The growth of the Internet has drastically affected fashion brands, whose business communication has been completely changed, and a large number of them have crossed their national borders and become internationally known [11].

After the actualization of the appearance of social media, the behavior and habits of customers changed. In the past, consumers spent more time with magazines and stores, looking for items on the shelves. Today, with the use of Instagram, Facebook, and Pinterest, consumers have at their disposal an almost unlimited choice of fashion content, trends, and styles, which is regularly improved and updated [12].

The economic background, the evolution of the digital offer, and the passion of younger consumers for fashion clothing is a set of new factors for managers in the fashion industry. This industry is under pressure to digitize and take full advantage of new technologies, to improve diversity in its range, and to address growing demand organizationally through online shopping, as a business sustainability program [13]. Even though consumers continue to shop in physical stores, they also feel there are a lot of benefits when shopping online.

Online shopping saves time for modern people because they are so busy that they cannot, or do not want to spend a lot of time shopping. While traditional stores have a physical limit on the maximum number of products that can be presented to consumers, online stores have virtually no limit and can easily present thousands of different products [14]. However, the impact of assortment perception on a visit to a particular traditional or online store has not yet been fully explored. Bashir et al. (2019) point out that the concept of diversity of choice is relevant for increasing or decreasing the value of online shopping among consumers [15].

In addition to the similarities and general principles of this modern way of shopping, consumer behavior when buying fashion products online has its specific characteristics. Some of them are the inability to directly check the size, color, and material compliance with images and colors and materials in the real world, but in many ways, decisions are made based on their perceptions and conclusion of certain details. In an effort to reduce the amount of perceived risk, consumers tend to gather information to reduce uncertainty and assess the consequences [16]. Also missing are elements such as interaction with the seller, a sense of the atmosphere in the store, and touching, testing, or trying on clothes [17]. Besides, consumers are also influenced by the announcements of friends or influencers when making purchasing decisions [18].

Another significant influencing factor in the purchase of fashion products is the pandemic of the COVID 19 virus, as a result of which changes in the habits and behavior of consumers from traditional to online shopping have been registered. Some studies have shown that online sales have increased by as much as 50 percent [19].

3. RESEARCH

In this research that was conducted in the Republic of Serbia, a total of 82 respondents participated, of which 49 were female and 33 were male. Of all respondents, 29.3% are respondents aged between 18 and 23, 59.7% are aged between 24 and 35 and 11% are respondents older than 35. The sample consists of respondents from various professions, such as students, marketing managers, economists, programmers, lawyers, etc. 31.7% of respondents are students, while 64.6% are employed and 3.7% are unemployed.

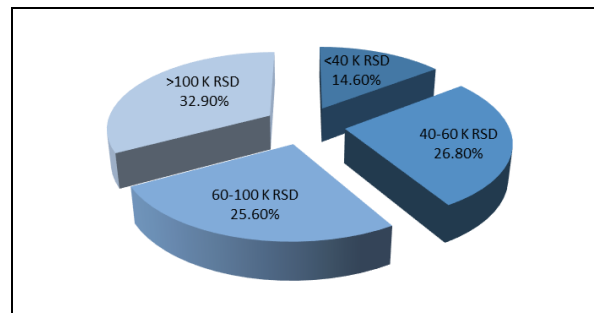


Fig. 2 Monthly income of research participants

3.1. RESEARCH METHODS

Data collection was conducted in Belgrade, in December 2019, using a questionnaire created in Google Forms. The questionnaire consisted of 22 questions, which were structured so that the first part consisted of questions related to the demographic characteristics of the respondents, such as gender, age category, occupation, and monthly income. The second part of the questionnaire contained ten questions about the experience in previous online purchases. Here the questions were offered as multiple choice. The third part of the questionnaire consisted of 8 opinion statements regarding various aspects of online fashion stores, as well as the satisfaction of the respondents. The answers were offered in the form of a Likert 5-point scale (from absolutely disagree to agree). Data were processed and analyzed using SPSS 20 software package.

3.2. RESEARCH RESULTS

The highest percentage of respondents (around 33%) buy online once a month, around 23% buy



Fig. 3 The frequency of online shopping

During one online purchase, respondents most often (about 57%) buy only one product, while a significantly smaller number is (about 29%) of those who buy two products, while three or more products are bought by about only 13% of respondents. The device through which they most often make online purchases is a mobile phone (70%), while 22% of them buy via computer, and the smallest number of them (about 7%) buy via tablets.

A significant number of respondents believe that the products match the description on the site (47.6%) while 25.6% of them believe that the products fully correspond to what is presented in the online store (Figure 4).

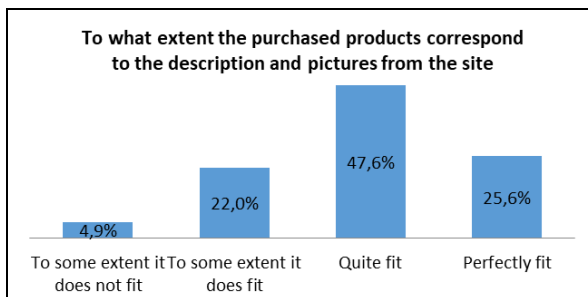


Fig. 4 Compliance of purchased products with the description in the online store

The appearance and functionality of the available pages for online shopping were rated by most respondents as very good (51.2%) or excellent (15.9%), while 30.5% of respondents rated it as average. Only 2.4% of respondents rated the website as somewhat poor, and no one rated it as very bad (Figure 5).

Also, most respondents buy in online stores that offer products that are not available in stores in our country, such as AliExpress, eBay, and brands that are not available on our market (more than 62%). In

addition, respondents usually spend less than 5 thousand RSD per month for online shopping (almost 44% of respondents), while between 5 and 10 thousand RSD allocate about 27%, between 10 and 30 thousand spend by about 28% of respondents, and more than 30 thousand RSD in online shopping is spent by 11% of respondents.

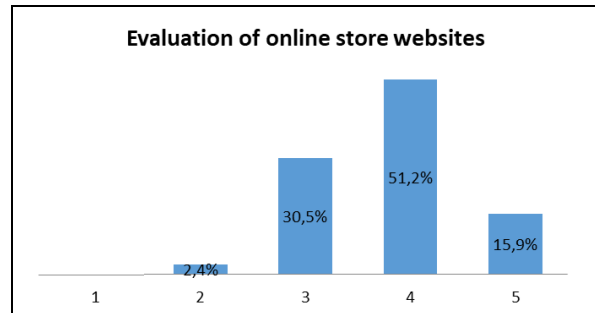


Fig. 5 Evaluation of the look and functionality of an online store website

When buying online fashion products, respondents are most concerned about whether the size will suit them (41.5%) as well as the quality of the product (40.2%), while they are significantly less worried about whether the color will suit them (6.1%), whether there will be some abuse (4.9%) or some other possible problems (7.3%).

On the other hand, they recognize the biggest advantage of online shopping as time savings (62.2%), a larger selection of products (23.2%), money savings (9.8%) and fast and easy and fast delivery (4.9%). In addition, the largest percentage of respondents (45.1%) are familiar with the possibility of returning products purchased online but do not trust this option, while a slightly smaller percentage of them know and believe in this possibility (37.8%), and as many as 17.1% of respondents are not even aware of this possibility.

An independent sample t-test showed that females ($M = 1.71$, $SD = 0.82$) and males ($M = 2.33$, $SD = 1.26$) differ significantly only in the amount of money they spend in online shopping ($t(82) = -2.76$, $p < 0.01$) with data indicating that men spend more. According to other observed criteria, such as frequency of purchases, evaluation of sites and how much the purchased products correspond to the description, no statistically significant difference was found between the two genders.

The results of the one-way ANOVA test indicate that the participants of different ages differ significantly regarding evaluation of online store websites ($F(79,2) = 5.13$, $p < 0.05$), average

amount of products purchased online ($F(79,2) = 3.4, p < 0.05$), as well as awareness of the possibility of returning products ($F(79,2) = 3.44, p < 0.05$) (Figure 6).

Additionally, participants of different ages don't differ significantly regarding frequency of online shopping, number of purchased products, and attitude on perception of compliance of purchased products with the descriptions on the site.

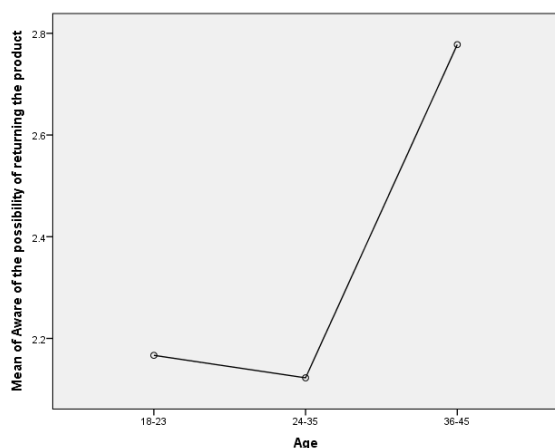
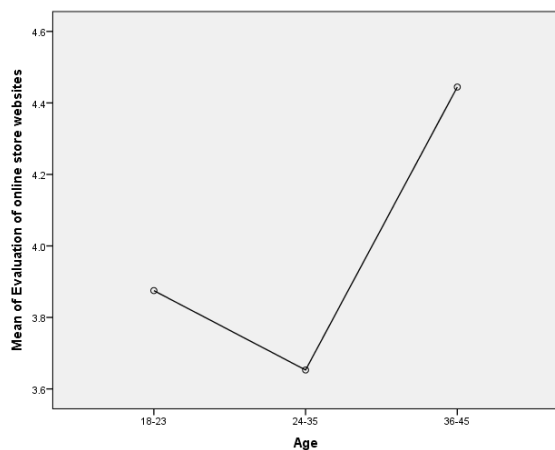
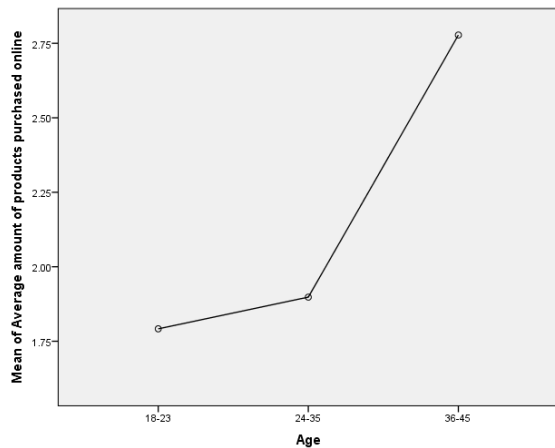


Fig. 6 Differences between participants of different age categories

As it was expected, the results of the one-way ANOVA test confirmed that participants of different employment status differed statistically regarding the average amount of products purchased online ($F(79,2) = 5.88, p < 0.05$) (Figure 7).

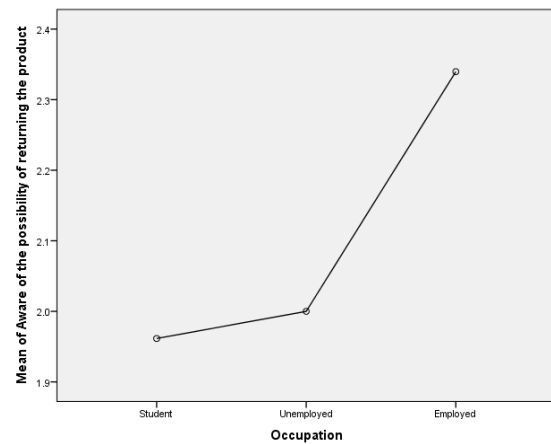


Fig. 7 Differences between participants of different employment status

A correlation test was used to analyze the Pearson correlation coefficient of certain variables and the results are presented in the Table 1.

Monthly income of participants is in positive correlation with frequency of online shopping ($r = 0.24, p < 0.05$), number of products purchased online ($r = 0.434, p < 0.01$), perception of compliance of purchased products with the description on the site ($r = 0.263, p < 0.05$), and awareness of the possibility of returning the product ($r = 0.252, p < 0.05$).

Frequency of online shopping is in positive correlation with number of products purchased online ($r = 0.23, p < 0.05$), evaluation of online store websites ($r = 0.24, p < 0.05$), and average amount of products purchased online ($r = 0.48, p < 0.01$).

Compliance of purchased products with the description on the site is in a positive correlation with evaluation of online store websites ($r = 0.62, p < 0.01$), as well as average amount of products purchased online with awareness of the possibility of returning the product ($r = 0.51, p < 0.01$).

Table 1 Results of correlation test

	S1.	S2.	S3.	S4.	S5.	S6.	S7.
S1. Monthly income	1	0.24*	0.43**	0.26*	0.18	0.18	0.25*
S2. Frequency of online shopping	0.24*	1	0.23*	0.14	0.24*	0.48**	0.14
S3. Number of products purchased online	0.43**	0.23*	1	0.22*	0.21*	0.24*	0.22*
S4. Compliance of purchased products with the description on the site	0.26*	0.14	0.22*	1	0.62**	0.42**	0.25*
S5. Evaluation of online store websites	0.18	0.24*	0.21	0.62**	1	0.35**	0.29**
S6. Average amount of products purchased online	0.18	0.48**	0.24*	0.42**	0.35**	1	0.51**
S7. Awareness of the possibility of returning the product	0.25*	0.14	0.22*	0.25*	0.29**	0.51**	1

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

4. CONCLUSIONS

The mass use of the Internet and digital media in modern society has caused a change in the desires, needs, habits, and overall everyday life of people, which is one of the basic features of the modern age. Caused by globalization, and under the influence of digital media, consumerism is increasingly developing and spreading, acting on all aspects of the life of the individual and society as a whole. Consumers today, thanks to the development and progressive advancement of information technology, quickly get the necessary information and have the opportunity to very easily and quickly compare prices, features, and range of offers in online stores, without having to waste a lot of time physically visiting traditional stores. All this has led to the emergence of extremely demanding consumers, who have an unlimited amount of available information and a large selection of products and services. In this regard, manufacturers and sellers make great efforts to respond to the demands of the modern environment, striving to attract and encourage consumers with a variety of marketing activities and strategies to buy their products and thus create a satisfied consumer. Consumer satisfaction is a function that depends on the efficiency and effectiveness of the product or service and consumer expectations. Buyers consider and evaluate offers, therefore if their expectations are met, they will be satisfied. A large number of companies and organizations assess and measure the satisfaction of their customers because it is one of the main factors in retaining old and gaining new customers. They are redirecting their business accordingly. The results presented in this paper can also help guide the activities of companies, which indicate the importance of certain factors in consumer satisfaction with the online purchase of fashion products. Among these factors, the need for a rich and diverse offer of

fashion products is emphasized, as well as the most realistic presentation of products within the possibilities of an online store. Also, it is recommended that fashion brands in the online environment focus primarily on the younger population, which shows the greatest inclinations towards online shopping. Extension of research findings is possible, because overall customer value and total customer consumption rely on the similar items in different contexts, starting from online shopping of goods from different industries to online acquisition of services, e.g. consulting, freelance specialized services or online teaching.

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OPTO-ELECTRO SIMULATION OF ORGANIC SOLAR CELL AT DIFFERENT ACTIVE LAYER THICKNESS AND CHARGE CARRIERS MOBILITY BASED ON P3HT: PCBM MATERIALS

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Abstract: *In this research work, bulk heterojunction organic solar cell is simulated optically and electrically at different active layer thickness and different hole mobility by GPVDM software. Organic bulk heterojunction solar cell consists of mixture of P3HT and PCBM as active layer material, ITO is a transparent electrode, PEDOT: PSS is an electron blocking layer and Al a back electrode. In this study, the optical simulation has been done at different active layer thickness i.e. 180 nm, 200 nm and 220 nm, and electrical simulation at different hole mobility $1 \times 10^{-4} \text{cm}^2/\text{Vs}$, $1 \times 10^{-5} \text{cm}^2/\text{Vs}$, $1 \times 10^{-6} \text{cm}^2/\text{Vs}$ and $1 \times 10^{-7} \text{cm}^2/\text{Vs}$ respectively. It is observed that current-voltage (j-v) characteristics are affected by the hole mobility. The best current-voltage (j-v) characteristic is obtained at $1 \times 10^{-6} \text{cm}^2/\text{Vs}$ mobility and the best absorption at 200 nm. It is concluded that in the organic BHJ solar cell the efficiency increases, when mobility decreases (from 10^{-4} to 10^{-6}) where as above 10^{-7} mobility, the efficiency further decreases. If the mobility is increased from $1 \times 10^{-5} \text{cm}^2/\text{Vs}$ the dissociation probability is increased and will be maximum at $1 \times 10^{-6} \text{cm}^2/\text{Vs}$, and again increase the mobility the dissociation will not further increase and efficiency is decrease.*

Key words: GPVDM software, carrier mobility, bulk heterojunction, organic solar cell

1. INTRODUCTION

Solar cell or photovoltaic cell is the optical device that converts sun radiation to electricity. The green plant does some similar work, the convert sun light to chemical energy so a group of solar cells so called organic solar cells. The sun supplies us a clean and unlimited resource of energy and help us relieve the energy crises and world pollution. Organic solar cells based on conjugate polymers are much promising for a cheap and flexible alternative to inorganic solar cells. Today several solar cell technologies exist in which organic solar cells are one of the newer classes of technologies.

Organic solar cell (OSC) devices attract more and more interest in last few years.

These devices yield an energy conversion efficiency of around 6% to 7% for single junction cell [1] as well as tandem cells [2]. This is much less compared to already accepted silicon photovoltaic devices, which has efficiency above 20%. But organic photovoltaic (OPV) devices have several advantages like, flexible substrates, the possibility of low cost production [3], room temperature processing and thin film structure. Organic solar cells consist of a mixture of polymer P3HT (donor) and PCBM (acceptor) as the photoactive layer. In bulk-heterojunction (BHJ) organic solar cells, the absorbed incident photons generate tightly bound electron-hole pairs, which can dissociate into (charge carrier) electrons and holes at the nearby donor/acceptor interface. The electrons and holes are then transported to their respective electrodes [4-6]. Research efforts in the last decade have significantly improved organic solar cell performance [7-12] and power conversion efficiency (PCE) values better than 10% have recently been achieved [13-14]. Over the years, significant research efforts have been performed at developing low band gap polymers to extends absorption and harvest more solar energy for which the more short circuit current can be produced.

In ITO/PEDOT: PSS/P3HT: PCBM/Al organic bulk heterojunction solar cells, P3HT (3-hexyl thiophene) is an electron donor material that effectively transports positive holes, PCBM ([6, 6]-phenyl C₆₁-butyric acid methyl ester) is an electron acceptor materials. It effectively transports electrons from molecule to molecule. The ITO (Indium Tin Oxide) film is used as a transparent electrode. Since, it has high transmittance in visible region and capacity of good conduction. PEDOT: PSS or poly (3, 4-ethylenedioxythiophene) poly (styrene sulfonate) is an hole transportation layer. PEDOT: PSS may be used as buffer layers between the transparent electrodes and active layer of materials to block the electron and hole transfer in the wrong direction. In this study we present optical and electrical stimulation of bulk heterojunction (BHJ) solar cell using GPVDM software at different active layer thickness. The main advantage of the bulk heterojunction solar cell is that most of generated excitons reach a nearby donor-acceptor interface, where they associated into free charge carriers [24].

These efficient Excitons harvesting lead to higher power conversion efficiencies for BHJ solar cell. The organic solar cell has two competing process, extraction and recombination of the charge carriers, both process are conducted by the mobility of charge carrier. As increase charge carrier mobility would a positive effect on transport, facilitating extraction, but on other hand it increase the recombination.

1.1 Bulk Heterojunction Structure and Charge Carriers Generation

Bulk heterojunction is a mixture of interpenetrating mixture of electron donor and

electron acceptor conjugated organic materials that allows absorption of light, the generation of charge carriers (excitons), splitting of excitons at donor-acceptor interface, and transport of positive and negative charges to opposite electrodes. Bulk heterojunction (BHJ) are mostly generated by forming the two conjugate polymers, casting and then allowing separating the two phases, usually with the help of annealing process. The two conjugate polymers will self-assembled into an interpenetrating network connecting the two electrodes [15]. The structure of bulk heterojunction solar cell is shown in fig.1.

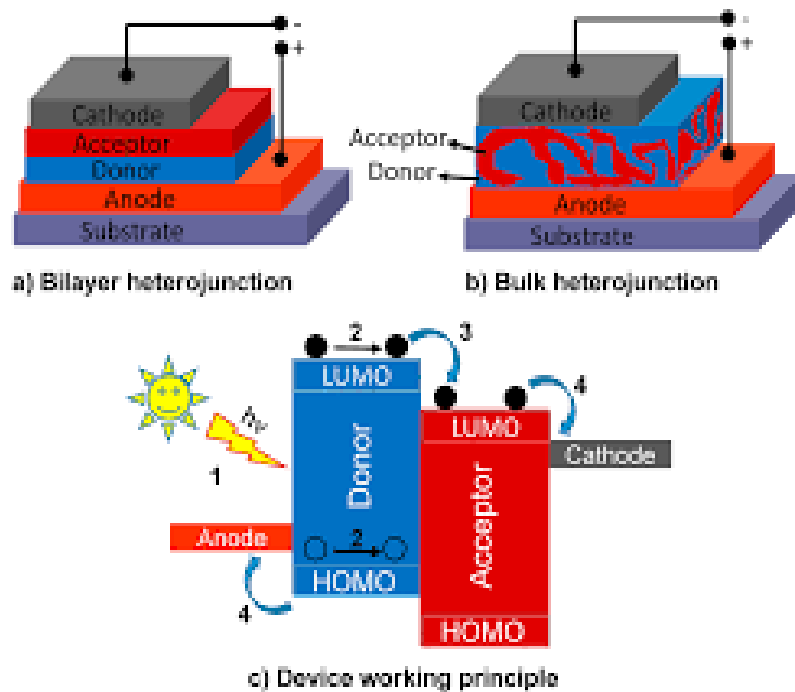


Fig.1 Bulk Heterojunction solar cell

After the capture of a photon, electron move to the acceptor domains, then are carried through the device and collected by the one electrode and holes moves in opposite direction and collected at other side. If the dispersion of the two materials is very much larger, it will result in poor charge transfer through the active layer. In charge transfer, both donors and acceptor contribute to the generation of charge carriers.

Organic solar cells produce natural mobile excitons after absorption of light. In order to separate the excitons into free charge carriers a donor- acceptor system must be employed [16]. When the excitons reaches the donor/ acceptor interface the electron will transfer to the material with lager electron affinity and the hole will be accepted by the material with the lower ionization potential. Due to the lower excitons diffusion lengths to 1-10 nm in polymeric materials [17-18] a simple bilayer structure will result in low efficiencies, since only photons absorbed within this distance from D/A interface

will contribute to the device current[19]. An increase in the generated photo current can be achieved by employing an interpenetrating network of donor and acceptor materials [20-21]. Ideally in bulk-heterojunction (BHJ), all absorbed photons will be in the vicinity of donor acceptor interface and these can be contributing to the generated photocurrent.

2. SIMULATIONS

2.1 Electrical Simulation

Bulk heterojunction solar cell ITO/PEDOT: PSS/P3HT: PCBM/Al is simulated by the GPVDM software at different series resistance of the device. GPVDM software is specifically designed to simulate bulk heterojunction organic solar cells, such as those based on the P3HT: PCBM materials. The model contains both an electrical and optical

properties, enabling both current- voltage characteristics to be simulated as well as optical properties [22-23]. The electrical model only covers the active layer of the device. In this model, there are two type's of charge carrier electrons (holes), free electrons (holes) and trapped electrons (holes). Free electrons (holes) have a finite mobility of $\mu_e^o(\mu_h^o)$ and trapped electrons (holes) cannot move at all and have a mobility of zero. To evaluate the average mobility we take the ratio of free to trapped carriers and multiply it by the free carrier mobility.

$$\mu_e(n) = \frac{\mu_e^o n_{free}}{n_{free} + n_{trap}} \quad (1)$$

Thus if all carriers were free the average mobility would be μ_e^o and if all carriers were trapped the average mobility would be zero. It should be noted that only $\mu_e^o(\mu_h^o)$ are used in the model for computation and using $\mu_e(n)$ is an output parameter. The electrical simulation window is shown in fig 2.

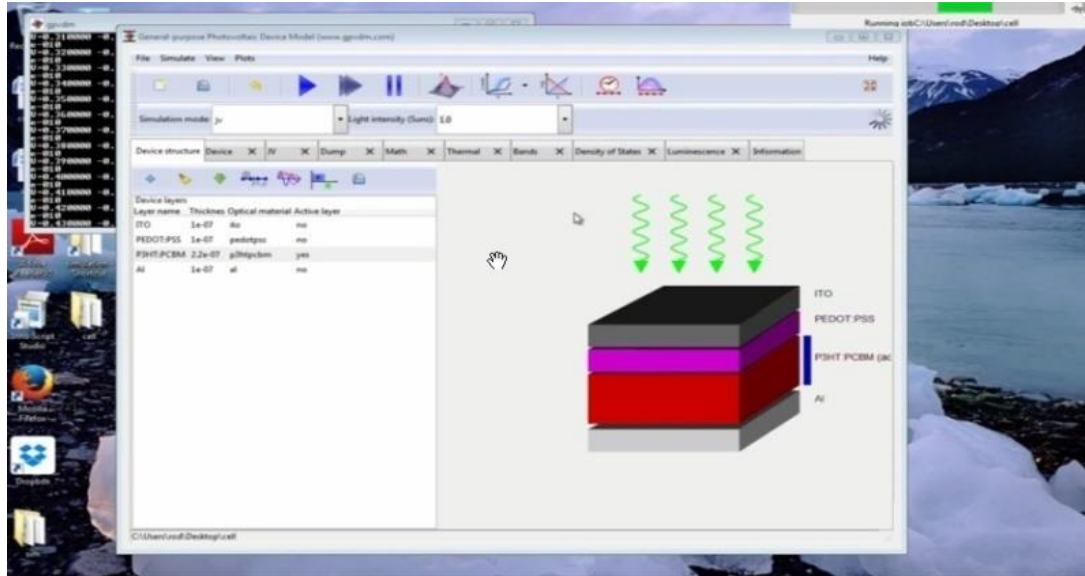


Fig.2. Electrical simulation window

2.2 Optical simulation

Bulk heterojunction solar cell ITO/PEDOT: PSS/P3HT: PCBM/Al is simulated by the GPVDM software at different active layer thickness. GPVDM software is specifically designed to simulate bulk heterojunction organic solar cells, such as those based on the P3HT: PCBM material. The model contains both an electrical and optical properties of the solar cell; accredit both current-voltage characteristics to be simulated as well as optical properties.

GPVDM is consisting of both an electrical and optical model. The optical model simulation usually includes the glass substrate, the contacts and layers such as PEDOT: PSS. The electrical simulation usually only cover, the active layer of the device, thus a typically optical simulation is much bigger than electrical simulation window. The optical model feeds the calculated optical profile of the light into the electrical simulation. Therefore, it described the optical model which can process the optical simulation and it also represents the active layer. This is done by placing a 'yes' in column (active layer) in the figure 3.

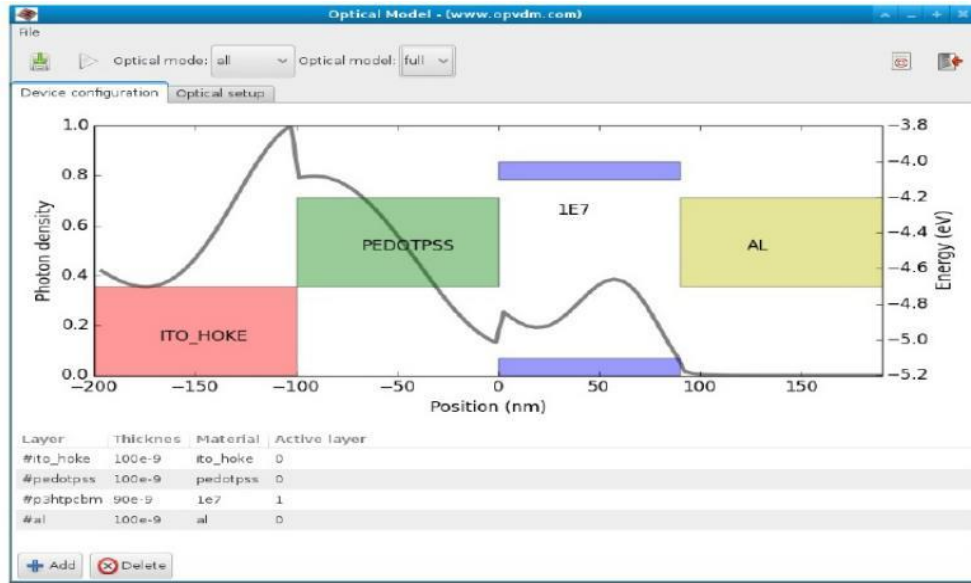


Fig.3: Optical Simulation Window

3. RESULT AND DISCUSSION

In this paper ITO/PEDOT: PSS/P3HT: PCBM/Al bulk heterojunction solar cells are designed by the GPVDM software to study the optical properties. The absorption of P3HT: PCBM active layer are more effective for the wavelength from 350nm to 750nm. The optical simulation (wavelength 150-750

nm) is made at different active layer thickness, ITO thickness 20nm, PEDOT: PSS thickness 20 nm, Al thickness 20nm and the active layer thickness are 180nm, 200nm, 220nm, and the absorptions at different active layer thickness are shown in the figures 4 a, b and c.

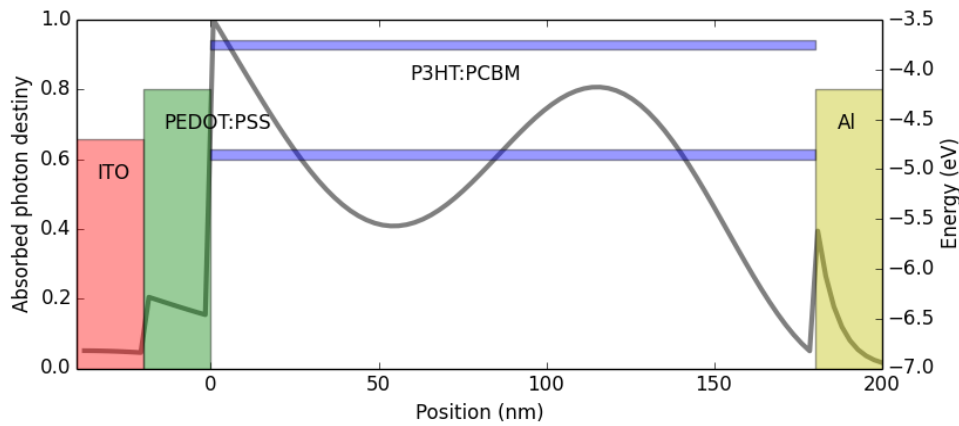


Fig. 4a. Active layer thickness 180 nm

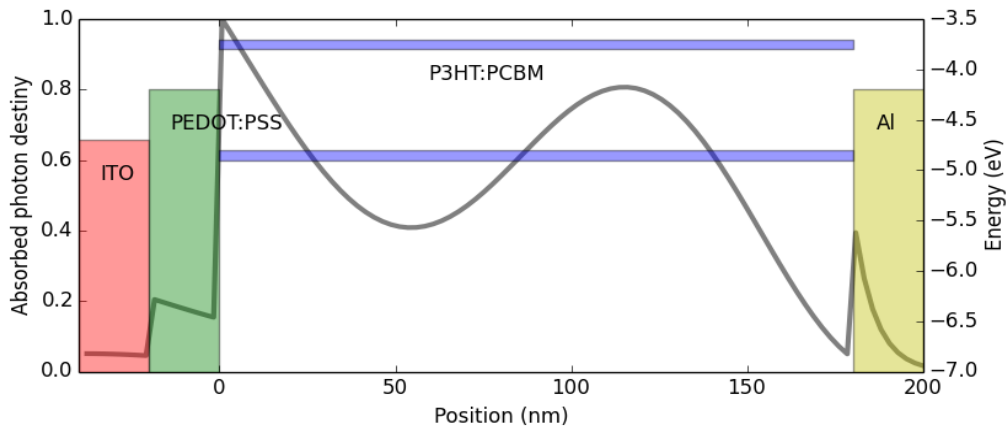


Fig. 4b. Active layer thickness 200 nm

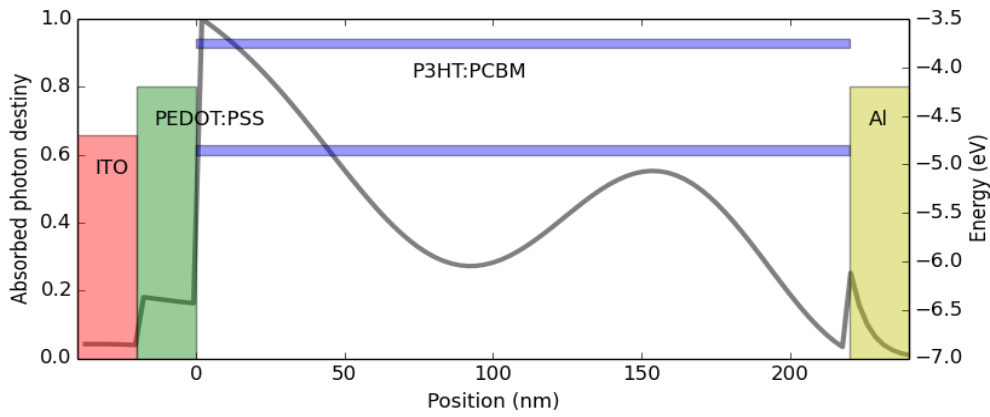


Fig. 4c. Active layer thickness 220 nm

Illumination current-voltage characteristics are simulated at different hole mobility, $1 \times 10^{-4} \text{cm}^2/\text{Vs}$, $1 \times 10^{-5} \text{cm}^2/\text{Vs}$, $1 \times 10^{-6} \text{cm}^2/\text{Vs}$ and $1 \times 10^{-7} \text{cm}^2/\text{Vs}$, which is shown in figure 5. It is clear from the

current-voltage characteristic curves that the short current density is maximum at $1 \times 10^{-6} \text{cm}^2/\text{Vs}$ and minimum at $1 \times 10^{-4} \text{cm}^2/\text{Vs}$.

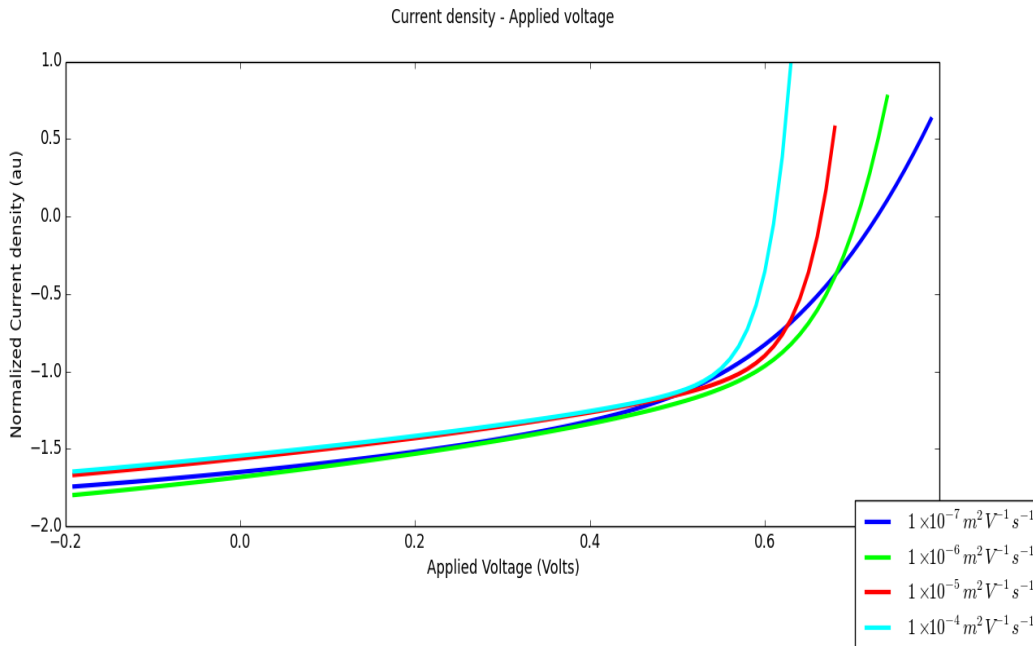


Fig. 5. Current Voltage characteristics at different hole mobility

It is clear from the curves that in organic BHJ solar cell the efficiency increases when mobility decreases (from 10^{-4} to 10^{-6}). Above 10^{-7} , the efficiency further decreases. The increased recombination of electron-hole pair and reduce dissociation efficiency, decrease efficiency whereas the loss in open circuit voltage at higher carrier mobility is responsible for the decrease of efficiency. If the mobility is increased from $1 \times 10^{-5} \text{cm}^2/\text{Vs}$ the dissociation probability is increased and will be maximum at $1 \times 10^{-6} \text{cm}^2/\text{Vs}$, and again increase the mobility the dissociation will not further increase and efficiency is decrease. It is clear that the solar cell is more efficient at definite mobility range.

4. CONCLUSIONS

In this work, we have presented optical and electrical simulation of the P3HT: PCBM based bulk heterojunction solar cell for different active layer thickness. The absorption pattern of the active layer

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of organic solar cell varies with thickness. At thickness 200 nm we get absorption peaks near the electrodes at which the maximum absorption take place. The short circuit current is affected by the electron and hole mobility and maximum short circuit current obtained at $1 \times 10^{-6} \text{cm}^2/\text{Vs}$. Thus by changing the active layer thickness and mobility the effective absorption and efficiency of P3HT: PCBM based solar cells can be optimized.

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WILL THE FUTURE IN ONLINE ACADEMIC EDUCATION CHOOSE ONLY A MINORITY OF TODAY'S IMPORTANT UNIVERSITIES?

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Abstract. *This paper describes the academic impact of online education, during the pandemic period and tries to anticipate or foresight the changes provoked by online education in today's important universities. First of all the article reveals in its introduction some specific features or some distinct aspects of the old distance learning and the new online education in the academic universe, continuing with identifying some of the certain advantages and disadvantages of online education in a brief but consistent section, and finally paper offers some possible image and trends in the future dimension and the anticipated design, specific to a selected minority of the most important universities more adapted to this pandemic period.*

Keywords: *online education, educational network, pandemic period, online academic universities. Internet, software.*

1. INTRODUCTION

All around the world and at a certain period of time, the national education systems as reunions of all the local levels are going through the real and profound need to reinvent themselves. Only a retrospective approach can explain this pandemic period the situation in which billions of pupils and students spend their days in their homes, as well as their teachers, and meet only online, but never face-to-face... During the last decades, and better revealed in pandemic time, the three key differences between face-to-face and online education remain the same major issues: i) the first is caused by the different impact of space and presence; ii) the second aspect is connected to self-presentation; iii) the third obstacle and perhaps the most difficult to pass over is interaction (in multiplied forms: teacher-student, student-student, teacher-teacher, old contents-new contents student-interfaces, student-education's contents, teacher-content interaction [1-3]. The focus is always on teachers, but one profound expert or analyst can mention three design- and teaching-related elements: student-centred design, social activity and peer collaboration [1]. Online learning provides adequate opportunities and solutions to devote attention to the correction of individual efforts and activities, transforming individualized feedback in the most efficient learning engine and promoting

peer collaborations over multiple weeks and even months.

The most important questions in the research of this paper underline the dimensions and changes of the online education process and the possible changes in a minority of tomorrow's important universities:

What the most important advantage of online academic education is?

What one can really imagine the up-to-date of the three classical actors in any modern online education system?

Will the continuous process of learning and understanding reality be changed dramatically inside the academic universe?

Can the classic educational act be perverted and become even unnatural in such an intensive manner to lose its major qualitative aim or level which remains the temptation to anticipate and adapt human beings to any possible changes?

How do students, and teachers communicate and adapt to online teaching/learning?

How can technology help all of them, where these intentions really exist, and how does online technology influence the learning/teaching process?

In a terrible situation, when society is facing pandemics, and a large part of any society is isolated in their own homes and a large part of the international economy depends on these habits of communication, only network communications, and connectivity can save the world transforming the entire Earth in a place more vital than ever.

Based on this real assumption, today's education survives only by using new software and derivated technologies, online dialogues and distance communications of the modern Internet world.

Dialogue online & distance communications are the seeds of the most adequate solutions to a pandemic period in human life needs to be robust and flexible enough to deal with the additional traffic for working, doing business, or e-learning and online education. In this case, the Internet becomes the major source of communication that people can rely on.

They need to ensure information shared is reliable and timely, and the disinformation and other dangerous activities do not disturb the education process. With such a dominant part of our lives now taking place online, the need for equilibrium between clarity and essence, synthesis and details,

safety and security becomes greater than ever. One needs to be able to trust that all networks are secure from attacks and reliable in their levels of connectivity; and one also needs to be more sure as individuals that one is as safe when operating online as offline, with trusted identity and security systems in place to support the new increasingly digital needs.

2. ONLINE EDUCATION'S ADVANTAGES AND DISADVANTAGES

A set of new studies, conducted by the United States Department of Education speaks on the one hand of the fact that the results of online learning seemed to be the same as in traditional courses [5, 6], and on the fact that students in online learning conditions behaved in a better manner than those who receive instructions face-to-face [7].

The classical advantages of distance learning, a form of education that can be considered neither inferior to any traditional forms of education, nor less able to consolidate or improve the memorization and understanding of the topics learned, are multiplied as importance and as impact in the case of online education, exemplified with the following opportunities [8 - 10]:

i) all of the students can decide themselves when (the period and the periodicity), where (the place and access) and how much time to devote to the studying process (based on specific individual study schedule) and all of them have the right to postpone and return to their specific studies without having to repay tuition fees [8];

ii) all the students can go back to studying more complex concepts, ideas and questions, watch on laptop or phone lectures several times, read the messages from their teacher and especially can skip already all the well-known topics or notions [8];

iii) all the students do not interrupt the length of jobs or services, and all the studied topics, issues, methods or models can be immediately applied to working life [8];

iv) all the students implied in the use of the new Internet's technologies based on the adequate appliances of the software in the learning process makes the online education and evaluation phenomena more interesting and offer higher training results [9];

v) the dimensionality debate for dialogues, the bias' questions inside teaching process, and the learning design is more profound and accurate in online education for all the students [9];

vi) for both students and teachers consulting in an online manner or by email must be considered sometimes more effective and faster than scheduling a face-to-face meeting [9-10];

vii) using the modern technologies and the adequate packages of software in online education can underline a more suitable method for all the

students in organizing a more efficient individual approach without being distress by too many nonverbal communications based on distance, touch, sincerity and comfort, posture and seating arrangement and many other nonverbal expression of interest [9-10];

viii) all the students can benefit from more attention and more time while online education and all the necessary literature remains available to all of them after registration on the university website or link (based on specific academic accounts);

ix) analogous with the sample's costs, compared to an exhaustive research, both full-time and partial or remotely, the online education will be cheaper (all the students does not have to pay for travel, accommodation, or to spend money on other similar necessities);

x) a lot of the distinct aspects of teacher behavior are not the same in the face-to-face and online education reflecting a different combination of cognitive and motivational gestures, shared or not shared by the students [11-13];

xi) the students quality of universities can be enhanced and the engagement and activity of the students can be improved in the virtual classroom, facilitating future discussions between teachers on creating the best practices or guidelines for synchronous online education [11-13];

xii) online education develops through real self-responsibility and requires adequate willpower, and self-control from all the students [11-13] etc.

One researcher can identify many disadvantages also not only in general distance education but especially in online type. The major cause is the specific non-suitability of distance and online education for the development of communication skills, confidence or teamwork attitudes for all the students [8]. The second negative aspect is the lack of "live" practice doubled by the characteristic approach not allowing an in-depth look at the learning process as a developed collaboratively phenomenon between all the participants [12]. In the evaluation process there is also a problem called the "user identification" problem meaning to find an effective way to see if the real student has passed exams or credits honestly and independently based on video surveillance (this permanent and vigilant attitude is not always and entirely possible) [8].

The transition to a dominant online teaching system means a long and difficult process not only for universities but also for their specific research environment, and so-called academic researchers or scientists underlined the new methods of communication that are now developing through online education and based on the results of the major online conferences. All of these results open up to a much larger research community and to a more diverse concept of the future university and offer new possible advantages of the online

academic education: i) the higher frequency of classes (online courses and seminars) of students compared to classical face-to-face education; ii) the several practical exercises, applications, tests, small projects in small teams in online education (Google Meet, Skype, Zoom, etc. sharing other software solutions and allowing the fulfillment of the targets of the educational process, accelerating the process based on multiple and reciprocal access and other new facilities); iii) the better statistics related to the actual presence/absence of students during the tests of attendance at courses and seminars (made automatically and detailed through online statistics for each student, which provide good feedback to the teacher about the real absorption of knowledge in the teaching act).

The recent evolutions reveal new disadvantages of online academic education. First of all, many students consider the new online education is more fixed, tiring and static (all participants must work online, practically all of them being connected to desks and chairs, the process being not a dynamic one, but especially a static one). Many times, even when online education includes the existence of a classic blackboard, the online education does not mean more visibility (implying higher costs with microphone and camera built into more powerful laptops).

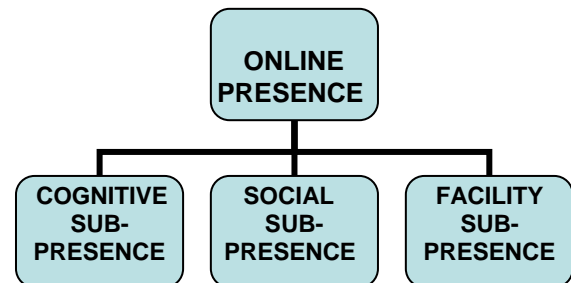
Any type of online education disaggregates teaching attitude by mutual agreement between teacher and students into many fragments during all the educational day, and because it usually changes the structure of the breaks (the break between the two hours of the course or seminar disappears and thus increases the break between courses and seminars). Absolutely necessary prior interaction in online education is sometimes lacking (online education requires more effort from the teacher to arouse students' curiosity and thus this type of education becomes more attractive or not so boring). Some specific online educations impose new teaching strategies mainly focused on creative play and actors. Any online education eliminates and does not replace classic forms of socialization (many times multiplying the existing networks and diluting the importance of messages and mutual interaction of all the students).

A simple sketch of the standard online educational process includes the major elements or the main components of the online learning activities and must include the following aspects:

- i) the context or the learner's goals;
- ii) the tools and resources used (communication channels between the students or learners and the teachers or among the students or learners);
- iii) the concrete tasks (e.g. encouraging peer collaboration between all the actors of educational play);
- iv) the relations between the three (e.g. how interactive the tools are, how self-paced/individual

the tasks or how necessary it is for the teacher to mediate the use of resources)". [1]

The evaluation in online educational process means a tripartite framework emerging from the latest interviews, with three main sub-presences of the students and teachers' presence (figure no. 1):



Source: Realized by the authors based on [2-3]

Fig. 1. The three sub-presences of online presence

In the online academic education, universities need a new language, an adequate theory to reality, and another kind of praxis, all of these aspects based on critical pedagogy. The new online critical pedagogy creates already a new concept and horizon of solidarity in learning and cooperation in academic universe. [14]

3. THE MODERN COMMUNICATION'S INFRASTRUCTURE OF ONLINE EDUCATION

The modern communication infrastructure for the university educational process includes not only the access to Internet but also specific data, adequate artificial intelligence (AI) and super computers with their digital and analytical power and networks or e-learning platforms, including an entire system of specialized software for online education, adapted to the specifics of the university.

Specific data, artificial intelligence (AI) and super computers, with their analytical power, are major assets in detecting patterns in the spread of the virus or potential treatments and devising strategies for reconstruction. AI also plays a part in powering the robots that have come into their own in times when human interaction is kept to a minimum. Newer and emerging digital technologies such as quantum computing or blockchain can also potentially bring unexpected solutions and approaches. Data will be crucial for devising recovery strategies. Digital networks are essential in terms of providing the infrastructure and platforms we are all increasingly reliant on. In these times of confinement due to coronavirus, they ensure a lifeline for our social lives. They offer a wealth of information, activities and learning opportunities, from skills sharing and collaborative working to creativity, culture and education.

All the educational institutions have promoted, in recent decades, several initiatives and programs

with a digital component, starting with the Computerized Education System (SEI) program, e-Twinning action, teacher training programs in the use of new technologies and ending with attempts to establish an open educational resource base or the approaches in the ROSE and CRED projects. E-Twinning is an educational program that provides all teachers in the European Union with a virtual environment and online tools for carrying out school projects.

The e-Twinning portal (www.etwinning.net) is available in 25 European languages and offers great opportunities for any teacher to find partners for projects, to participate in groups, workshops, events, teachers' rooms and training seminars, to progress, be up to date with the latest news, benefit from support and resources provided by other users of the platform.

Some of the most efficient ways of monitoring students' process of online learning during online courses and seminars define and offer dimensions to ICT. ICT can and really add value to the assessment process in online education and facilitates the entire continuous monitoring system including: i) the management of the qualitative feedback; ii) the automatic feedback for receiving immediate responses; iii) the use of diversified instruments and strategies of assessment; iv) the data produced by the system and informing about the online learning process (defining the analytics strategy, the support and the scaffold online education at any time) [1]. E-Portfolios describes one of the major strategies highly recommended for online education, allowing the students to have an adequate evidence of online education and reflecting the progress in the monitoring of the process.

The wirelessness offers already a further challenge for online education, not only concerning signals and detections, but also including the machine learners, adaptive platforms, new digital students' activities in order to "adequate" their learning process to reality...

4. SOME FINAL REMARKS

From North to South, from East to West, the pandemic impact of the COVID -19 has caused the disruption and the change of the classic solutions for the entire academic education system, including the online education. For all of the students, open, flexible, and distance or online education, however, this 2020 year provides the best period of all times. After so many years of presence somewhere on the peripheries of conventional educational process and practices, online education is suddenly thrust onto the center point of teaching all over the world.

A very important problem in education still is the morality of learning process. Educational reasoning

must also always come up again and again, for since humanity means only a species in which every young individual must learn the same moral lessons and ethic knowledge that older individuals did, it stands to reason that when a immoral idea sounds appealing in a new generation, this generation must strike it down once more before. A concept of false morality can, in fact, come about without having the ideal spread around.

Online education and online-supremacy, for examples, are things that come from being told if we are faster we are smarter, being shown if we are online educated, or online being observed in our intimate that we are better when we compare ourselves to other generations (sometimes simply asserting from nowhere that we are better). Online education and online-supremacy (online being nothing else but a variable of educational system) must be reasoned away, and even then it must be done so in a way that does not make it confrontational but as common as a project assembling. No one wants to hear he or she is not educated or that he or she made a lot of educational mistakes being considered foolish or have come close to the notion of illiterate, just because he or she has no money to buy a laptop, smart phone or PC. In fact, one would assert online compassion and online individual concern that together these attitudes are a better mode for education than face-to-face catch-all ideals that are phrased as their own separate entity when they still rely on real mentors as real people. "The online education system", "the departments of online educational corrections", "the minister of online education", these are not harmful, dehumanized, falsely impeccable generalizing phrases in the future, but all of these notions can become dehumanizing ideas because one cannot afford to simplify education into something more ethic, more moral, more direct and smore elective, or because the teachers as mentors cannot feel like they can be analyzed, picked apart, and changed by students in any free online educational process.

All the so-called famous universities and their specific academic management have decided that all the academic programs are going fully online in order to be able to remain viable during pandemic times. All the questions and the entire criticism underlying the disadvantages of the online education, and its effective and efficient activity compared to face-to-face educational experience, do not matter anymore [7]. The answer can be the same fragile answer as the ancient history of humanities: adapt or dye, be online educated or illiterate... But a minority of important universities can change everything in education [15], and these famous universities did it already. A university's reputation may be more important than its current quality, especially when it comes to the employment of graduates. The reputation score of

each university will be noted at the top of each entry in the top, but to compare these prestigious rankings with the main list, teaching and research results have been added. Online education means already the future education and all the universities adapt or dye...

In the adapting case, the famous universities shift away from the teacher-centered evolution and focus on what students learn rather than what they have been taught. Online education is now student-centered already and the university's vehicle is the online certificate program. In the so-called *dying case*, many researchers will demonstrate when things do not go so well for students and teachers, then must be blame the failure of online education methods, models and guides, both pedagogically and technologically [16]. How should this minority

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A REVIEW OF ONLINE DOCTORAL RESEARCH ON MULTIDISCIPLINARY INFORMATION NEEDS

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Abstract. *We all are experiencing the need for information in our daily life. Research on the information needs and satisfaction of information needs are carried out by the researchers. The present online research has been carried out to find out the research on information needs in Indian universities. The outcome of this research in terms of doctoral thesis has been made available online for further research. The researchers have conducted studies of the various disciplines of faculty members, students, scientists, researchers, communities, and professionals. There are many factors that are influencing the satisfaction of the information needs, few of them are considered here. The number of research conducted on information needs has increased over a period. The satisfaction level of the study group consisting of multidisciplinary people varies according to constituents of the group, the geographical location of the group in terms of implementation of the library legislation, etc.*

Keywords: *Communities, Educationalists, Information Needs, Professionals, Shodhganga (online reservoir of Indian Thesis).*

1. INTRODUCTION

The information has been defined by various authors in different ways. Case [1], has listed the assumptions that are turned out to be problematic while applying the definition. Those five assumptions are Utility, Physicality, Structure/Process, Intentionality, and Truth. The information which does not have usefulness to humans may not have utility. If the information or its effects are not observable then it will not be useful for scholarly study. The information shall comprise elements in fixed relation to others in a structured way. The information shall be intended to communicate it to other entities. If the information is not true then it will be misinformation [1].

According to Wilson [2] a human being may get facts, consultation or reactions in script form or in spoken form for which he is anxious while the transfer of the information is taking place. Miller [3], a psychologist, referred information to the occurrence of one out of a set of alternative stimuli. Madden [4] proposed the definition of information as a stimulus originating in one system that affects the interpretation by another system of either the second systems related to the first or of the

relationship the two systems share with the given environments.

All of us are experiencing the power of information in our daily life. The political decision making will also be affected by the information provided [5]. Despite the abundance of information, the mismatch between the information needed and the information available resulted in insufficient information [6]. The human capital stored in human beings such as stock of education, skills, culture, and knowledge leads to the development of society [7]. Considering these multi-disciplines, the study groups can be divided into:-1) students & faculty, 2) communities 3) researchers & scientists and 4) professionals.

2. A BRIEF LITERATURE REVIEW

Satija [8] concluded in her study that information is the most overused and least understood term without which life is nothing yet it needs life to be born. Parvez [9], in his study on the information needs of managers in Indian financial institutions concluded that the information providers should focus on providing customized information solutions and serious thought is needed on the part of the government and the private agencies for providing timely and credible information to the institutions for research and analysis. Feather [10] mentioned that the information professionals should be key players in the information society. Bigdeli, [11] while studying information needs of engineers in an agro-industry company summed up by stating that staff members shall be treated as remote customers and librarians shall arise with modern & inventive approach to satisfy their needs.

The study of "Australian general practitioners information resources needs" concluded that further educational inference on complementary medicines need to be furnished to general practitioners to advance their knowledge of complementary medicines and to improve their communication with patients about their use [12]. Patterson et al. [13] emphasized the need for access to the latest patient information being a hurdle to paramedics delivering correct end-of-life care, which will help community-based care.

Kawasaki, Henry, and Meguro [14] in their survey found that many hurdles to the compilation of

disaster information and arrangements still remained for overseas peoples, both in Japan and in other disaster-prone countries with more distinct persons.

The improvement in the collections and services at the University of Lethbridge has been done by applying the knowledge gained after examining the information needs of university students in foundational foreign language courses [15]. The study of information needs of the farmers, their access and constraints faced in getting information, concluded that the arrangements and focused transmission of agricultural information to modest growers continue to be a challenge and recommended for developing information and communication technology-based information management systems [16].

3. OBJECTIVE ANND METHODOLOGY

In review of the above studies, this paper aims at determining the following objectives:-

1) To examine the trend of doctoral theses in Indian universities over a period of time on the study of information needs.

2) To study the overall outcome in terms of the satisfaction of various groups' information needs.

3) To study the impact of the adoption of library legislation on the satisfaction of information needs by the respective state governments where the group is geographically located.

The work of Information and Library Network (INFLIBNET) with regards to Indian Electronic Thesis and Dissertation (ETD) online free availability of all the multidisciplinary doctoral research work conducted in India is praiseworthy work [17]. This Indian ETD repository Shodhganga has been accessed online to find out research work done in the field of Information needs of Faculty, Students, Scientists, Researchers, Communities, and Professionals.

The important keyword for search used was "Information needs". A total of 62 number of the theses were retrieved under the keyword information needs doctoral thesis conducted under the Library and Information Science department from Shodhganga. Out of these, two theses were in other than the English language and the conclusion of the three theses was ambiguous so, 57 theses were used for the study. Researchers of four of these theses studied two groups each. Thus, data sets of 61 groups of information needs were available for the study.

The large primary data collected by the doctoral researchers on information needs is considered enough to be studied. The inter-group statistical comparison of the distribution of categorical variables is tested using the Chi-Square test or Fisher's exact probability test. All the results are tabulated to visualize the statistically significant difference with more clarity. In the entire study, the p-values less than 0.05 are considered to be

statistically significant. The entire data is statistically analyzed using the Statistical Package for Social Sciences (SPSS version 22.0, IBM Corporation, USA) for MS Windows.

4. RESULTS AND DISCUSSIONS

A. Chronological Distribution of Doctoral Theses on Information Needs

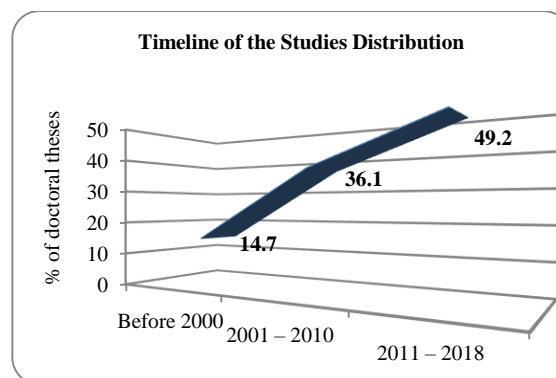
Table 1 shows the chronological distribution of the doctoral theses submitted in Indian universities on the study of information needs. The data shows that the doctoral theses on information needs have increased over three times during two decades as a period of time.

Table 1. Chronological Distribution of Studies

Year of Study	Number of Doctoral Theses	%
Before 2000	9	14.7
2001-2010	22	36.1
2011-2018	30	49.2
Total	61	100.0

Source: Realized by the authors

A timeline restates the dynamics and underlines the truth of these real scientific and doctoral needs as in figure no.1



Source: Realized by the authors

Fig. 1. Timeline of the Studies Distribution in Percentages

B. Structural Distribution by Groups of the Doctoral Theses on Information Needs

The doctoral scholars did research on information needs of various structural groups of Indian peoples. These groups can be clubbed thematically into four major structural classes:

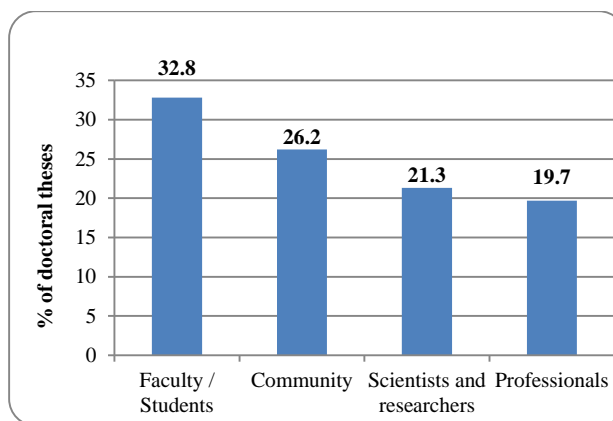
1. Study of information needs of faculty members & students of educational institutions.

2. Study of information needs of various communities.

3. Study of information needs of scientists & researchers.

4. Study of information needs of various professionals.

Figure no. 2 shows numbers of doctoral research conducted on various structural groups, thematically distributed as above. It can be seen that the research has been conducted on all of these groups. The minimum 19.7 % study has been conducted on professionals and maximum 32.8% study has been conducted on faculty & students. All these structural distributions, caused by the faculty & students are easily approachable by researchers.



Source: Realized by the authors

Fig. 2 Structural Distributions by Group of Study Undertaken by the Doctoral Thesis

C. Overall Distribution of Satisfaction/Suggestive Satisfaction of Information Needs of All the Groups Studied by the Doctoral Researchers

The doctoral researchers have tried to find out the level of satisfaction for the information needs of various groups. They have analyzed the data collected by them and concluded based on the majority the opinion of the groups.

Some studies clearly concluded the level of satisfaction for information needs of the groups, others have indicatively concluded about the level of satisfaction for the information needs of the groups. Table 2, shows the distribution of outcome of all the doctoral theses about the level of satisfaction for information needs. Non-satisfactory outcomes of these are more than that of the satisfactory.

Table 2. Distribution of Overall Outcome (Conclusion) on the Level of Satisfaction for Information Needs Amongst the Doctoral Thesis Studied.

Outcome	Number of Doctoral Theses	%
Satisfactory	28	45.9
Non Satisfactory	33	54.1
Total	61	100.0

Source: Realized by the authors

D. Chronological Distribution of Satisfaction/Suggestive Satisfaction of Information Needs of All the Groups Studied by the Doctoral Researchers

Table 3 shows the chronological distribution {1) before the year 2000, 2) year 2001 to 2011 and 3) 2011-2018}, of the outcome of doctoral theses about the level of satisfaction for information needs. It is clear that a higher proportion of theses completed in recent years showed relatively higher levels of satisfaction compared to the theses completed in the older years.

However, the difference did not reach statistical significance (P-value>0.05). Distribution of level of satisfaction did not differ significantly across the three groups of the time period of study (P-value>0.05).

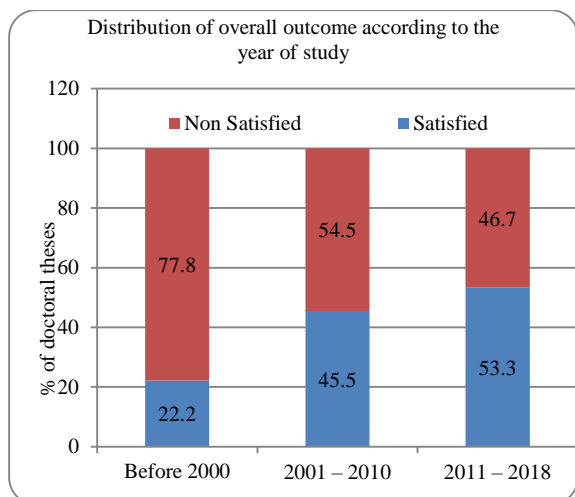
Table 3. Distribution of Overall Outcome (Conclusion) on the Level of Satisfaction for the Information Needs According to the Year of Study

Outcome (Conclusion) on the Satisfaction					
Year of Study	Satisfied		Non-Satisfied		P value
	Number of Theses	%	Number of Theses	%	
Before 2000	2	22.2	7	77.8	0.259 ^{NS}
2001 to 2010	10	45.5	12	54.5	
2011 to 2018	16	53.3	14	46.7	
Total	28	45.9	33	54.1	

Values are n (% of cases), P-value by Chi-Square test P-value<0.05 is considered to be statistically significant. NS-Statistically non-significant

Source: Realized by the authors

The percentage of satisfaction is increasing significantly during the last two decades as in figure no.3.



Source: Realized by the authors

Fig. 3. Distribution of Overall Outcome (Conclusion) on the Level of Satisfaction for the Information Needs According to the Year of Study.

E. Structural Distribution of Satisfaction/ Suggestive Satisfaction of Information Needs of all the Groups Studied by the Doctoral Researchers

Table 4, shows the distribution of the level of satisfaction for information needs of groups clubbed thematically. It is clear that the level of satisfaction differs significantly across various groups studied in the doctoral theses (P-value<0.05). Significantly a higher proportion of scientists & researchers and faculty & Students had higher satisfaction compared to the other groups such as professionals and communities (p-value<0.05).

Table 4. Distribution of Overall Outcome (Conclusion) on the Level of Satisfaction for Information Needs According to the Group of the Study.

Outcome (Conclusion) on the satisfaction					
Group	Satisfied		Non-Satisfied		p-value
	Number of Theses	%	Number of Theses	%	
Faculty & Students	12	60.0	8	40.0	0.025*
Community	4	25.0	12	75.0	
Scientists & Researchers	9	69.2	4	30.8	
Professionals	3	25.0	9	75.0	
Total	28	45.9	33	54.1	

Values are n (% of cases), P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. *P-value<0.05.

Source: Realized by the authors

F. Distribution of Satisfaction of Information Needs According to the States which have Implemented Library Legislation

Ranganathan's untiring efforts resulting in the enactment of the library legislation [18]. After independence, two-third of the Indian states have passed the library legislation because of educational revolution and spread of knowledge under the literary mission aiming spread of education and dissemination of knowledge through establishing public libraries in India, Table 5 shows chronological enactment of public legislations in different states of India [19].

Table 5. The Indian States Which has passed the Public Libraries Act

State	Year of Enactment	State	Year of Enactment
Tamil Nadu	1948	Mizoram	1993
Andhra Pradesh	1960	Gujarat	2001
Karnataka	1965	Orissa	2001
Maharashtra	1967	Uttaranchal	2005
West Bengal	1979	Uttar Pradesh	2006
Manipur	1988	Rajasthan	2006
Haryana	1989	Bihar	2007
Kerala	1989	Chhattisgarh	2007
Goa	1993	Arunachal Pradesh	2009

Source: Realized by the authors

Analysis is done for the satisfaction of information needs by bifurcating the groups studied in doctoral theses according to their residence in the states that have a library legislation and those states which do not have library legislation.

Table 6, shows the distribution of satisfaction of information needs according to the states which have implemented library legislation. It is evident that the level of satisfaction differs significantly across groups of states who implemented and who did not implement the library legislation (P-value<0.05). Significantly a higher proportion of theses completed in the library implemented states had higher satisfaction compared to the states who did not implement the library legislation (P-value<0.05).

Table 6. Distribution of Overall Outcome (Conclusion) on the Level of Satisfaction for the Information Needs According to the Implementation of the Library Legislation

Outcome (Conclusion) on the Satisfaction					
Library Legislation	Satisfied		Non-Satisfied		p-value
	Number of Doctoral Theses	%	Number of Doctoral Theses	%	
Implemented	22	55.0	18	45.0	0.049*
Not Implemented	6	28.6	15	71.4	
Total	28	45.9	33	54.1	

Values are n (% of cases), P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. *P-value<0,05.

Source: Realized by the authors

5. CONCLUSION AND FURTHER RESEARCH

Doctoral theses on information needs have increased over a period of time in Indian universities. This shows the importance of investigating the information needs of various groups. It is also seen that over a period of time there is an increase in satisfaction of information needs amongst various groups studied. The groups comprising faculty & students and scientists & researchers are largely satisfied with their information needs. While groups comprising communities and professionals are largely not satisfied with their information needs.

The analysis indicates that groups that are located in the states which have public library legislation are more satisfied than the groups which are located in states which do not have public library legislation. This aspect needs further research to be carried out as the doctoral researchers do not have this object in their research. There are many other questions needed to be answered to comment on the impact of library legislation. So the impact of the library legislation cannot be concluded from the present study.

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PERCEIVED EFFECTIVENESS OF PUSH AND PULL PROMOTIONAL STRATEGIES ON MARKET SHARE AND SALES OF COMPUTER PERIPHERALS

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Abstract. *Sales promotion strategies have the ability to change the fortune of any business. Almost all businesses across the world adopt sales promotion strategies to promote their products and to sustain in the market. The businesses that deal with computer peripherals are no exception to this. They are also dependent on such strategies to promote their products in the highly competitive market. In this context, the present study intended to investigate the effects of push and pull strategies adopted by the computer peripheral distributors on the market share and sales of their products. Accordingly, a structured questionnaire was used to collect data from the participants (n=451) who were computer peripheral distributors in Karnataka. The analysis of the data showed that push strategies such as Trade shows, Point of sale and Supply chain efficiency adopted by the distributors convinced the intermediaries in the distribution channel to sell their products to customers; thereby, increase the market share and sales of the computer peripherals. Among the pull strategies, Advertisements, Referrals, and Promo and discounts motivated the customers to seek the products of the distributor, which in turn increased its market penetration, sales, customer loyalty and repeat purchase (i.e. its market share and sales). Thus, push and pull strategies both have a significant impact on the market share and sales of computer peripherals.*

Keywords: *Sales promotion, Push strategies, Pull strategies, Market share, Sales, Computer peripherals.*

1. INTRODUCTION

The most important objective of any business entity is to sell its products and stay in the market for the longest period possible (Buil, de Chernatony & Leslie, 2010). Coupled with the increasing global competition, this key objective has forced companies to look for innovative means for selling their products. Ultimately, 'sales promotion' occupied a crucial position in business decision making. In order to sell their products companies must focus a great deal of their time and resources on sales promotional activities (Preko, 2012). Sales promotion represents the activities carried out by an

organization to improve its sales, enlarge its customer base and/ or retain its loyal customers. Blattberg and Neslin (1990) defined sales promotion as "an action-focused marketing event whose purpose is to have a direct impact on the behavior of the firm's customer." In general, sales promotion either attempts to increase a product's value or decrease its price, so that the customers prefer that offering over the rest in the market (Adeniran, Egwuonwu & Egwuonwu, 2016).

Promotional strategies adopted in marketing are of two types, namely, push and pull strategies. The strategies vary mainly based on the way in which information and products move between the customers and the companies. According to Brocato (2010), push strategies focus on marketing intermediaries such as wholesalers and retailers, rather than no customers, in order to facilitate the movement of goods from manufacturer to customers. Such strategies aim at offering the partners extra value or incentives to engage in additional marketing activities to stimulate retail sales. Pull strategies, on the other hand, are targeted at customers. They offer extra value to the customers to attract them to retail locations and stimulate immediate sales (Martín-Herrán, Sigué & Zaccour, 2010). Retailers adopt push strategies like point of purchase displays, conducting trade shows, etc. to convince customers to buy the products. Pull strategies like advertisements, word-of-mouth referrals are adopted to encourage customers to ask the intermediaries (or the retailers) for the company's products. Adopting a mix of push and pull strategies can effectively lure customers into buying a particular brand. Furthermore, such promotional activities also enable the customers to readily recognize a brand and become aware of it while making a purchase (Rizvi, Malik & Zaidi, 2012).

The technological developments made in the last two decades have significantly affected the lifestyle of people. Consequently, the market for computer peripherals witnessed a drastic growth. The market is characterized by changing customer needs, diverse products, and tough competition (Rajeswari and Selvarasu, 2015). As a result, a number of brands

have entered the market, with some still struggling to carve a niche for themselves in the market. The competing organizations are always under a constant pressure to achieve a competitive edge in the market. In order to do so, the companies largely adopt sales promotion as the marketing tool. By identifying the sales promotion strategies that have a significant impact on the market share and sales of computer peripheral distributors, the marketing team can develop such strategies to effectively promote their products. With this backdrop, the objectives of the present study can be stated as follows:

- To explore the implications of applying push strategies of sales promotion on market share and sales volume
- To study the implications of applying pull strategies of sales promotion on market share and sales volume

2. REVIEW OF LITERATURE

Significance of sales promotional strategies

Sales promotions and advertisements have a significant impact on brand equity. For instance, the content of the advertisement itself helps in increasing brand equity, which includes brand loyalty, brand awareness, and brand associations (Buil, de Chernatony & Leslie, 2010). The promotional activities though are short-lived, have a lasting impact on customers' mind and are readily remembered by the customers, which makes them an effective tool for building customer/ brand loyalty (Rizwi, Malik and Zaidi, 2012; Nazish Zehra & Sadia, 2011). Sales promotions could be either monetary or non-monetary and both of them can increase the social value of a brand (Buil, de Chernatony & Leslie, 2010).

The promotional strategies are also effective at increasing the sales volume of a company and its market share. They help in increasing customers' awareness about their products (brand awareness) which in turn influences their purchase decision and ultimately the sales volume (Odunlami & Ogunsiji, 2011). Promotional strategies like coupons, free trials, guarantees, and premiums boost the sales volume (Amusat, Adejumo & Ajiboye, 2013). With increase in sales revenue, the profitability of the firm also increases (Oyedapo Williams, Akinlabi Babatunde & Sufian Jeleel, 2012). The promotional strategies also have an impact on customer's purchase intention. For example, techniques like coupons and price reductions stimulate customer's buying intentions (Meo et al., 2014).

Studies in the past have also found that promotional strategies are used by firms as a means for market penetration (Oyedapo Williams, Akinlabi Babatunde & Sufian Jeleel, 2012). Promotional activities also help in building brand loyalty among the customers. Such initiatives aim at having a

positive impact on the customers' perception towards the brand and ultimately results in brand loyalty (Nazish Zehra, & Sadia, 2011; Oyeniyi, 2011). Therefore, promotion initiatives can be used as an effective tool for building customer loyalty as well.

Push and pull strategies for sales promotion

Push strategies like conducting trade shows help in increasing the sales of a product. Further, they also help firms to successfully launch their products, find new distributors or outlets for their products in a new territory, strengthen the organization's position in the market place through public relations and receive feedback about their products (Patten, 2001). The trade shows may not always increase the sale volume, but will help firms to effectively reach out to their customers, introduce their products, and gather information about their competitors (Yeshin, 2006). Point of sales has been adopted as an effective marketing mix for increasing the purchase shares of a brand (Hwang & Thomadsen, 2016). Showrooms, virtual as well as physical, can help firms increase demand generation and contribute to brand awareness (Bell, Gallino & Moreno, 2018; Akturk, Ketzenberg & Heim, 2018).

Advertising is an effective pull strategy that is positively associated with brand equity and brand sales (Huang and Sarigöllü, 2014; Ataman, Van Heerde and Mela, 2010). Advertisements through social media as a marketing medium has a significant impact on the purchase intention of gen Y customers and on their brand loyalty (Balakrishnan, Dahnil and Yi, 2014). Word-of-mouth referrals is yet another pull strategy that have been found to have a significant impact on sales distribution (Lee, Lee & Shin, 2011). The referrals generated by the consumers increase firms profits by boosting its sales (Kim & Kim, 2018). Price discount has been adopted by firms as an effective strategy to increase product awareness across different sales channels (Gong, Smith & Telang, 2015). Framing of sales promotions also has a significant impact on consumers' perception towards the brand/ product.

From the literature review, it can be observed that studies on the promotional strategies to be adopted in technology markets is scarce. The impact of the push and pull strategies, discussed above, on the profitability of firms is scarce in India. Studies in the past have not explored which kind of strategy (push or pull) is effective at increasing the market penetration of technology products like computer peripherals. The present study intends to bridge these knowledge gaps by testing the following hypotheses:

H1: Push strategies are positively related to market share and sales

H2: Pull strategies are positively related to market share and sales

3. METHODS

Participants

A structured questionnaire was used for collecting data from the distributors of computer peripherals (n=451) in the state of Karnataka. The profile of the participants can be studied from Table 1. Among the participants, a majority (94%) of them were retail distributors, who sold computer peripherals through their own store. Only 6% of the participants were wholesale distributors of computer peripherals. Among the wholesale distributors (n=27) of the study, 95% bought large quantities of computer peripherals and sold them to regional retailers and businesses only. The study population was highly experienced with 85% having more than 10 years of experience in the field. It was also found that among the study population, 39% of them enjoyed a revenue between 11 and 50 lakhs from their business, followed by 30% of them who enjoyed a revenue of more than 1 crore from their business. The data thus shows that computer peripherals distribution is a lucrative business. From the data, it was also inferred that computer peripheral distributorship is a business that can be run with less than 50 employees.

Table 1: Demographics information

Demographics	Categories	Frequency	Percent
Type of business	Wholesale	27	6
	Retail	424	94
If wholesale, magnitude of the business	Regional	429	95.1
	National	22	4.9
Experience	1-2 years	18	4
	3-5 years	8	1.8
	6-10 years	39	8.6
	> 10 years	386	85.6
Revenue of your business	Up to 10 lakhs	104	23.1
	11 lakhs to 50 lakhs	177	39.2
	51 lakhs to 1 crore	36	8
	More than 1 crore	134	29.7
Number of people working in your distributorship	Less than 50	439	97.3
	51-100	10	2.2
	101-150	2	0.4
Total		451	100.0

Measures

A 25-item instrument was developed to measure the promotional strategies adopted by the computer peripheral distributors. The scale was developed based on the researcher's prior knowledge as well as from the knowledge gained through literature review on sales promotional strategies. The push strategies

were measured in terms of Tradeshows, Showrooms, Packaging, Point of sale and Supply chain efficiency. The pull strategies are measured in terms of Advertisements, Referrals, Customer Relationship Management, and Promo and discounts. Market share and sales is considered the main dependent variable in the study and was measured in terms of Market penetration, Repurchase, Profit, and Customer loyalty. A 15-item scale was used to measure Market share and sales. The responses to the items were rated on a 5-point Likert scale ranging from 1- Strongly Disagree to 5- Strongly Agree. Hierarchical regression was carried out to show the amount of variance in the market share and sales of computer peripherals that could be explained by each of the push and pull strategies considered in the study.

4. RESULTS

Push strategies as predictors of market share and sales

H1: Push strategies are positively related to market share and sales

A hierarchical regression analysis was carried out to determine which of the push strategies of sales promotion significantly predicted the market share and sales of computer peripherals distributorship business. The predictors used in the regression models are Trade show, Packaging, Point of sale, Showrooms and Supply chain efficiency. In step 1 (first model), Trade show alone was used as the predictor (F=638.48; p<0.001) and it was found that 58% variance in market share and sales can be explained by Trade show. In the second step, Packaging was introduced into the model (F=10.250; p<0.001) and it was found that 59% variance in market share and sales can be explained by both Trade show and Packaging. In the next step, Point of sale was pushed into the model (F=64.39; p<0.001) and 64% variance in market share and sales was accounted for after this step. After introducing Point of sale, it can be observed that the beta values for Packaging reduced by more than half and it was no longer statistically significant. In the next step (step 4), Showrooms was introduced into the model (F=7.38; p<0.001) and 65% variance in market share and sales was accounted for after this step. After the introduction of Showrooms, the beta values of other predictors reduced to more than half and were no longer statistically significant. Point of sale and Packaging did not make a statistically significant contribution to the regression models in either step. Supply chain efficiency was added to the model in the last step (F=40.384; p<0.001), after accounting for all the other variables in the model, and it was found that the amount of explained variance in market share and sales increased. After adding Supply chain efficiency, though the betas of Trade show and Point of sale reduced, they became

statistically significant predictors of market share and sales. Thus, it can be inferred from these results that Supply chain efficiency, Point of sale and Tradeshow are the push strategies that significantly

predict the market share and sales of computer peripherals distribution. Based on these results, H1 has been accepted.

Table 2: Push strategies as predictors of market share and sales

Model	Unstandardized Coefficients		Standardized Coefficients	t	R ²	Adjusted R ²	F	p
	B	Std. Error	Beta					
(Constant)	1.347	0.131		10.278	0.587	0.586	638.487	0.000
Trade show	0.725	0.029	0.766**	25.268				
(Constant)	1.280	0.131		9.739	0.596	0.595	10.251	0.001
Trade show	0.511	0.073	0.540**	7.041				
Packaging	0.228	0.071	0.246**	3.202				
(Constant)	0.991	0.128		7.735	0.647	0.645	64.390	0.000
Trade show	0.401	0.069	0.424**	5.789				
Packaging	0.003	0.072	0.003	0.042				
Point of sale	0.394	0.049	0.418	8.024				
(Constant)	0.957	0.128		7.484	0.653	0.650	7.385	0.007
Trade show	0.368	0.070	0.388	5.257				
Packaging	-0.078	0.078	-0.084	-1.006				
Point of sale	0.350	0.052	0.371	6.781				
Showrooms	0.167	0.061	0.180*	2.718				
(Constant)	0.837	0.124		6.751	0.682	0.678	40.384	0.000
Trade show	0.278	0.068	0.294**	4.065				
Packaging	-0.091	0.075	-0.098	-1.222				
Point of sale	0.270	0.051	0.287**	5.305				
Showrooms	-0.023	0.066	-0.025	-0.345				
Supply chain efficiency	0.395	0.062	0.413**	6.355				

**<0.001; *p<0.01

Pull strategies as predictors of market share and sales

H2: Pull strategies are positively related to market share and sales

Hierarchical regression analysis was again performed to determine whether the pull strategies of sales promotion, such as Advertisement, Referrals, Customer Relationship Management (CRM), and Promo and discount improved the market share and sales of computer peripherals distributorship. These strategies were considered as the predictors in the model and market share and sales was considered as the dependent variable. In the first step, Advertisement was introduced into the model (F=596.03; p<0.001) and it was found that 57% variance in market share and sales was explained by it. In the second step, Referrals was introduced into the model (F=45.641; p<0.001) and

61% variance in market share and sales was explained by both Advertisement and Referrals. In the next step (Step 3), Customer Relationship Management was introduced into the model (F=45.641; p<0.001) and 62% variance in market share and sales was explained after this step. The beta values of Advertisements and Referrals though were reduced, their contribution to market share and sales was found to be significant. In the last step, Promo and discount was added to the model (F=23.256; p<0.001) and it was found that all the predictors together explained 64% variance in market share and sales. The beta value of CRM reduced by more than half after the addition of Promo and discount and was found to be no longer significant. Thus, it was found that among the pull strategies, Advertisement, Referrals, and Promo and discount significantly predicted the market share and sales of computer peripherals distributorship. Hence, H2 has been accepted.

Table 3: Pull strategies as predictors of market share and sales

Model	Unstandardized Coefficients		Standardized Coefficients	t	R ²	Adjusted R ²	F	p
	B	Std. Error	Beta					
(Constant)	1.474	0.130		11.308	0.570	0.569	596.036	0.000

Advertisement	0.707	0.029	0.755**	24.414				
(Constant)	1.244	0.129		9.650	0.610	0.608	45.641	0.000
Advertisement	0.462	0.046	0.494**	10.148				
Referrals	0.292	0.043	0.329**	6.756	0.625	0.622	17.713	0.000
(Constant)	1.201	0.127		9.451				
Advertisement	0.401	0.047	0.429**	8.549				
Referrals	0.180	0.050	0.202**	3.589				
Customer Relationship Management	0.185	0.044	0.219**	4.209				
(Constant)	1.075	0.127		8.482	0.644	0.640	23.256	0.000
Advertisement	0.361	0.047	0.386**	7.755				
Referrals	0.148	0.049	0.167**	3.003				
Customer Relationship Management	0.043	0.052	0.050	0.817				
Promo and discount	0.240	0.050	0.271**	4.822				

**p<0.001

5. DISCUSSION

Tradeshows were found to significantly predict the market share and sales of computer peripherals. Organizations that conduct events such as exhibitions, fairs and expositions can effectively promote their products, find prospecting and nurturing leads which can be converted into customers, gather competitive information, build brand image and explore potential partnerships (Kim & Mazumdar, 2016; Sarmiento, Farhangmehr & Simões, 2015). These benefits reaped through participating in tradeshows can increase the profits and market penetration of firms, as found in the present study.

It was also found that Packaging and Point of sale did not have much impact on the market share and sales of computer peripherals when Showroom was used to promote their products. When organizations display their products in a showroom, the customers are not really concerned about the packaging of the product and its point of sale. At showrooms, the customers can physically inspect the product and later buy them from any merchant online or at another physical store. Therefore, when showrooms are used to promote a product, packaging and point of sale have no significance in marketing the product.

When supply chain efficiency was introduced as a push marketing strategy, the showrooms and packaging did not have significant impact on market share and sales. Under this strategy, the companies know what to expect when. So, they may be able to successfully sell their product as and when required by the customers. In such cases, the customers need not be bothered about showroom experience and packaging of the product. Also, efficient supply chains will help organizations predict the needs of their customers and reduce the gap between supply and demand, which in turn improves product

availability in the market; thereby, ultimately increasing the organization's profits.

Along with supply chain efficiency, tradeshows and point of sale were also significant at predicting the market share and sales of computer peripherals. The first step of regression which shows tradeshows as a significant predictor of market share and sales is in line with earlier findings reported by Patten (2001) and contradicted the findings by Yeshin (2006). The current study also found that point of sale has an impact on the profitability, customer loyalty, repurchase and market penetration. These findings can be substantiated by those reported earlier by Hwang and Thomadsen (2016) who found that Point of sale increases the purchase shares of a brand.

The first block of regression for pull strategies (Table 3) shows that advertisements significantly predict the market share and sales volume of computer peripherals in terms of repurchase, customer loyalty, profit and market penetration. Studies like Huang and Sarigöllü (2014) and Malik et al. (2013) have also found evidence for the impact of advertisements on the market share of a brand or product and on the buying behaviour of customers. Balakrishnan, Dahnil and Yi (2014) also found evidence that advertising through social media increases the purchase intention among the Y generation. Thus, advertisements play an important role in enhancing the sales of a product.

The second block of regression (Table 3) shows that Referrals, usually word-of-mouth, play an important role in enhancing the market share and sales of computer peripherals and the last step of regression shows that Promo and discounts also have a significant impact on the market share and sales in terms of repurchase and profits. The findings can be corroborated by the findings put forth earlier by Ataman, Van Heerde and Mela (2010) who also explored and reported the positive effects of price

promotions and advertising on brand sales. The impact of promotional strategies on customers buying intention was also posited by other researchers like Rong-Da Liang, Yang, Chen and Chung (2017), and Khouja, Subramaniam and Vasudev (2020).

6. CONCLUSION

The study found that push and pull strategies have a significant impact on the market share and sales of computer peripherals. Among the push strategies, trade shows, point of sale and supply chain efficiency can significantly increase the sales, profits, customer loyalty and repeat purchase intention. In the case of pull strategies, advertisements, referrals, and promo and discounts can significantly increase the market share and sales of computer peripherals. It is recommended that computer peripheral distributors must conduct trade shows regularly to display their products and to develop connections while also improving the efficiency of their supply chain to meet customer demands. The distributors must also spend on advertisements and sales promotions for marketing their products, which will increase their market presence.

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Faculty of Economic Sciences and Law

ARFYT VII 2020



University of Pitesti

ACADEMIC RESEARCH FOR YOUNG TEACHERS INTERNATIONAL WORKSHOP PROGRAMME

THE 19th OF DECEMBER 2020

ONLINE EDUCATION AND RESEARCH

	9h30 – 13h30	15h00 – 19h00	
	MORNING SESSION ONLINE	AFTERNOON SESSION ONLINE	
9h30	ONLINE OFFICIAL RECEIVING GUESTS	Gheorghe SĂVOIU, Marian TAICU <i>What Do You Really Need to Realize Online Courses?</i>	15h00
10h00	Opening speech Rector of the University of Pitesti	Milenko IVETIĆ <i>Online Seminars as Case Studies of the Organizational Objectives</i>	15h30
10h30	Gheorghe SĂVOIU & Mladen ĆUDANOV <i>Online Education & Research</i>	Gheorghe SĂVOIU and ARFYT team <i>Some of the Most Cited Online Researches and Courses During the Last Years</i>	16h00
11h00	Gheorghe SĂVOIU, Mladen ĆUDANOV, Magdalena DĂNILĂ <i>A New Typology of the Online Scientific Research</i>	Coffee break	16h30
11h30	Coffee break	J.M. Patekari, S.D. Naik, M.G.Sayyad <i>A Review of Online Doctoral Research on Multidisciplinary Information Needs</i>	17h10
11h50	Gheorghe SĂVOIU, Magdalena DĂNILĂ <i>"How-to-do" and "Checklist" for the Major Online Activities in Academic Education</i>	Gheorghe SĂVOIU <i>Some Opinions about Online Available Sources for Bibliographies and References in the Internet Universe</i>	17h40
12h30	Gheorghe SĂVOIU, Mladen ĆUDANOV, Georgiana MĂNDRECI <i>The Future in Online Academic Education Will Choose a Minority of the Today Important Universities?</i>	Final discussions about common projects/contracts	18h10
13h00	Teodora LUKIĆ, Marija JOVIĆ <i>Customer satisfaction with online shopping</i>	Workshop closing	19h00
13h30	Lunch break		
		ARFYT WORKSHOP ORGANIZER 2020 Gheorghe SAVOIU e-mail: gsavoIU@yahoo.com Phone: +40 745 047 085	

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Academic Research For Young Teachers INTERNATIONAL WORKSHOP PROGRAMME THE 19th OF DECEMBER 2020 ONLINE EDUCATION AND RESEARCH

10:00 - 10:30	10:30 - 11:00
WORKING SESSION ONLINE	AT TERNION SESSION ONLINE
10:00 George SAVOIU, Mladen CUDANOV Workshop Opening	10:00 George SAVOIU, Mladen CUDANOV Workshop Opening
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NEW TYPOLOGY OF ONLINE SCIENTIFIC RESEARCHES AND MULTIDISCIPLINARITY

George SAVOIU¹, Mladen CUDANOV²

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Abstract. The well-known www (world wide web) or Internet and the history of education and research specific flows in academic universe are the most important topics for the introductive section, together with a brief conceptualization of multidisciplinary, Classical types and the modern typology of the scientific researches are generally coordinated inside the second section and some final remarks underlines the future of online scientific researches, concluding this article, opening the ARFYT workshop.

Keywords: online education, pandemic period, Internet, educational network, academic clusters.

1. INTRODUCTION
This paper about the typology of online scientific researches and multidisciplinary becomes possible because of the existence of Internet, used not only as a scientific and research or academic net but also as a new language. Some particular characteristics of the modern Internet, such as immediacy, immateriality, and a relatively free and uncontrolled

from academic to economic profiles, and even from scientific to art groups [2].
The Internet is often described as "organized chaos." One can use a simple figure (Fig. no. 1) placing inside it one subordinate-descendent line to describe finally two major academic flows of words to describe the history of the Internet inbetween education and research.

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    graph TD
      A[INTERNET IN UNIVERSITIES] --- B[ACADEMIC INSTITUTIONS]
      B --- C[EDUCATION INTERACTIONS]
      B --- D[RESEARCH INTERACTIONS]
  
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Fig. 1. Two major flows of Internet in universities
The real Internet history traced linkage among the

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