Customer Awareness of Medical Wearable Health Care Technology and Policy Management in India

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KEYWORDS	ABSTRACT
Internet of Things, Medical Devices, Wearable Medical Devices	Patient and healthcare providers can take preventive actions based on a review of vital signs obtained remotely with wearable medical devices thanks to Internet of Things-based wearable sensors and an integrated cloud platform. Provide essential home care that is as clean and well-manicured as the intensive care unit (ICU), complete with remote vital sign monitoring. In India, there is no governing agency for healthcare. Healthcare professionals are concerned about the dependability of medical devices in the absence of sufficient laws, which makes them prefer to employ conventional medical devices. Based on related dangers, medical gadgets are to be divided into four types. Converging, analysing, and applying massive data collected by wearable medical devices for use in illness diagnosis, mitigation, and preventive therapy is a challenge to the medical business. By exchanging real-time data, the use of wearable medical devices would not only aid to strengthen patient-physician relationships but also decrease the need for human interventions. To uncover consumer awareness difficulties in the adoption of these devices, this paper explores the possibilities of the Internet of Things in the medical wearable business.

1. Introduction

Non-communicable diseases (NCDs) pose a serious risk to human health, development, and economic expansion. If immediate action is not done to prevent and cure NCDs and mental health disorders, the world's lost economic output from 2010 to 2030 might amount to $47 trillion. NCDs represent a threat to India's population and economy [1]. According to estimates, the top causes of death in India include cardiovascular illnesses, malignancies, chronic respiratory disorders, diabetes, and other non-communicable diseases (NCDs). These conditions account for 60% of all deaths, surpassing even infectious diseases, accidents, and maternal, perinatal, and nutritional problems. Moreover, around 40% of hospital stays and roughly 35% of documented outpatient visits are related to noncommunicable diseases. In addition to a significant increase in the number of elderly people, the spectacular growth in human life expectancy over time has also caused a significant shift in the demographic of those 80 years of age and older. Wearables, sensors, mobile health apps, and medical equipment in clinics and hospitals are just a few of the technological innovations that are changing this environment. They make it easier for carers to carry out their duties by automating the logging-on process, updating patient vitals in real time, and offering insights into early disease diagnosis. Technologies facilitate the gathering, storing, and exchange of vital patient data. Carers can give the patient far better advice and an analysis of their condition by adding an analytics layer to this. Based on specific triggers in vital signs, AI can help carers spot diseases early. Wearable technology and smart sensors can follow patient history and potential threats to an individual even outside of hospitals. This can be helpful, particularly for individuals who are more vulnerable, including those with diabetes or a history of heart attacks [2]. People have a variety of options to monitor their own health parameters in order to not only lead a healthy life but also obtain professional opinion by simply sharing these parameters with their carers. These range from basic fitness and heart rate monitors to smart glasses and smart clothing. The number of wearable sensors on the market has expanded dramatically in the areas of athletics, fitness, and enhanced productivity and connectivity [5]. However, there are major obstacles in the way of its implementation in Indian healthcare [3]. In the wake of transforming research by gathering big data on pre-symptomatic patients to understand disease and develop earlier inventions, the challenge rests with the medical innovation industry and corresponding marketers to lower the innovation cost and raise the awareness of potential customers [11]. The outline for the paper is as

follows. Section 2 contains some relevant work. Evidence of a comprehensive security and privacy system is presented in Section 3. Current wearable technology is covered in Section 4, with a discussion of the findings in Section 5 and a conclusion in Section 6.

Related works

In the presentation [4] titled "Mobile health: the power of wearables, sensors, and app to transform clinical trials," the speaker reviewed the International Diabetes Federation's estimates from November 2013 that the number of people with diabetes will rise by 50%, with an estimated $630 billion in costs to the health care system. Many smartphone and wearable sensor owners use their devices to automatically track and measure their own health, including sleep, vitals, and exercise [10]. However, most routine lab tests will likely soon be available to consumers with Smartphone kits, which will shift the ownership of data from healthcare providers to patients (see [15] "Unpatients-why patients should own their medical data"). The knowledge gap between consumers and the wearable technology market was discussed in [6] "Wearable Technology Products: Awareness in Sri Lankan Market," where it was stated that low customer motivation, low trust, low market influence, and lack of product experience were among the factors contributing to customers' decreased awareness. The Innovation Adoption Model was described in "Marketing: an Introduction" [7]. But according to the Innovation Adoption model's phases, using marketing tools and techniques developed by marketers can help move consumers from "Awareness" to "Evaluation." Doctors will be able to replace one-off tests with continuous monitoring that offers a much better continuous real-time "view" into the patient's conditions [12]. This is highlighted in practical implications in [13] "Wearable sensors bring new benefits to continuous medical monitoring, real time physical activity assessment, baby monitoring, and industrial applications." In the future, wearable monitoring will contribute to far better medical care. Remote monitoring and supervision will be possible for industrial managers and other officials. According to [9], as the number of senior adults rises, remote healthcare has emerged as a crucial service [16]. A growing concern in healthcare is the monitoring, rehabilitation, and assisted living of the aged and medically challenged. These services depend on smooth networking between patients, medical equipment, and social and medical service providers[8]. This highlights the need for wearable technology that is inexpensive, dependable, low-power, and can enhance the quality of life for a large number of elderly and physically disabled individuals. Wearable ECG devices, according to [17], have the potential to completely change how doctors manage a variety of cardiovascular illnesses (CVD). The elderly, young, and chronically sick patients stand to gain the most from these systems. Heart-related problems are more common in the elderly population. Keeping a close eye on their ECG will enable early detection and prevention [14]. These technologies will aid in the development of very effective ambulatory ECG systems that will get beyond the limitations of ECG systems that are at rest. India has a sizable market for medical wearable diagnostic devices due to a number of factors, including an ageing population, rising disposable income, shifting disease patterns, emphasis on preventive healthcare and awareness, growing demand for health-focused diagnostic services like Mapmygenome, shifting demographics including an increase in tech-savvy individuals and their use of these devices, and rising awareness and literacy rates. This study is arguably the first to examine Indian behaviour in relation to wearable healthcare devices' acceptability. Understanding new health information technology (HIT), how it is received, and how it affects privacy and health is also helpful.

2. Methodology

A quantitative research approach was utilised to investigate factors influencing opinions and buying intentions for WT medical equipment. Feedback was obtained via a preliminary pretest of a questionnaire given to doctors in several hospitals in India who specialise in different specialties. The logic required to accept or reject any hypothesis is sufficiently and sufficiently provided by statistical approaches. The literature review indicates that the tools are most suitable and fitting. In order to test social issues like awareness and perception scientifically, the researchers have employed the aforementioned instruments.

Table 1. Participants profile

		Frequency	Percentage
Gender			
	Male	84	49
	Female	99	51
Education	Educated	139	76%
	Uneducated	44	24%
Family Income	2000- 10,000	180	98.36
	10,000- 25,000	2	1.10
	25,000- 40,000	1	0.54
	More than 40,000	0	0
Age	51-60 years	44	24
	46-50 years	139	76
	17-25 years	0	0
	20-30 years	0	0
Occupation	Medical field	139	76
	Doctors	44	24
	Teaching Staff	0	
	Faculty Members	0	
	government or private sector	139	76
	self-employed	44	24
	Engineer	0	

Data Analysis Techniques

To assess the awareness, roles, and perceptions, as well as to determine the validity and reliability of the questionnaire, appropriate statistical tools such as Microsoft Excel and SPSS are utilised. The data analysis methods utilised were ANOVA (one way/two way).

Table 2. Students opinion to their mental health

Comments	Frequency	Percentage
Role of Gender to familiarity and MWT Purchase	99	51
Role of education categories to familiarity with the WT Device and WMT Purchase:	84	49

Role of income to familiarity with the WT Device and WMT Purchase	99	51
Role of Medical Profession to familiarity with the WT Device and WMT Purchase	139	76%
Role of a WT category (sports/fitness/health/cloth/security) to customized offering:	44	24%
Role of Gender to customized offering / promotional impact and purchase of a suitable WT category	180	98.36
Role of Education to customized offering and purchase of a suitable WT category	2	1.10
Role of Medical Professional field to customized offering and purchase of a suitable WT category	1	0.54
Role of Medical Professional to Medical wearable purchase decision depending upon the facilities on the smartphone	0	0
Role of Education to Medical wearable purchase decision depending upon the facilities on the smartphone	44	24
Role of Age to Medical wearable purchase decision depending upon the facilities on the smartphone	139	76

3. Results and discussion

The results of the ANOVA test and t-test, (Table 3 and 4) show that all independent factors and the corresponding subscales under consumer behaviour and the psychological factor.

Table 3. ANOVA test result

Variables	Category	Awareness				
		Mean	Standard Deviation	Count	F	Sig
Age	Under 15	3.47	1.155	16	.685	.603
	25- 30	3.25	1.025	601		
	31-45	3.39	.993	350		
	45-70	3.24	1.089	96		
	Above 30 years	3.24	1.114	71		
Educational Level	Diploma	2.25	1.075	9	2.260	.080
	UG	3.43	1.034	145		
	PG	3.28	1.019	773		
	PhD	3.30	1.046	207		
	≥ Rs.10000	3.21	1.072	108		

income	Rs. 20000-30000	3.30	1.011	486	.194	.901
	Rs. 30000-40000	3.29	1.049	342		
	Rs. 40000-50000	3.33	1.024	198		
Family size	3-4	3.30	1.032	818	.511	.674
	4-6	3.27	1.030	270		
	6-8	3.85	.576	9		
	8-10	3.26	1.059	37		
Aware of Wearable Technology	1-2 times	3.28	.975	423	1.600	.173
	2-5 times	3.36	1.034	288		
	5-10 times	3.38	.997	180		
	11-20 times	3.36	1.126	99		
	21 times or more	3.05	1.120	144		

It is evident from Tables 3 and 4 that the researcher has considered every aspect and detail. Function of Demographic variables influencing the degree of acquaintance with the current wearable device and the intention to purchase a medical wearable device: Before making a buying decision, women prefer to try on wearable technology, whereas men are more accustomed to it. Prior to making a purchase of a medical wearable, postgraduates in the 1 Lac to 5 Lac income range also rank familiarity with the wearable device as a critical factor. The IoT Policy Enforcement Framework, which continuously oversees service provisioning and access control operations, is primarily integrated into the IoT Platform. It specifically manages all of the activities involved in resource access control, dynamic and adaptive service providing, data processing, node/user registration, etc.

Table 4. t-test result

Demographic Profile	Category	Awareness					
		Mean	SD	N	t	df	Sig.
Gender	Male	3.27	1.048	751	-.665	1132	.506
	Female	3.33	1.000	383			
Insights from the physician's perspective	Less than 3 years	3.28	.967	180	-.195	1132	.845
	More than 3 years	3.30	1.041	954			
Insights from the physician's perspective	Less than 3 years	3.30	1.029	873	.420	1132	.675
	More than 3 years	3.26	1.032	261			
Insights from Policy makers	Less than 3 years	3.30	1.029	873	.420	1132	.675
	More than 3 years	3.26	1.032	261			

IoT Platform includes logical entities and interfaces that expose the set of capabilities of the IoT Policy Enforcement Framework, together with databases for policies, user profiles, and data storage servers. Customers, doctors, and policy administrators who may be involved in the Internet of Things application space or serve as facilitators of ten smart health settings in various hospitals, clinics, and pharmacies are the main stakeholders. Thus, it may be said that: Start-ups play a significant role in introducing technology disruption that is less expensive and more agile. Assuring volumes of scale, the

solution positioned in India will function well in international markets with no need for customisation. The "Interoperability Standards for interoperability at device, network, and application levels" are essential to startups.

4. Conclusion and future scope

The primary cause of the dearth of early NCD illness diagnosis is the implementation of central licencing authority policies and low public investment in preventive healthcare technologies. India must therefore embrace entrepreneurship as an economic growth paradigm and make investments in accessible innovation. Our goal is to establish a "ideas economy" that fosters constant value accumulation and, consequently, increases jobs and the economy by supporting creative entrepreneurs. With the target market segment determined in the previous section's conclusion, companies can use a hybrid subscription business model to provide medical WT products at a reasonable price. Advantageous demographics and a ripe innovation base bolstered by enabling technologies such as cloud computing, big data analytics, mobile health, and artificial intelligence necessitate an integrated business model in which the client pays a weekly, monthly, or annual subscription fee customised to his preventive care needs. Academics, entrepreneurs, and industry would all help to support this integration; they would just need to explain the value provided.

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