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PARTICIPATORY CHALLENGES AND PRIORITY CONCERNS FOR WOMEN IN HIGHER EDUCATION

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Abstract

The present paper emphasis on Women education is the sole element in determination societal, economic and civilisation development of a Nation. In every women men is there and therefore if a Nation believes on such gender growth certainly emphasis on societal improvement. Education is milestone of women empowerment because it enables them to responds to the challenges, to confront their traditional role and change their life. So that we can't neglect the importance of education in reference to women empowerment India is poised to becoming superpower, a developed country by 2020. The growth of women's education in rural areas is very slow. It signifies that still large womenfolk of our country are illiterate, the weak, backward and exploited. Education of women in the education of women is the most powerful tool of change of position in society. Education also brings a reduction in inequalities and functions as a means of improving their status within the family. To provide the education to everyone, EFA programme was launched in 2002 by the Government of India after its 86th Constitutional Amendment made education from age 6-14 the fundamental right of every Indian child. But position of girl's education is not improving according to determined parameter for women. In accordance to the words of our beloved Prime Minister Pandit. Nehruji's, the real growth is based on the educating the women their by it also enhance and enrich Bhrath Matha in all spheres of endeavors.

Key Words: Higher Education, Women Education, Women Empowerment, Teachers, Literacy Rate.

Introduction

Women education in India plays a very vibrant role in the overall development of a country. It not only helps in the development of half of the human resources, but in improving the quality of life at home and outside. Educated women not only tend to promote education of their girl children, but also can provide better guidance to all their children. Moreover educated women can also help in the reduction of infant mortality rate and growth of the population. All these leads to significant development in all over the spheres of a Nation. Of nearly 300 Government-run universities in India, roughly six per cent have women as their Vice-Chancellors. Women continue to be a minority when it comes to positions of leadership and influence in higher education institutions in the country despite the fact that the sector has undergone a sea-change since Independence. Even as the number of women in the sector has increased significantly in the past three decades, this does not translate into senior appointments or leadership positions within higher education institutions, when compared to other developed nations. The number of women working at the top level of academia or in senior university management positions is still far less.

Grossly under-represented, there are only a few women who have risen to the position of influence within the male-dominated Indian academic system. This despite the fact that the framework of national development recognizes women as a unique power unit and a potential resource that has played a crucial role in social reforms, economic development and political process. Although the Companies Act of 2013 mandates that every public company should have at least one woman director, there is no such legislation for government or private universities.

The Glass Ceiling in Higher Education

Back in the 90s, the Commonwealth Secretariat and UNESCO had conducted a study 'Women in Higher Education Management in India'. According to the study, seven per cent (pc) of professors, 22 pc associate professors, 38 pc assistant professors and 56 pc lecturers were women. At university-level institutions, only six pc had women vice-chancellors (VCs), 21 pc had women senior administrators and 10 pc had women heads of departments and principals of affiliated colleges. In the past one decade, there has been only a marginal improvement in these numbers, as per the All India Survey of Higher Education (AISHE) conducted by the Ministry of Human Resources Development (MHRD) for the past five academic sessions.

Even if women have achieved positions of high office, it has usually been associated with 'soft' subjects like Social Sciences, Humanities and Arts, and not in the 'STEM' subjects of Science, Technology, Engineering and Mathematics. Gender disparity is visible in the VC or Director positions of some of the most popular educational institutions of the country. Consider this: In the current session of 2014-15, of the 42 Central Universities in the country, just two — Pondicherry University and The

English and Foreign Languages University in Telangana — have women VCs, Prof Chandra Krishnamurthy and Prof Sunaina Singh respectively.

In the 62 institutes of National importance including the Indian Institutes of Technology (IITs), there are only two women Directors — Dr SK Pandey who is the Director of NIT-Puducherry and her counterpart in Rajiv Gandhi National Institute of Youth Development, Dr Latha Pillai. Among the 16 National Law Universities, only two — National Law University at Jodhpur and National University of Advanced Legal Studies at Kochi have women VCs now, Prof. Poonam Saxena and Prof Rose Varghese respectively. The first woman in India to head a university as its VC was Hansa Mehta. An educator, freedom fighter and a social reformer, Mehta was the VC of the SNDT University, India's first women's university, from 1946 to 1948 and the MS University of Baroda from 1949 to 1958. In fact, she was the first VC of MS University of Baroda but after her, only the 11th VC of the university was a woman — Padma Ramachandran.

Interestingly, the famed Viswa-Bharati University has never had a full-time woman VC in its 64 years of existence. In 1946, Indiradevi Chaudhurani was appointed VC of Viswa-Bharati University temporarily. Similarly, the country's apex institution of medical sciences, All India Institute of Medical Sciences (AIIMS), since its inception in 1956, has been headed by just one woman, Prof Sneha Bhargava, from 1984 to 1990. The first three universities in the country were set up at Bombay (University of Mumbai), Calcutta (University of Calcutta) and Madras (University of Madras) in 1857. While the University of Calcutta and University of Madras have never been headed by a woman VC till today, the University of Mumbai had two woman VCs — Dr Snehalata Deshmukh and Dr Chandra Krishnamurthy (acting VC).

The Jawaharlal Nehru University, one of India's avant-garde institutions, has not had a single woman VC yet. Even when it comes to the University Grants Commission (UGC), only two women have headed this apex regulatory body for higher education in India for five years each since its inception on December 28, 1953. They are Dr Madhuri R Shah, who held the position from 1981 to 1986, and Dr Armaity S Desai, who was the UGC Chairperson from 1995 to 1999.

No Capacity Building of Women Faculty

Prof Desai was instrumental in starting a 'Capacity Building for Women Managers in Higher Education' programme under the UGC in 2004, to help women in higher education overcome gender bias and take up academic leadership. The idea was to promote gender equality in higher education institutions, which are not gender neutral either in their structure or functioning. "You will not find many women as VCs in India because the selection committees mostly comprise men, who do not give much weight age to women candidates. Besides, we have observed many times that

women candidates do not have the confidence and are not ready to take up the role, which is why we had started the capacity building programme," says Prof Desai, who was also the former director at the Tata Institute of Social Sciences (TISS).

The programme was carried out in three levels - SAM (Gender Sensitization and Motivation) workshops, ToT (Train the Trainer) workshops, and MSEM (Management Skills Enhancement Modules), which is spread over five to six days each, in 10 regions covering all parts of the country. Teachers with five to 10 years of experience were identified for the workshops. The initiative yielded results with around 7,000 women faculty members being appointed as either principals, deans or heads of departments in colleges or VCs in a period of seven years.

However, UGC stopped sanctioning funds for the programme in mid-2012 and it was abruptly stopped in 2013 for reasons unknown. "It is extremely shameful that an apex governing body of higher education stopped a participatory programme like this one, which actually developed management skills of women teachers, without any reason. The initiative was instrumental in bringing about a change. Women who had completed the training and gone back to their institutions saw noticeable changes in themselves and in the way they functioned." Currently, the women faculty members and administrators who were associated or had benefited from the programme, are networking through a closed Google Group where information, problems and suggestions on the issue are shared.

Prof Desai laments that the country is patriarchal and that that attitude pervades the higher education system as well. "Patriarchal attitudes are why women are overlooked. When they have been at the receiving end of men's chauvinistic attitudes, most women back down and do not attempt to capture opportunities for management positions."

Dual Roles of Balancing Career and Home

Social Scientist and former Vice-Chancellor of SNDT University, Prof Suma Chitnis feels the problem of gender disparity is a psychological one, although women in higher education are more hardworking and committed than their male counterparts. She says many times it has been noticed that women join the academic profession because it is safe and gels well with their responsibilities as home-makers. "The number of women faculty members in the country has increased to a large extent, but only a handful of them rise to the positions of directors, VCs, professors and registrars," she says. This is because; women are stuck with the dual responsibilities of managing home and work, unlike men.

"As a result, they are, in many cases, unable to give their 100 per cent to work. For upward career growth and to reach managerial levels, they need to carry out research, write papers, acquire doctoral and post-doctoral degrees and other

academic distinctions, attend seminars, etc. But while managing home, they do not get time to think about going beyond their academic positions. "Most women in academic posts consider their role as professionals or as one that helps supplement their husband's income, and therefore they lack the drive to move up. Although this mindset is changing, the change is visible only in metros and bigger cities.

A pointer to this is the increasing gender disparity in the hierarchy, beginning from Lecturer to Vice-Chancellor posts. The last available AISHE report of 2012-13 states that of 10,954 Lecturers in the country, 6,712 were women; of 2, 44,242 Assistant Professors, 1, 72,978 were women and there were 4,173 women Readers against 7,567 males in the post. While gender disparity in these three posts was less than 50 pc, it was more than half for the positions of Professor, Principal, Pro-Vice Chancellor and VCs, who are the administrative as well as the academic heads of institutes. The report put the total number of VCs at 354 and of them, only six pc (18) were women. Places like Chhattisgarh, Delhi, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh had one woman VC each while, Odisha had two, Tamil Nadu four, and Telangana and West Bengal had two each. Of these 18 universities headed by women VCs, there are seven that are exclusively meant for women. The rest are co-educational. Of 24,074 people holding Principal posts, 49 pc (11,022) were women and of 53,954 Professor Posts, just 17,017 were women. Out of 64 Pro-VCs, only 12 were women.

Apparently, except for the AISHE data, the MHRD hardly has any information on gender composition of academic and administrative positions in higher education sector.

Participation of Women in Teaching

As far as faculty positions are concerned, there is also a systemic gender disparity that plagues the college and university education system in a majority of States. Although the population of the fair sex in the teaching profession at school-level is high (primary teaching is often seen as a women job), their number declines as we go up the hierarchy. As per the AISHE report, the total number of teachers in colleges is 6, 57,376. Out of this, 64.8 pc are male teachers and 35.2 pc are female teachers. Bihar has the lowest gender proportion where there are four times fewer female teachers than their male counterparts — 77.2 pc male and only 22.8 pc female teachers; Arunachal Pradesh comes second with 63.3 pc male teachers and 36.63 pc female teachers. Odisha, West Bengal, Jharkhand and Uttar Pradesh have only 30 to 40 pc (approximately) female staff of the total teachers available. A few States like Delhi, Chandigarh, Goa, Kerala and Meghalaya, on the other hand, have more female teachers than male teachers.

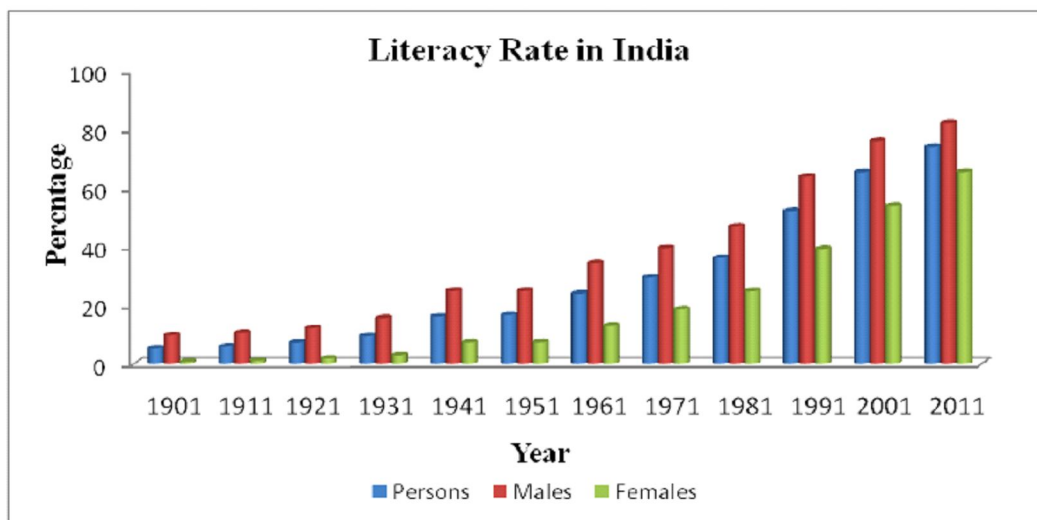
The report further states that there are merely 35 female teachers per 100 male teachers in colleges. Similarly in the SC category, the female staff is only half that is 46 per 100 males; ST category has around 60 females per 100 males and OBC has a little more than half female teachers. As far as Muslim minority is concerned, there are around 49 female teachers per 100 male, but other minorities are inversely higher with 120 females per 100 male teachers. Female representations in teachers belonging to Persons with Disabilities (PWD) category is half of the male teacher population in higher education institutions.

The 2011 Census report indicates that literacy among women as only 65.46 percent it is virtually disheartening to observe that the literacy rate of women India is even much lower to national average i.e. 74.04. The growth of women's education in rural areas is very slow. This obviously means that still large womenfolk of our country are illiterate, the weak, and backward and exploited. Moreover education is also not available to all equally. Gender inequality is reinforced in education which is proved by the fact that the literacy rate for the women is only 65.46% against 82.14% of men as per 2011 Census.

Table I - Literacy Rate in India Year Persons, Males and Females

Year	Persons	Males	Females
1901	5.3	9.8	0.7
1911	5.9	10.6	1.1
1921	7.2	12.2	1.8
1931	9.5	15.6	2.9
1941	16.1	24.9	7.3
1951	16.7	24.9	7.3
1961	24.0	34.4	13.0
1971	29.5	39.5	18.7
1981	36.2	46.9	24.8
1991	52.1	63.9	39.2
2001	65.38	76.0	54.0
2011	74.04	82.14	65.46

Source: Census of India 2011. Government of India



According to the Table I the pre-Independence time literacy rate for women had a very poor spurt in comparison to literacy rate of men. This is witnessed from the fact that literacy rate of women has risen from 0.7 % to 7.3 % whereas the literacy rate of men has risen from 9.8 % to 24.9 % during these four decades. During the post-independence period literacy rates have shown a substantial increase in general. However the literacy rate of male has almost tripled over the period e.g. 25% in 1951 and 76 % in 2001. Surprisingly the female literacy rate has increased at a faster pace than the male literacy during the decade 1981 -2001. The growth is almost 6 times e.g. 7.9 % in 1951 and 54 % in 2001. From this analysis one can infer that still the female literacy rate (only half of the female population are literates) is wadding behind male literacy rate (three fourth of the male population are literates). The rate of school drop outs is also found to be comparatively higher in case of women. This higher rate of illiteracy of women is undoubtedly attributing for women dependence on men and to play a subordinate role. The lack of education is the root cause for women's exploitation and negligence. Only literacy can help women to understand the Indian's constitutional and legislative provisions that are made to strengthen them. Thus promoting education among women is of great important in empowering them to accomplish their goals in par with men in different spheres of life.

Educational Equality

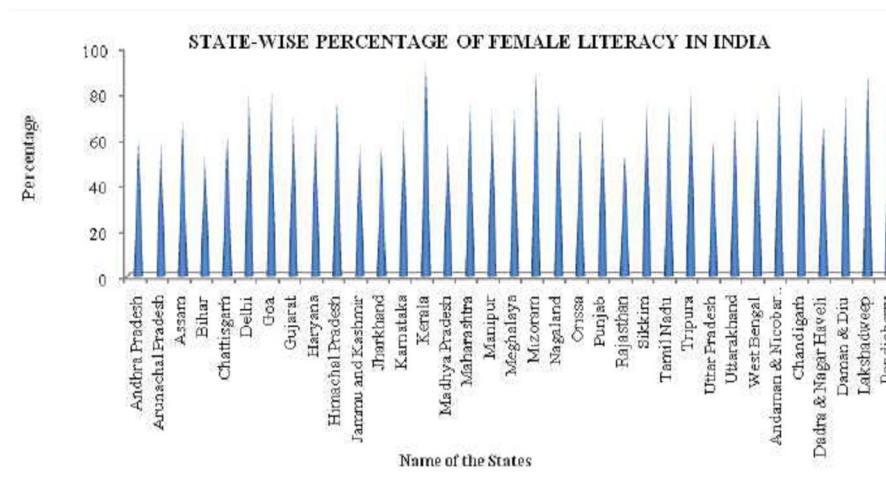
Another area in which women's equality has shown a major improvement as a result of adult literacy programs is the area of enrolment of boys and girls in schools. As a result of higher participation of women in literacy campaigns, the gender gap in literacy levels is gradually getting reduced. Even more significant is the fact that disparity in enrolment of boys and girls in neo-literate households is much lowered compared to the non- literate householders.

Table II - State-Wise Percentage of Female Literacy

S. No.	Name of the State	Female Literacy
1	Andhra Pradesh	59.7%
2	Arunachal Pradesh	59.6%
3	Assam	67.3%
4	Bihar	53.3%
5	Chattisgarh	60.6%
6	Delhi	80.9%
7	Goa	81.8%
8	Gujarat	70.7%
9	Haryana	66.8%
10	Himachal Pradesh	76.6%
11	Jammu and Kashmir	58.0%
12	Jharkhand	56.2%
13	Karnataka	68.1%
14	Kerala	92.0%
15	Madhya Pradesh	60.0%
16	Maharashtra	75.5%
17	Manipur	73.2%
18	Meghalaya	73.8%
19	Mizoram	89.4%
20	Nagaland	76.7%
21	Orissa	64.4%
22	Punjab	71.3%
23	Rajasthan	52.7%

24	Sikkim	76.4%
25	Tamil Nadu	73.9%
26	Tripura	83.1%
27	Uttar Pradesh	59.3%
28	Uttarakhand	70.7%
29	West Bengal	71.2%
Union Territories		
1	Andaman & Nicobar Islands	81.8%
2	Chandigarh	81.4%
3	Dadra & Nagar Haveli	65.9%
4	Daman & Diu	79.6%
5	Lakshadweep	88.2%
6	Pondicherry	81.2%
	All India	65.46%

Source: Census of India. Government of India.



According to the Table II the state wise female literacy rate had an average of 65.46% in all India basis in 2011 census the high literacy rate is 92.0% in Kerala and least literacy rate is 52.7% in Rajasthan in 2011 census while comparing literacy rate

of female 11% increased in 2011 census is increased from 54.16% to 65.46%. Women's are growing well in the last 10 years. Government of India has been taken various steps and plans especially for women empowerment and sustainable development in economic, trade, and industry.

Creating a Fair Environment

Academicians feel there will be gender-friendly policies in the higher education sector only when women are involved in the decision-making process. Not just Government intervention, but attitudinal changes are also required to ensure equal opportunities and a more representative leadership in the higher education sector. Often, when it comes to rotational leadership as heads of departments in universities, women are overlooked. "And these days, women faculty members are hired on contractual or ad-hoc basis. As far as VC positions are concerned, corruption and bias have had a major impact on entry of women," On the other hand, social activist equality should be made a key performance indicator in quality audits of higher education institutions. Besides, Government should again start training women faculty members to improve their participation in the management of higher education. "The academic aspirations of women in academic positions should be stimulated and they should be motivated to rethink their responsibilities as professionals," which was instrumental in opening a Centre for Women's Studies in Odisha's Utkal University. Women as heads of colleges and universities have a distinct role in redressing the bias against women in non-traditional professions. "They have a greater role to play in empowering their girl students by acquainting them with their social and political rights."

Struggling against the Dual Whammy of Caste and Gender

As part of a study on the socio-economic status of women from the 'Most Backward Castes', women from the Nayibrahmin or barber community talk of their lives of oppression and deprivation. Akhileshwari Ramagoud recounts their tales. In the hierarchy of caste, the service castes occupy the bottom rung, doing what is known as 'shuddhi' or cleansing -- keeping the society and its people clean through their services such as washing clothes, shaving beard and heads, and so on. Today, even as much time has passed, they remain at the lowest rungs as the stranglehold of their low caste status has prevented them from modernizing.

People from the lower castes have little education, and lead a hand-to-mouth existence since their traditional caste occupations do not give them either social respect or financial stability. Modernization has not resulted in any substantial gains to the community as they do not have the resources, either financial or human, to capitalize on it. As a result the community is floundering. If the overall community has remained backward both socially and economically, then the situation of the women in these communities has been even worse in terms of every social and economic indicator. The gender gap among Other Backward Castes (OBC) is enormous; OBC

women lag behind men in every social and economic indicator such as income, literacy, health, nutrition, ownership of land/property, life expectancy.

The Maternal Mortality Rate and Infant Mortality Rate are higher among OBC women than the general all-India rates. Besides, an epidemic of violence prevails in their society with OBC women facing regular domestic violence and sexual exploitation; they are also among the largest groups of women trafficked into sex trade. The women and girl children in these communities not only suffer from the general discrimination and deprivation that characterizes Indian women, but the very fact that they belong to excluded communities makes their situation far more tenuous than the women of 'upper' castes. They struggle against a variety of deprivations that make them vulnerable at different levels. Among the disadvantaged groups the women are doubly marginalized, first for being women and second for belonging to a disadvantaged community. As part of a survey to study the socio-economic status of women of the Most Backward Castes (MBC), an initial exploratory study of some of the MBCs was undertaken. The aim was to get an understanding of the situation by meeting the community leaders and the women themselves. This exercise would throw up the issues and concerns of the women which could be explored in depth in the next phase of the study.

At the Dusk of Life

Old age seems to be a curse, especially for women in the community. Two old women were deserted by their sons soon after the latter started their own family. According to her neighbours, one woman even fell at the feet of her two sons, begging them to take her with them but they didn't agree. They left the town. Today, the lady survives by washing dishes as domestic help. It does not own even a ration card, and now has an additional problem to deal with. She has a fairly large tumor in her armpit but no money for surgery. The other aged lady is a widow and has only one son; the latter, after marriage, has asked her to move out of his house. She used to make beedis but is now too old for it.

The tragedy lies in the fact that these women are alone as they deal with these issues of domestic violence, of old age and abandonment of parents by their sons, of the imperative to feed and educate their children. Is this world of women and their woes unknown to the male leaders of the community, waiting to be discovered? Not really. They know it very well but apparently, the women's problems are not seen as serious enough. And how do the community's elders respond to this crisis? Among several ideas considered, only one was implemented for women: awareness programmes and yagnas were conducted to inculcate 'good thinking' in them so that they could change themselves and become good wives and good mothers! It is an undeniable reality of our society that women are mere add-ons. They have no existence of their own, nor are they valued for their own merit. There is no independent recognition, either of their contribution or of their concerns. Their needs are overlooked or neglected, even ignored.

The fact appears to be something which is grasped by even the neglected women of the Nayibrahmin community. Asked if their problems were common to only women of their community or to all women, a woman stressed, all women faced such problems. While some admitted them, others were inhibited or ashamed to talk about them. This is the reality.

Conclusion

To conclude, as per the words of our beloved former First Prime Minister of India PT. JAWAHARLAL NEHRU, "If you educate a man you educate an individual, however, if you educate a woman you educate a whole family. Women empowered means mother India empowered". Education also brings a decrease in inequalities and functions as a means of improving their status within the family. To encourage the education of women at all levels and for dilution of gender bias in providing knowledge and education, established schools, colleges and universities even exclusively for women in the state. To bring more girls, especially from marginalized families of BPL, in mainstream education, the government is providing a package of concessions in the form of providing free books, uniform, boarding and lodging, clothing for the hostilities mid-day meals, scholarships, free circles and so on. Education for All (EFA) programme and other many educational programmes are providing various facilities to enhance the education for women, so these programmes are very helpful to improving the girl's education in India. Therefore, from the analyses it signifies that the sustainable growth and economic development relies on educating women in education it also leads to improve the sovereignty of the country.

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PROSPECTS AND CHALLENGES TO LEVERAGE THE INTERNET OF THINGS (IOT) IN PHARMACEUTICAL INDUSTRY

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Abstract

The Internet of Things (IoT) is increasingly being recognized by the pharmaceutical engineers and scientists as one of the most sophisticated technologies that has the potential to not only affect the health, safety and productivity of millions of people but also has a major impact on the cost of drugs and the health support system. IoT primarily consists of physical objects that are embedded with sensors, actuators, computing devices and data communication capabilities. These are linked to networks for data transportation. The backend systems exist for data aggregation, storage, analytics, visualization and host user-centric services. In the IoT, physical objects monitor their surroundings and participate in daily activities, helping create new product formulations, new drugs, services and business models, improve efficiency, decision-making processes and overall optimize the business operations. GMP manufacturing plants across the globe will soon encounter radical changes in their operations with increasing use of sensors on the production floor. This network of sensors which can drastically improve patient outcomes is referred to as Internet of Things for Pharmaceutical Manufacturing (IoT-PM). The paper discusses in depth the applications of IoT-PM in remote central monitoring, real time monitoring, organ-on-chips, chip in a capsule and the challenges in IoT-PM.

Key Words: Internet of Things, Good Manufacturing Practices, Remote Central Monitoring, Real Time Monitoring, Organ-on-Chips, Chip-in-a-Capsule, Product Serialization, Interoperability.

Introduction

Industrial pharmacy developed during the nineteenth century with the discovery of several potent medicinal agents that could be systemically and economically synthesized and standardized on a large scale¹. The synthesized medications gradually replaced the herbal medicines and this gave rise to further technology improvement in the pharmaceutical industry. There was an appreciable increase in technology development after 1960 as more and more companies began to invest their surplus in research and development particularly in product formulation. Formulation is responsible for developing a product that will have a good patient acceptance, stability and therapeutic effectiveness. Emphasis on palatability, physiologic availability and utility gained importance as technology became an enabler in the pharmaceutical industry.

Industrial pharmacy is concerned with research leading to the development of new drugs, and the production of a wide array of medicinal products in appropriate dosage forms, under quality supervision and proper distribution. The US Food, Drug and Cosmetic Act describes the term drug as an article recognised in the United States Pharmacopeia (USP) or official National Formulary or any supplement to any of them and articles intended for use in the diagnosis, cure, mitigation, treatment or prevention of diseases in man or other animals and articles intended to affect the structure or any functions of the body of man or other animals. Innovative strategy is central to a pharmaceutical company's competitive advantage as they help to develop superior new products and technologies with a well-defined competitive advantage especially in knowledge intensive areas such as the drug and pharmaceutical industry². Pharmaceutical industries need to continuously innovate by developing and marketing new products, drug delivery systems, and product attributes, based on cutting-edge scientific advances, as part of survival and growth strategies at national and global levels. Understanding that industry life cycles have become shorter³ and numerous regulatory challenges are emerging faster, the industry spends far more on Research and Development, relative to its sales revenue. In 2014, Deloitte and Thomson Reuters examined newly introduced drugs from twelve pharmaceutical companies with the largest research and development (R&D) budgets and found that it costs about USD 1.3 billion to bring a newly discovered compound to market⁴. The R and D as a percentage of revenue in respect of leading pharmaceutical companies in India like Wockhardt and Cipla has been significantly high at about 11.32% and 10.16% respectively for the financial year ended March 2015⁵.

The Indian Pharmaceutical industry operates in a multi-billion dollar market place. Its operations and regulatory compliances are highly complex. There are a number of national regulatory structures and legal systems to comply with but the key to understanding these regimes is the way in which they link trade and sanctions. The large pharmaceutical industries in India have now adapted their manufacturing process to comply with the standards set by the US and the European nations. The

drug life cycle is regulated and documented at every stage be it the discovery of molecular entity, clinical trials, licensing, manufacturing and distribution till it reaches the patients⁷. With globalization of pharmaceutical markets, the regulatory aspects and especially those concerning quality, efficacy and safety of the drug formulation have been taken to the super national level. The quality and the safety standards that are developed at the national level normally converge and are guided by the various international agreements. The harmonized standards are then adopted at the national level and possibly adjusted further to local conditions.

The high level of quality and safety standards has made the pharmaceutical industry in India has not only trustworthy but at the same time has created barriers to market entry and competition leading to concentrated markets and higher intellectual property protection. Good Manufacturing Practices (GMP, also referred to as 'cGMP' or 'current Good Manufacturing Practice') is the aspect of quality assurance that ensures that medicinal products are consistently produced and controlled to the quality standards appropriate to their intended use and as required by the product specification⁷. GMP defines quality measures for both production and quality control and defines general measures to ensure that processes necessary for production and testing are clearly defined, validated, reviewed, and documented, and that the personnel, premises and materials are suitable for the production of pharmaceuticals and biologicals including vaccines. GMP also has legal components, covering responsibilities for distribution, contract manufacturing and testing, and responses to product defects and complaints. One has to appreciate that GMP standards are only guidelines and alternative quality and manufacturing process can be deployed with an assurance that equivalent quality and efficacy standards can be maintained. GMP manufacturing plants across the globe will soon encounter radical changes in their operations with increasing use of sensors on the production floor. This network of sensors which can drastically improve patient outcomes is referred to as Internet of Things for Pharmaceutical Manufacturing (IoT-PM)⁹.

The Internet of Things (IoT) is increasingly being recognized by the pharmaceutical engineers and scientists as one of the most sophisticated technologies that has the potential to not only affect the health, safety and productivity of millions of people but also has a major impact on the cost of drug and health service system. IoT primarily consists of physical objects that are embedded with sensors, actuators, computing devices and data communication capabilities. These are linked to networks for data transportation. The backend systems exist for data aggregation, storage, analytics, visualization and host user-centric services. In the IoT, physical objects monitor their surroundings and participate in daily activities, helping create new product formulations, new drugs, services and business models, improve efficiency, decision-making process and overall optimize the business operations. The IoT-PM technology finds application in strict monitoring, controls serialization and quality maintenance. Drug production supervision, remote diagnostics and effective drug flow management are some of the important uses of IoT-PM. Other industry

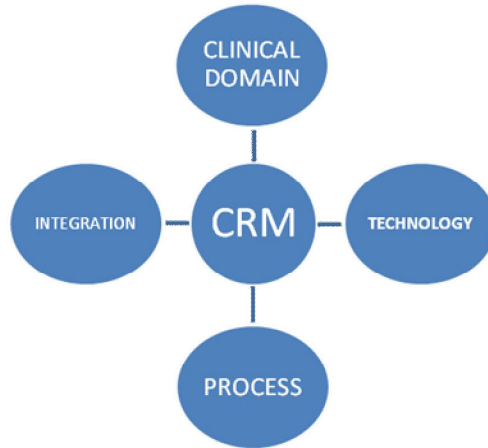
applications include improving drug manufacturing and plant compliance and also enhancing the information flow across the entire value chain.

The pharmaceutical industry has been more reactive rather than pro-active in technology adoption primarily because of adherence to GMP standards and the regulatory environment that encompass it. Falling investment in Research and Development as is seen in Sanofi and Pfizer which stands at 0.20% and 0.91% as percentage of revenue⁵, increasing costs, large number of patents expiring, and increasing shareholders expectations as regards to the potent efficacy of new molecules have placed tremendous pressure on the pharmaceutical companies in India. Early investors have already initiated IoT to enable end-to-end digital integration across the value chain. The sophistication and success of recently reported micro-fabricated organs-on-chips and human organ constructs have made it possible to design scaled and interconnected organ systems that may significantly augment the current drug development pipeline and lead to advances in systems biology. Successful drug development would require new challenges like low-volume micro-devices that support chemical signaling, micro-fabricated pumps, valves and micro-formulators, automated optical microscopy, electrochemical sensors for rapid metabolic assessment, ion mobility-mass spectrometry for real-time molecular analysis, advanced bioinformatics, and machine learning algorithms for automated model inference and integrated electronic control¹⁰. Clubbing the output from these devices with big data analytics has the potential to provide an opportunity to improve the R and D productivity.

Applications of IoT-PM

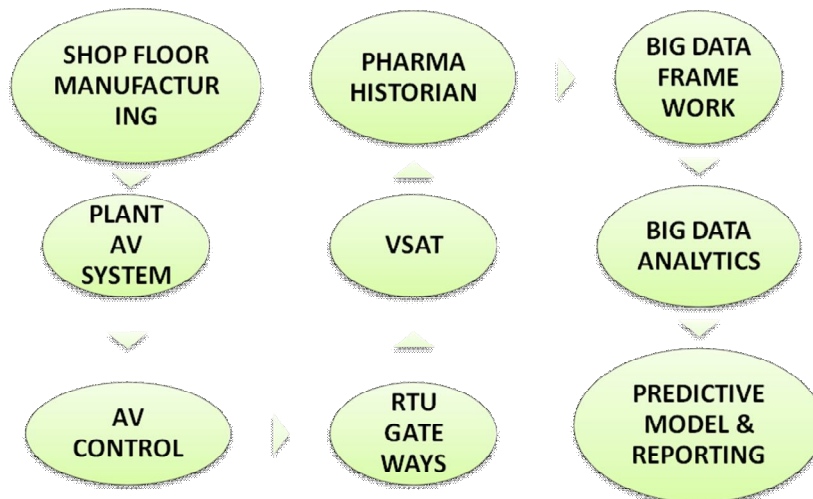
Remote Central Monitoring (RCM):

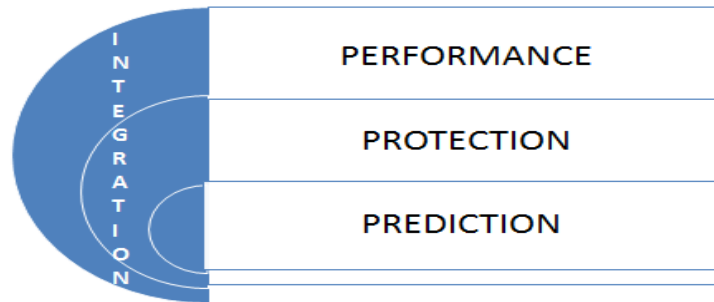
Pharmaceutical companies and Contract Research Organizations (CROs) face multiple challenges in the market today, among them the increasing complexity of clinical trials, the risks and costs of monitoring trials, the quality of the sites, and a high attrition rate among monitors. A CRO is an independent organisation that steps into the development process once a pharma company has identified a promising new molecule. Examples of CROs include Quintiles, Covance, Icon, HMR and Semler Research. Typically, a CRO will organize and conduct clinical trials to test the new molecule in humans. As independent companies, they offer an objective assessment of a new drug in the clinical setting and, because they partner with many companies, typically offer broader experience than if the pharma company organized the trials themselves. To address some of these challenges, through the process of IoT, we can carry out Remote Central Monitoring (RCM) by integrating the clinical domain, with process, technology and delivery. We can develop unique solutions to bring efficiency and resources to the process of clinical trial monitoring and help the pharmaceutical companies to achieve significant savings and gather high-quality clinical trial data.



Real Time Monitoring of Equipments (RTME)

IoT-PM provides a unique opportunity to connect various equipments, plant and machinery and sensors on the shop floor with similar equipments and sensors across other manufacturing plants spread across various locations. This enables convenient supervision of various manufacturing activities in a pharmaceutical industry from any location, at any time. Realtime monitoring from anywhere helps to pinpoint opportunities for performance improvement that would otherwise go unnoticed. It would minimize waste, improve equipment utilization and lower the production costs leading to quality enhancement of the drug and the formulation. Whether it is the reactor, compressor, blender, granulator, fluid bed dryer, heavy duty punching machines, rotary tablet making machine, soft gelatin capsule machine, ampule or vial filling machine or any piece of productive equipment in the shop floor, it could be monitored through remote diagnostics leading to operational excellence. IoT would also lead to integration of protection, prediction and performance information.





Product Serialization and Control of Supply Chain

Every pharmaceutical company worries about losing control of its supply chain. Companies lose revenue and market share if products are unaccounted for, damaged, or become defective while in transit leading to erosion of consumer loyalty. The pharmaceutical industry is no stranger to high-profile cases of tampering and unsafe products. Though every pharmacy house implements risk management, quality assurance and performance optimization, the reality is that the information they collect and share is not enough to manage risk in today's global supply chains. A pharmaceutical company despite being a leader in the sector cannot completely avoid recalls in case of defects, counterfeiting, diversion, authentication challenges, and tampering of products, however, it can still optimize its processes to respond effectively to the risks of supply chain. Pharmaceutical companies are challenged to collect, track, and trace the products and information that traverse their supply chains. How can a pharmaceutical company know exactly which drug from which batch needs to be recalled or has expired? How can they pinpoint exactly which pharmacies, hospitals, or stores end up with tainted products on their shelves? To respond to this challenge, most of the world's top pharmaceutical companies are spending millions to experiment with new technologies to battle the rising tide of spurious drugs that are making their way into the pharmacies and hospital and to be able to respond quickly when they detect problems. Serialization technology is the key to enabling track-and-trace capabilities to keep counterfeiting from thriving and enabling focused recalls. While serialization equips manufacturers with critical data, an emerging challenge is to ensure that no part of a product lifecycle poses a risk to ongoing operations. IoT-PM will help monitor end-to-end serialization devices and respond to any exceptions in real time to prevent additional waste and time loss. It will track all points of the manufacturing and distribution channel up to the retail user.

How to respond to Recalls, Counterfeits, Tampering and Regulation

The more a product changes hands from the manufacturer, to the distributor, the retail pharmacy or to the Hospital pharmacy, the easier it is to introduce problems in the system and pharmaceutical manufacturers need to trace the movement of goods in production at each stage in the process, including activities at contract manufacturers or third-party job works. Each process involved in creating a product, from inception through packing and shipping, provides an opportunity for foul play to enter the system. According to World Health Organisation, the counterfeit medicines being manufactured across the globe account for about USD 32 billion. Generic drugmaker Wockhardt Ltd had recalled some drugs manufactured at its two plants in Waluj and Chikalthana plants in central India before the US Food and Drug Administration (FDA) could ban those products citing manufacturing quality lapses. While there were no evidence of risk to patient safety from those drugs, Wockhardt said the recall was being conducted "as a measure of preparedness and as an abundant precaution"¹³. Counterfeit products are also behind many recalls, including a recent recall of 10,000 bottles of cholesterol medicine, which cost a major North American pharmaceutical manufacturer USD 55 million. And with the rise of Internet pharmacies, an ever-growing number of off-shore manufacturers are pushing unlicensed generic drugs into the world market. The ease with which goods move throughout the world permits counterfeit products made in one region to be moved to another at very high profit, and with very little risk. In addition to monitoring counterfeits, the pharmaceutical industry has to closely manage products based on expiration date. The Healthcare Distribution Management Association reports that the pharmaceutical industry incurs about USD 2 billion a year in returns and product losses and incurs another USD 2 billion annually in the costs associated with processing returns, expirations, and recalls.

So how does a global supply chain pharma company meet this level of regulatory scrutiny? Across the pharmaceutical industry, companies often manage their product materials at the batch level, providing limited visibility at the RMPM stores level. While this seems to keep costs low and streamlines data management, it simply does not provide the level of information granularity needed to track products through the supply chain and minimize risks. For example, if a defect is discovered, the only prudent way to recall the items is to take back everything that has been shipped during a particular timeframe, essentially clearing the entire supply chain of the product and making the recall wider in scope than necessary. In the pharma industry, this could mean recalling an entire batch of lifesaving drugs rather than just those manufactured at a specifically pinpointed site. These extensive recalls add costs for the manufacturer and retailer in lost inventory and sales, as well as brand image and consumer confidence. With globalized supply chains, the problem gets further more exacerbated.

To help combat diversion and counterfeiting, the US Prescription Drug Marketing Act, passed in the late 1980s, contained a “pedigree” rule mandating that manufacturers must produce a detailed record of a drug formulation movement from their plants to the point of dispensing. Since then, the pharmaceutical industry is working on standards to support the effort to secure the supply chain. A complete serialization program represents the complete history of a given product’s chain of custody from the manufacturer to the point of dispensing. Much of the early work around implementing solutions has focused on support of serialization using electronic solutions, in terms of applications for managing serialization data, printing of human-readable markings, and sensory technologies for verifying these markings. Although there are many advantages in early implementation of a serialization program, there is still much less clarity as to how laws and regulations will evolve in the near future.

Pharma manufacturers are investing in ways to set up serialization systems. There are several factors that influence the complexity, risk, as well as cost of implementing and managing serialization solutions, including regulatory uncertainty, ongoing technological evolution, and infrastructure requirements. Prescription drugs are distributed to every place on the globe. Drugs are produced, distributed, repacked, and sold by hundreds of thousands of manufacturers, including CMOs. This complexity creates many questions about how best to address serialization and how it will affect the supply chain and distribution channels.

Combining RFID and Serialization

In the pharmaceutical industry, many leading drug makers are using RFID tags to verify the authenticity of their products. They can follow the chain of custody of individual products in an technology to enable track-and-trace, to combat counterfeiting and mishandling of medications. In these cases, serialized tags are affixed directly to the product itself, so that individual items can be monitored throughout the entire supply chain and life cycle. RFID can be implemented both to complement barcode labeling and to automate SAP transactions and processes that are not already automated ; providing additional efficiencies by creating a “hands-off” operational approach and avoiding manual data entry as each item travels from production line to store shelf. Companies can facilitate the authentication of serialized drug products by distributors or retailers, which provides manufacturers with real-time visibility into where a specific product physically resides at a certain time in the downstream supply chain. This visibility and data helps manufacturers recognize counterfeit situations, identify expired products, and perform targeted recalls. With regulations calling for a unique serial number (along with expiration date and lot number) on each saleable unit, companies can easily identify counterfeit products. Additionally, manufacturers would not only have visibility into where the product physically resides, but also have a record of the specific path it took to get there through the supply chain, and this data is invaluable to a manufacturer.

Organ-on-Chips







Microscale engineering technologies provide unprecedented opportunities to create cell culture microenvironments that go beyond current three-dimensional in vitro models by reviewing the critical tissue–tissue interfaces and dynamic mechanical microenvironments of living organs. DongeunHuh¹¹ et al. focused on the development of organs-on-chips in which living cells are cultured within microfluidic devices that have been micro-engineered to reconstitute tissue arrangements observed in living organs in order to study physiology in an organ-specific context and to develop specialized in vitro disease models. This model is touted as an alternative to conventional cell culture model and animal testing for pharmaceutical and toxicology applications and has the potential to transform the drug development and quality safety.


Organs-on-chips, a class of micro-engineered in vitro tissue models, have the potential to combine an artificially engineered, physiologically realistic cell culture microenvironment. They are robust, because the engineered physiological, organ-level features such as tissue organization, geometry, soluble gradients and mechanical stimulation are well-defined and controlled. Pharmaceutical industry in particular has a strong need for realistic models that deliver information on biopharmaceutics, pharmacokinetics and pharmacodynamics with a very high throughput. Moreover, their microfluidic properties and integrated sensors pave the way for high-throughput studies.

Chip in a Capsule

Another example of growing influence of smart devices is “Chip in a capsule” – a special ingestible capsule - that on consumption captures health status, including drug effects on key organs, and sends to a wearable device. This data is then sent as a report over cloud for diagnosis. Use of smart devices in clinical development, supply chain and patient engagements can not only help reduce time-to-market for drugs but also the real-time data feeds can be ploughed back to proactively detect errors across the value chain and, thus, improve regulatory compliance. Data from wearable devices can be used to prescribe personalized medicines that will improve drug efficacy manifold and will reduce treatment period considerably¹².

CHIP IN A CAPSULE ECOSYSTEM

 <p>SMART CAPSULES SUSTAINED RELEASE MEDICATIONS →</p>	 <p>WEARABLE DEVICE →</p>	 MO BILE DEVICE →	 <p>ANALYTICS ENGINE →</p>
<p>Ingestible Sensor in Capsules gets activated after oral medication</p>	<p>WD captures the response from the sensor, detects various health parameters and sends informative to the mobile device</p>	<p>Patients can check health stat on Real time basis</p>	 <p>↕</p>
<p>Sensor to be powered by the digestive juices</p>	<p>Bio availability data also can be captured by the mobile device</p>	<p>Info can be passed on to the community centre for synchronization of data through cloud</p>	 <p>www.shutterstock.com - 157231454</p>
<p>Sensors communicate</p> <ol style="list-style-type: none"> 1. Health status of the patient 2. Bio availability of the drug 		<p>Bio availability data can be passed on to the pharmacist or where the prescription is filled through cloud</p>	<p>↕</p>

	Drug efficacy data and bio availability of drug collated from the clinical and hospital pharmacists is analyzed at the data centre of the pharmaceutical company
	Patient health data also collected by the Data centre
	The data can be fed to the Analytics Engine and results from predictive analytics can be used.
	Pharmacology, adverse reactions, and posology can be monitored and can be deployed as an effective tool in determination of the drug dosage
	Patient statistics can be shared with the local community health centre.
	Help in keeping track of the drug including Drug Expiry by the Drug control authorities

IoT-PM simulates an environment wherein the various parameters of production equipments and plant and machinery in the pharmaceutical shop floor will be transmitted by the production pharmacist through a gateway onto the internet to be stored, aggregated and analyzed. This application will be capable of storing data for multiple pharmaceutical manufacturing plants across various locations. It will analyze data and report exceptions in real time to promote global visibility and control of manufacturing operations, and also optimize the performance. Connected manufacturing technologies have gained prominence as a result of the growing incidence of counterfeit drugs and the need to monitor drug quality and distribution. A connected manufacturing environment offers seamless and integrated access to information from shop floor to top floor, as well as through the distribution channels. Regulatory agencies and manufacturers can track the flow of pharmaceutical products through various channels. Not only the finished products and the work in process but those products in the quarantine can also be tracked. The improved visibility and remote access to plant and equipments improves the overall performance of the production process and reduces the cost of production through timely intervention.

Challenges in IoT-PM

Requirement of Billions of Sensors and Instruments

For the success of IoT –PM, we need a network of billions of sensors and instruments monitoring the performance of plant and machinery and equipments across various sites in the pharmaceutical industry. The idea of this hyperconnected network is surging forward, thanks to advances in sensor technology, big data collection, storage and analysis, and high-speed Internet connectivity. From production processes to research and development and potential new products, the implications for pharmaceutical companies and its technical team guiding strategic goals into reality are enormous.

The IoT future is primarily about measurement: the ability to measure with precision, exactness and reliability, and to instantly relay and analyze those measurements on a real time basis. The ascendance of the IoT has already begun to transform the global economy. According to research firm Gartner that by 2020, the IoT will consist of 26 billion sensors, instruments and other connected devices¹⁵. That staggering number doesn't even include gadgets such as smartphones, e-readers, tablets and PCs. Another research firm, International Data Corp., estimates that global annual revenue from IoT solutions will grow from US\$1.9 trillion in 2013 to US\$7.1 trillion in 2020. With embedding of more and more sensors, the pharmaceutical equipments will become more intelligent, and hence we need to automate even the simplest of process. Sensors are the foot soldiers of the Internet of Things. They are the data collectors whose readings fuel the IoT. The sensors do not merely replace traditional instruments and recording methods. By making more things measurable and analyzable, they also open new project possibilities. As such, the onset of the IoT will set in motion a massive wave of projects in the coming years, as the pharmaceutical companies race to take advantage of its potential. In the years to come, every pharmaceutical business process and decision making will be supported by machine intelligence transmitted through the IoT.

Complex data Integration

To sustain and grow, the Pharmaceutical Industries need to revamp their existing plant facilities and build an intelligent manufacturing unit that integrates itself with data from the multiple sensors embedded with its facilities. The value and opportunity within the IoT-PM is its data. It will allow a level of knowledge that we've never had before about the systems underlying every part of the economy, and create the opportunity to leverage that knowledge. Mere data collection and device interfacing may not yield the desired result unless the structure and syntax of data is understood and implemented. Only when the semantics is understood, we can build an intelligent application using the business analytical tools. As more and more data evolve over the system, the inter connectivity among plants at various site location

will improve drastically. But this will also lead to huge data to be collected, analyzed and assimilated in the system. As the volume and velocity of data and graphics increases, it will render the existing platform and architecture redundant and the real time performance may tend to become obsolete. This may be pose a real challenge and as the operations become more and more complex, it will lead to Big Data Problem.

Data Privacy

Data collected from the pharmaceutical equipments need to be protected from unauthorized access. Companies need to enforce a code of ethics and follow strictly data privacy policies.

Issues related to Interoperability

For the IoT to reach its global potential interoperability is essential. The data gathered by one company's sensors need to be stored in a way that is comprehensible to another company's analytics tools. If IoT protocols become an intellectual property, IoT's future will be limited. Hence the pharmaceutical units need to adopt an universal IoT standards just like the ingredient standard like the USP or BP or IP and the standards can be called IoT-US/BP/IP. Resistance is bound to be there when a company realizes it will have to shed its existing standards and systems to comply with an emerging standard.

Manufacturing is Brick and Mortar

Pharmaceutical equipments tend to be long lived. Normally they have a life span of not less than ten years. Compared to this a software product may have a much shorter life cycle and may not last even for six months or one year. Hence, pharmaceutical units need to reinvent themselves so that they are adaptable to the changing scenario. We need to set canonical standards that are acceptable to all the pharmaceutical units. The IoT presents challenges especially to those accustomed to old methodologies. It also offers enormous possibilities to pharmacists wanting to leverage data to work more effectively.

As the pharmaceutical manufacturing processes evolve with improved capabilities, it would demand newer applications and constant upgradation of the facilities. The pharmacists need to have dedicated 'apps' that could match his domain skills and blend well with the eco-system.

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A STUDY ON CONSUMER SATISFACTION TOWARDS PRISTINE ROP WATER PURIFIER OF ION EXCHANGE INDIA LIMITED. (With Reference to Chennai District, Tamilnadu, India)

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Abstract

Consumer Satisfaction is the base for every business organization, without concentrating consumer satisfaction the company will not grow and profitable. To improve the sales of the product, the business firm has to concentrate on after sales and service also. This article concentrates on consumer satisfaction in water purifier industry namely Zero-B. Purification of water is the neediest of the people of Chennai because of the contaminated water. The samples were collected to test the level of consumer satisfaction in this article.

Key Words: Water, Purifier, Zero-B

INTRODUCTION

Water is a basic and fundamental need for any living creature in the world without which nothing would survive on the earth. As it is said that it is a fundamental need it needs to be very clear and purified water may be polluted in different ways. As it is said that water is an essential requirement, it needs to be clear and purified.

Starting from river water, it gets polluted in many ways. The major pollutants are release of effluent from industries. Washing clothes, animals, and so on. Water may also get polluted when it is stored in tanks, containers, etc. for a long period of times.

Due to these pollutants many number of microorganisms, viruses, pesticides, etc. are formed in water. Water also contains mineral impurities such as, clay, dust, sand, heavy metals, excessive salts and suspended particles, which may result in foul odour, change in colour and taste, and it also makes the water hard and saline.

Contaminated water gives diseases such as heart disease, viral diseases, poisoning, bacterial diseases, dysentery, cancer, etc. To prevent these types of diseases, total water management is necessary, which refers to the use of advanced water purification techniques, which is also an environment friendly technology. By taking more care, while purifying or treatment of water, which removes all contaminations, paves way for the consumption of purified water help human beings to lead a better and healthier life.

ION Exchange (India) limited, a company that is saving lives for over 40 years by performing water treatment processes, with its high range of next generations water purifiers. The company has also obtained certification from World Health Organization (WHO).

COMPANY PROFILE

Ion Exchange India provides industry with total water management, from pretreatment, through process water/liquid and waste water treatment, to water recycle and recovery of valuable byproducts for reuse in process. Total solutions address environmental concerns of customers by incorporating water conservation, pollution control, energy saving and reduced chemical consumption. Comprehensive services, including O&M and BOO/T contracts, deliver end benefit conveniently and economically, with single-point responsibility.

The company has more than 40,000 installations worldwide - packaged, pre-engineered and custom built, of which over 500 are at thermal and nuclear power stations, fertilizer factories, refineries, petrochemical and other core sector industries. Our plants, ion exchange resins and water treatment chemicals are exported to South East Asia, Japan, Europe, Africa, Egypt, the Middle East, USA and UK, as well as to the neighboring countries of Bangladesh, Nepal, Mauritius and Sri Lanka. Asia's No.1 company in water treatment, ION Exchange (www.ionindia.com) started as a subsidiary unit of Permutit Company of UK in 1964. With the divesting of the holding in 1985, we became a wholly Indian company. Over the years we have accumulated a wealth of experience and expertise that has earned us the reputation of being India's premier company in total water management, with a growing international presence. Today we treat water from the biggest industrial units right down to the smallest units that can be used at homes. This makes us one of the few companies in the world with a complete range of water treatment technologies, products and services.

Zero-B, is a regular household name. In addition to pioneering advance water purification processes at the domestic level, using Reverse Osmosis technology, we

were also the first to launch water purification for rural households. For over three decades now, we have been the leaders in water treatment in India.

Our market leadership has been attained by our focus on technological advancement, continuous R&D and affiliations with the best specialist water treatment companies internationally. We are committed to customer satisfaction and fulfilling needs with value added solutions. We shall continue to use technology innovatively for a better world, a better quality of life. Ion Exchange has a wide range of processes, coupled with an integrated approach, to deliver total solutions for every market - household, institutional, commercial, industrial and public water supplies, both urban and rural.

SERVICES PROVIDING BY COMPANY

Supporting the company's solution-centric approach is its service network, the largest in the water treatment industry in India. Supply of plant is backed by the complete gamut of services including its O&M, BOO/T and even sale.

Single-point responsibility and integrated services cover every aspect of water treatment plant, helping maximize overall production and performance levels through its continuous, optimum performance. And saving customers supervision the hassle of maintaining facilities in-house, enabling them to concentrate on their core competencies

CUSTOMER SERVICES DIVISION

Services customers of medium and large size plants. It comprises highly experienced engineers who provide troubleshooting and advice on optimum equipment operation, annual service contracts, essential spares and consumables. It specializes in rehabilitation and upgrading of water treatment plants to improve quality, augment capacity, reduce chemical consumption and provide automation; O&M, BOO/T. Ion Exchange Services Ltd. This all-India service company network provides customized, cost effective services to customers of domestic, packaged and pre-engineered systems. Committed and experienced teams of more than 250 service engineers, directly trained by Ion Exchange India, are strategically located on an all-India basis to ensure proximity to customers for quick service. Their diagnostic capabilities and hands-on experience is backed by laboratory facilities and computerized customer databases to enable them to function efficiently and reliably. Service operations have also been extended to several countries overseas.

In 1985, Ion Exchange introduced Total Water Care Solutions for domestic households and institutional applications through its Consumer Products Division. The company offers a wide range of **Zero B** products to prevent water-borne diseases and guarantee pure water to all its customers.

These products use the globally proven concept of water purification - Resin Technology. As water flows through the Zero B Resin, iodine is gradually released and all the harmful bacteria are instantly destroyed. This makes the water safe and eliminates any need for further filtration. Leading scientific laboratories in India and abroad has certified its effectiveness. An interesting feature of these products is that none of them require electricity and are designed to suit every environment - be it homes, offices or traveling. Besides microbiological contamination, water also contains various mineral impurities.

These impurities make the water hard, saline and contain iron. To tackle this problem **Zero B** introduced products like Water Softeners, Iron Removers, Reverse Osmosis Units and Bottled Water. All these products collectively offer complete water treatment solutions to the consumer. Ion Exchange continues its dedication to use its environment-friendly technology for a better quality of life.

OBJECTIVES OF THE STUDY

- § To find out consumer satisfaction towards 'Pristine' Rop Water Purifier.
- § To find out effective factors for purchase behaviors.
- § To find out consumer attributes for their water purifying facilities
- § To find out the reason for the preference of this particular product.
- § To find out the satisfaction level of consumer.
- § To know consumer problems in PRISTINE ROP.

RESEARCH DESIGN

A research design is the specification of methods and procedure for acquiring the information needed to structure or to solve problems and it is a plan and strategy of investigation conceived so as to obtain answers to research questions and to control variances. In this study, the researcher has used a descriptive research design for laying a strong foundation of a good research design, which will help to satisfy the research objectives. The primary data are generated through questionnaire; the data collected by questionnaire method are reliable and accurate. Survey of secondary data bank of the company of the company and the external secondary data is taken from source such as magazines, newspapers, journals, etc.; the internal secondary data was obtained with the intention of getting various updated and reliable data.

PROBLEM DEFINITION

Consumer satisfaction:

In theory the Marketing considers consumer satisfaction as the main objective. According to the Marketing '*Consumer is said to be the king*' and the organization is supposed to serve and satisfy him, but in reality, consumers are not fully satisfied with the product they do have some defects in any product they consume. They may be done accidentally or deliberate. Problem refers to something to be worked out, anything that is hard to understand or deal with, but the expert says problem means "Question set for solution".

Identified problem:

While I collecting the information about the ION Exchange (India) Limited, I found that their major problematic area is consumer satisfaction. The following reasons may express why I select that topic that consumer satisfaction.

Reasons:

While I saw their annual report, I found the following aspects:

1. In a service department got so many complaints every day.
2. Service peoples go to the consumer's home at so lately (i.e.) more than two days.
3. Even the service is over, the same consumer complaint again.
4. The company running past few years but it is not well known till now.
5. They are using only direct marketing so it is not well known to others.
6. They were not using any media advertisement.
7. Usage of direct marketing may cause the in availability of the product.
8. When I saw the price catalogue of this company it is so high compared to other competitors.
9. They increased their sales by recommendation of the consumer to other. But past few months the recommendation level is decreasing.

By analyzing these reasons I decided to know the satisfaction level of the consumers.

SAMPLING METHOD

Here systematic sampling method is used. Because it helps to gather maximum information about the consumer who resides in Chennai District of Tamilnadu and used to saves time and cost of study.

SYSTEMATIC SAMPLING

Systematic sampling with a random beginning is a form of restricted random selection, which is highly useful in service concerning enumerable population. In this method every number of the consumers are numbered in a serial order and i^{th} element starting from any of the i item is chosen.

ION Exchange as given the consumer details above 500. With the help of the given data I took survey about 100 of them who belonging to chennai city with use of systematic sampling.

A sample of 100 out of 500 units was chosen. The sampling fraction k is N/n where

$$k = N/n$$

k – Sampling fraction

N – Total no of units in the population, n is size of the sample.

In this study total number of units is 500 size of the sample is 100. Sampling fraction is $k = 500/100 = 5$. The number between 1 to 5 is chosen at random. I took the number 5. The sample numbers are 5, 10, 15, 20,.....500.

SAMPLE SIZE

Considering the nature and extent of the study and with the time constraint a sample size of 100 respondents.

RESEARCH INSTRUMENT

A questionnaire was prepared keeping the objective in mind, which contains 20 Questions. These questions were structured and directed so as to make the respondent to understand it easily respondent have to use rating scale to answer some questions. The questionnaire includes the open ended and closed-ended questions

DATA ANALYSIS TOOLS

The data collected from the respondent were analyzed using various statistical tools, they are as follows:

- (i) Percentage, (ii) Chi-square

PERCENTAGE METHOD

Percentage is used to make comparisons between two or more series of data; percentages are used to describe relationships. It can also be used compare the relative terms, the distribution or two or more series of data.

CHI SQUARE TEST

The χ^2 tests is one of the simple and most widely non-parametric tests in statistics.

To determine the value of Test steps involved are as follows:

1. Calculate the expected frequency.
2. Take the difference between observed and expected frequency and obtained the square of these differences.
3. Divide the value of $(O - E)^2$ obtained in step 2 by the respective expected frequency and the total $\sum (O - E)^2 / E$. This gives the value χ^2 which can range from zero to infinity. If is zero it means the observed and expected frequencies completely coinciding the greater the discrepancy between the observed and expected frequencies the greater shall be the value of χ^2 . One of the conditions for the applications of χ^2 tests is that no cell frequency should be less than 5 in any case. If O_1, O_2, \dots, O_n are the observed values and E_1, E_2, \dots, E_n are corresponding

expected values then Chi Square can be given by $\chi^2 = \sum (O - E)^2 / E$.

With $(C - 1) (R - 1)$ Degree of Freedom.

LIMITATION OF THE STUDY:

Every survey has its own limitations. Hence it is inevitable to specify the limitation of the study. As for as this project work is concerned the limitations were below.

1. The study is limited to Chennai District. Therefore the same can't be as project to state level.
2. The sample size is 100, so the non-sampling error is high.

3. The time to study is limited to 3 Months
4. If few occasions the respondents were not given information, because of they were busy. Hesitation to respond to the questionnaire was also there.
5. Data was collected on the basis for primary data; hence there is chance for biased and misleading response from the users of PRISTINE ROP.
6. The data was collected from the customers in qualitative nature (i.e.) opinions, satisfaction, attitudes, awareness, and etc. These factors may be changed from time to time. So it is not a convenient data for the study at a longer duration.

DATA ANALYSIS AND INTERPRETATION

TABLE – 1 : PERCENTAGE REPRESENTATION OF MONTHLY INCOME OF THE RESPONDENTS ARE HAVING “PRISTINE” PURIFER

INCOME OF RESPONDENTS	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
BELOW – 5000	7	7%
5000 – 8000	23	23%
8000 – 10000	41	41%
10000 – ABOVE	29	29%

Source: Primary Data

The Monthly Income wise distribution of the sample respondents is given in table 1 and it reveals that out of 100 respondents, There are 7% of respondents are below Rs.5,000 salary level, 23% of respondents are in the salary group of Rs.5,000 to Rs. 8,000, 41% of respondents are fall in the category of Rs.8,000 to Rs.10,000, and remain 29% of respondents are in the above Rs.10,000 scale.

TABLE – 2: PERCENTAGE REPRESENTATION OF KNOWN ABOUT THIS PRODUCT

KNOWN ABOUT PRISTINE	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
SELF	8	8%
FRIENDS & RELATIONS	36	36%
ADVERTISEMENTS	18	18%
OTHERS	38	38%

Source: Primary Data

The product awareness of the sample respondents is given in table 2 and it reveals that out of 100 respondents, There are 8% of respondents are known personally, 36% of respondents are know the product by friends and relatives, 18% of respondents are know the product by advertisement, and remain 38% of respondents are know the product by other aspects.

TABLE – 3: PERCENTAGE REPRESENTATION OF USE OF THIS PRISTINE

USE OF THIS PRODUCT	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
RESIDENCE	19	19%
INDUSTRY	34	34%
SHOP	24	24%
OTHERS	23	23%

Source: Primary Data

The percentage representation of use the product of the sample respondents is given in table 3 and it reveals that out of 100 respondents, There are 19% of respondents are using the product to resident, 34% of respondents are using the product for industry purpose, 24% of respondents are use the product in the shops, and remain 23% of respondents are using the product for some other purposes.

TABLE – 4: PERCENTAGE REPRESENTATION OF THE FACTOR THAT INFLUENCED FOR THE PURCHASE

FACTOR INFLUENCED FOR PURCHASED	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
QUALITY	43	43%
PRICE	6	6%
BRAND NAME	32	32%
SERVICE	19	19%

Source; Primary Data

The factor that influenced for the purchase of product, in the sample respondents is given in table 4 and it reveals that out of 100 respondents, There are 43% of respondents are influenced by quality, 6% of respondents are influenced by price, 32% of respondents are influenced by the brand name, and remain 19% of respondents are influenced by the service of the company.

TABLE – 5 : PERCENTAGE REPRESENTATION OF THE ATTRIBUTE OF PRODUCT

ATTRIBUTE OF THE PRODUCT	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
APPEARANCE	33	33%
EFFECTS	41	41%
COLOURS	17	17%
PRICE	9	9%

Source: Primary Data

The attribute of the product of the sample respondents is given in table 5 and it reveals that out of 100 respondents, There are 33% of respondents are attribute of product by appearance, 41% of respondents are attribute of product by effects, 17% of respondents are attribute of product by colours, and remain 9% of respondents are attribute of product by price.

TABLE – 6: PERCENTAGE REPRESENTATION OF THE SATISFACTION OF PRODUCT

SATISFACTION OF THE PRODUCT	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
YES	88	88%
NO	12	12%

Source: Primary Data

The percentage representation of the satisfaction of the product of the sample respondents is given in table 6 and it reveals that out of 100 respondents, There are 88% in the satisfaction level, and remain 12% of respondents are in the dissatisfactory level.

TABLE – 7 : PERCENTAGE REPRESENTATION OF PURIFICATION OF THE PRODUCT

PURIFICATION OF THE PRODUCT	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
YES	94	94%
NO	6	6%

Source: Primary Data

The percentage representation of purification of the product wise distribution, of the sample respondents is given in table 7 and it reveals that out of 100 respondents, There are 94% of them agreed that the product purifying the water, and remain 6% of respondents are in the dissatisfactory level.

TABLE – 8 : PERCENTAGE REPRESENTATION OF QUALITY OF THE PRODUCT

QUALITY OF THE PRODUCT	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
EXCELLENT	40	40%
SATISFIED	36	36%
GOOD	16	16%
NOT SATISFIED	8	8%

Source: Primary Data

The ranking quality of the product wise distribution of the sample respondents is given in table 8 and it reveals that out of 100 respondents, There are 40% of respondents are ranked the product quality as excellent, 36% of respondents are ranked as satisfied, 16% of respondents are ranked the product as good, and remain 8% of respondents are ranked as not satisfied.

TABLE – 9 : PERCENTAGE REPRESENTATION OF OPINION ABOUT THE PRODUCT PRICE

OPINION ABOUT THE PRODUCT PRICE	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
HIGH	46	46%
NORMAL	37	37%
GOOD	17	17%
LOW	0	0%

Source: Primary Data

The opinion of the product price among the sample respondents is given in table 9 and it reveals that out of 100 respondents, There are 46% of respondents are stated that the price of the product was high, 37% of respondents are stated the price is normal, 17% of respondents are in the group of good, and remain 8% of respondents are stated the price of the product is low.

TABLE – 10: PERCENTAGE REPRESENTATION OF THE LEVEL OF CUSTOMER SERVICE

LEVEL OF CUSMOTER SERVICE	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
EXCELLENT	21	21%
SATISFIED	38	38%
GOOD	24	24%
NOT SATISFIED	7	7%

Source: Primary Data

The percentage level of customer service of the sample respondents is given in table 10 and it reveals that out of 100 respondents, There are 21% of respondents are ranked the customer service as excellent, 38% of respondents are ranked as satisfied, 24% of respondents are ranked the customer service as good, and remain 7% of respondents are ranked as not satisfied.

TABLE – 11 : PERCENTAGE REPRESENTATION “PRISTINE” PURIFIER HELPS TO REDUCE WATER DISEASES

PRISTINE HELPS TO REDUCE WATER DISEASES	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
YES	79	79%
NO	21	21%

Source: Primary Data

The percentage representation of reducing water diseases of the sample respondents is given in table 11 and it reveals that out of 100 respondents, There are 79% of them agreed that the product help to reduce water diseases, and remain 21% of respondents are in the dissatisfactory level.

TABLE – 12 : PERCENTAGE REPRESENTATION OF WILL THEY RECOMMEND THE PRODUCT

WILL THEY REDOMMEND THE PRODUCT	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
YES	74	74%
NO	26	26%

Source: Primary Data

The percentage representation of recommend the product wise distribution of the sample respondents is given in table 12 and it reveals that out of 100 respondents, There are 74% of them interested to recommend, and remain 26% of respondents are not interested in the recommendation.

TABLE – 13 : PERCENTAGE REPRESENTATION OPERATIONAL PROBLEM ARISING WHILE USING PRISTINE PURIFIER

OPERATIONAL PROBLEM ARISE	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
OCCASIONALLY	6	6%
MORE	13	13%
LITTLE	33	33%
NO	48	48%

Source: Primary Data

The operational problem arising while using the product wise distribution of the sample respondents is given in table 13 and it reveals that out of 100 respondents, There are 6% of respondents are ranked the operational problem arising is occasionally, 13% of respondents are ranked as more, 33% of respondents

are ranked the little, and remain 48% of respondents are ranked as no problem arising.

TABLE – 14 : PERCENTAGE REPRESENTATION OF THE FACTORS IN ADDITIONS TO THE PRESENT QUALITIES OF PRISTINE TO BE ADDED

FACTORS ADDITIONS TO THE PRISTINE	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
QUALITY TO BE IMPROVED	5	5%
COST TO BE REDUCED	52	52%
EASY AVAILABILITY	29	29%
OTHERS	14	14%

Source: Primary Data

The qualities should be added to the product wise distribution of the sample respondents is given in table 14 and it reveals that out of 100 respondents, There are 5% of respondents are ranked the quality to be improved, 52% of respondents are ranked as cost to be reduced, 29% of respondents are ranked the easy availability, and remain 14% of respondents are ranked the others.

TABLE – 1 MONTHLY INCOME AND PURCHASING COST

INCOME OF RESPONDENTS	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
5,000 – 10,000	7	7%
10,000 – 20,000	23	23%
20,000 – 25,000	41	41%
25,000 & ABOVE	29	29%

Source: Primary Data

H₀: Null Hypothesis: There is no significant relationship between Monthly Income and Purchasing Cost.

H₁: Alternative Hypothesis: There is a significant relationship between Monthly Income and Purchasing Cost.

Total no of customers = 100

On the assumption H₀, Expected Frequency = 100/4=25

Let O denote Observed Frequency and E denote Expected Frequency

O	E	(O - E)	(O - E) ²
7	25	-18	324
23	25	-2	4
41	25	16	256
29	25	4	16
100	100		600

$$c^2 = S [(O - E)^2/E] = 600/25 = 24$$

n = number of classes = 4

\ Number of degrees of freedom = n - 1 = 4 - 1 = 3

For 3 of degrees of freedom the table Value of c² = 7.815

But the calculated value of c² is 24

Conclusion:

Calculated value of c² > the table value of c²

Hence H₀ is rejected at 5% level. This means there is significant relationship between Monthly Income and Purchasing Cost.

TABLE - 9 OPINIONS ABOUT THE PRODUCT PRICE

OPINION ABOUT THE PRODUCT PRICE	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
HIGH	46	46%
NORMAL	37	37%
GOOD	17	17%
LOW	0	0%

H_0 : Null Hypothesis: There is no evidence of significant change in opinion about the product price at the distribution of customers.

H_1 : Alternative Hypothesis: There is an evidence of significant change in opinion about the product price at the distribution of customers.

Total no of customers = 100

On the assumption H_0 , Expected Frequency = $100/4=25$

Let, O - Observed Frequency

E - Expected Frequency

O	E	(O - E)	(O - E) ²
46	25	21	441
37	25	12	144
17	25	-8	64
0	25	-25	625
			1274

$$c^2 = \sum [(O - E)^2/E]$$

$$c^2 = 1274/25 = 50.96$$

$$n = \text{number of classes} = 4$$

$$\backslash \text{ Number of degrees of freedom} = n - 1 = 4 - 1 = 3$$

For 2 of degrees of freedom the table Value of $c^2 = 7.815$

But the calculated value of c^2 is 50.96

Conclusion:

Calculated value of $c^2 >$ the table value of c^2

Hence H_0 is rejected at 5% level. This means that there is an evidence of significant change in opinion about the product price.

TABLE – 13 OPERATIONAL PROBLEM ARISES WHILE USING THE PRODUCT

OPERATIONAL PROBLEM ARISES	NO OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
OCCASIONALLY	6	6%
MORE	13	13%
LITTLE	33	33%
NO	48	48%

H₀: Null Hypothesis: There is no evidence of significant change in Operational arises while using the product at distribution of customers.

H₁: Alternative Hypothesis: There is an evidence of significant change in Operational arises while using the product at distribution of customers.

Total no of customers = 100

On the assumption H₀, Expected Frequency = 100/4 = 25

Let, O - Observed Frequency

E - Expected Frequency

O	E	(O – E)	(O – E) ²
6	25	-19	361
13	25	-12	144
33	25	-8	64
48	25	23	529
100	100		1098

$$c^2 = S [(O - E)^2/E]$$

$$c^2 = 1098/25 = 43.92$$

$$n = \text{number of classes} = 4$$

$$\backslash \text{ Number of degrees of freedom} = n - 1 = 4 - 1 = 3$$

For 3 of degrees of freedom the table Value of $c^2 = 7.815$. But the calculated value of c^2 is 43.92

Conclusion:

Calculated value of $c^2 >$ the table value of c^2

Hence H_0 is rejected at 5% level. This means that there is an evidence of significant change in Operational problem arises while using the product at distribution of customers.

FINDINGS

1. The pristine using peoples of 41% earns 8,000 – 10,000 per month and 7% of the consumers earns less than 5,000.
2. 38% of the consumers came to know this product by others and 8% of the people came to by their self.
3. The industrialists users are 34% and 19% were residence.
4. 43% of the people bought the pristine for its quality and 6% for its price.
5. Because of the effects 41% of the people bought pristine and 9% of its price.
6. 88% of the people satisfied and 12% dissatisfied about their product.
7. 94% of the consumers said that the product purifies and 6% of the people not satisfied with the product.
8. 40% of the consumer said 'excellent' for the pristine and 8% of the people say that they were not satisfied.
9. The pristine consumers said that their opinion is 46% of them were high, 17% of them say good.
10. 38% of the consumers satisfied with the after sale service and 7% of them not satisfied.
11. In a survey among the 100 peoples, who using the pristine purifiers, 79% of them says that it reduces the disease increasing level and it gives them pure water, 21% of them did not accepted.
12. 74% of the PRISTINE ROP users refer the product to others and 26% of them say that they won't recommend the product.
13. 33% of the pristine purifier customer faces the operational problem arises little and 48% of consumers says they did not get those problems.
14. Pristine purifier consumes electricity said high 11% of consumers and 89% of the consumers says low.
15. 52% of consumers requested to reduce the cost of the product and 14% of them asked for the other reasonable factors.
16. Chi-square test represents H_0 is rejected at 5% level. This means that there is significant relationship between monthly income and purchasing cost.
17. Chi-square test represents H_0 is rejected at 5% level. This means that there is an evidence of significant change in opinion of product price.
18. Chi-square test represents H_0 is rejected at 5% level. This means that there is an evidence of significant change in operational problem arises. While using the product at distribution of customers.

SUGGESTIONS

1. Ion exchange can try to decrease the price of the PRISTINE ROP, because most of the people consider that.
2. Consumers are expecting to increase its efficiency.
3. The quality of the PRISTINE ROP must improve.
4. The after sale service could also be made bit more efficient because few of the considered it has important.
5. The company should make the effective advertisement like media and other promotional tools.
6. They should develop the technical features in the product.

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ROLE OF RIGHT TO INFORMATION ACT TO SECURE CONSTITUTIONAL GOVERNANCE AND DEMOCRATIC PRINCIPLES IN INDIAN POLITY

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Abstract

Good governance means the governing the conduct of the subjects by the state through various institutions with certain goals and objectives. Transparency and accountability in functioning of governmental authorities is one of the most important objects of the Act. The goals of accountability and transparency in the working of every public authority may be achieved by urging up on the authorities to disclose the information. Good governance and Right to information are complementary to each other and the success of one depends up on the other. Right to information and good governance is the bedrock of democracy and can pave the way for transparency, openness, and accountability in governance of the affairs of the state and ensure effective participation of people in democratic society. The term transparency and accountability, made part of preamble of the constitution and preamble of the Right to information Act.2005. The central and state information commission has played a crucial role in enforcing the provisions of the Act as well as educating the information seekers and providers. The implementation of the law on right to know for setting up information regime there fore augurs well for strengthening the knowledge of society as well as for increasing the accountability of public bodies

Key Words: constitutional governance Democratic principles and the Indian society.

INTRODUCTION

Good governance of the government means the governing the conduct of its subjects by the state through various institutions with certain goals and objectives. Constitutional governance is the governance where the authority of the state to govern the conduct of its subjects drawn through constitution. The relevance of the Right to information is constitutional governance is that the constitution of India in its preamble has resolved to uphold the principles of democracy which include "Right of citizens to know about day to day affairs of government. Transparency and accountability in functioning of government authorities is one of the most important object of the Act. The good governance further implies that there is involvement of citizens in decision making involvement of citizens in implementation and evaluation of policies of the government. The goal of transparency and accountability in the working of every public authority may be achieved by enforcing the authorities to disclose the information.

Good governance and right to information are complimentary and the success of each other depends up on the other. Right to information Act 2005 would make the civil servants alert to provide the information to public challenges and as a byproduct would make administration responsive and transparent which means good governance. Right to Information and good governance is the bedrock of democracy and can pave the way for transparency, openness and accountability in governance of the affairs of the state and ensure effective participation of people in a democratic society. Accountability incorruptibility sensitivity and ethical conduct are the key factors of good governance.

In *S. P. Gupta¹ and others vs President of India and others* S.C held that democratic form of government necessarily requires accountability which is possible only when there is openness transparency and knowledge. Greater exposure about functioning of the government ensures better and more efficient administration promotes and encourages honesty and discourages corruption, misuse or abuse of authority. In *Express²News papers pvt ltd vs the union of India* the S.C affirmed that Right to know is part and parcel of the Right to freedom of speech and expression. The terms transparency and accountability are made part of "Preamble of the constitution and preamble of the Right to information of Act 2005. Transparency makes the citizens to know exactly what is going on and the rationale of the decision taken by the government and accountability makes sure about that the action and inaction of the government. In order to have transparency and accountability in administrative functions of the state the government should have efficient mechanism like facilitation centers and redressal centers. In *State of Uttar Pradesh Vs. Raj Narayan³ and others* S.C held that the Right to Know which is derived from the

¹ AIR 1982, Supreme Court 149.

² Case Decided on 8 January 1958.

³ 1975, 4 SCC 428.

concept of freedom of speech though not absolute the people of the country have a right to know every public transaction.

In T.S.R Subramanian and others vs Union of India and others the issue of accountability of administrative officers of the government was questioned and the court held that democracy requires an informed citizenry and transparency of information .

The main Constitutional Governance Indicators⁴ are

- Voice and Accountability
- Political Stability and Absence of Violence
- Government Effectiveness
- Regulatory Quality
- Rule of Law
- Control of corruption.

In 161 session at Cairo in sep 1967 the inter parliamentary union has adopted a document as Universal Declaration of democracy which enumerated the principles of democracy.

1) Democracy is a universally recognized idea as well as a goal which is based on common values shared by peoples throughout the world community irrespective of cultural political social and economic differences.

2) Democracy is the basic right of Citizenship to be exercised under conditions of freedom equality transparency and responsibility with due respect for the plurality of views and in the interest of polity.

3) Democracy aims essentially to preserve and promote the and fundamental rights the individual to achieve social justice foster the economic and social development of the community strengthen the cohesion of society and enhance national tranquility as well as to create a climate that is favorable For international peace .Democracy is the best way of achieving these objectives it is also the onlythat has the capacity for self correction.

4)Democracy is based on the existence of well structured and well functioning institutions as well as on body of standards and rules and on the will of society as a whole fully conservant with its rights and responsibilities.

⁴

World Bank Report for Period 1960 to 2012

5) Democracy is founded on the of every one to take part in the management of public affairs it therefore requires the existence of representative institutions at all levels.

6) It is an essential function of the state to ensure the enjoyment of the state to ensure the enjoyment of civil cultural economic political and social rights to its citizens. Democracy thus goes hand in hand with an effective honest and transparent government freely chosen and accountable for its management of public affairs.

7) Public accountability which is essential to democracy applies all those who hold public authority whether elected or non elected and to all bodies of public authority without exception. Accountability entitles a right of access to petition to government and seek redress through impartial administrative and judicial mechanism.

8)Public life a whole must be stamped by a sense of ethics and by transparency and appropriate norms and procedures must be established to up hold them.

9)A sustained state of democracy requires a democratic climate and cultural nurtured and reinforced by education and other vehicles of culture and information.

10)The state of democracy presupposes freedom of opinion and expression this right implies freedom to hold opinion without interference and to seek receive and impart information and ideas through any media and regardless of frontiers.

The principles of democracy emphasize up on freedom of equality transparency and responsibility .It aims at preserving and promoting the dignity and fundamental rights of the individual achieving social justice fostering the economic and social development of the community .Our democracy is based on the existence of well-structured and well functioning institutions like parliament judiciary Election commission and others .In democracy citizens have a Right to Know what their government is doing .It is only if the people know how the government is functioning and they can fulfill the democratic rights given to them and makes the democracy a really effective and participating democracy.

In recent judgment of the institute of chartered accounts of India vsShaunak H. satya and others⁵ the S.C.has mentioned the relationship between democracy and Right to information Act2005 in detail. One of the objects of democracy is to bring about transparency of information to contain corruption and bring about accountability .Since the constitution of india has declared India to be a democratic country ,the state is duty bound to adhere various principles of democracy recognized widely in polity of other democracies .The goals and objectives of the constitution could be termed as principles of democracy . In Union of India vs Association⁶ of democratic forum the court held that the Right to know would strengthen the participation in decision making process and also in election process .The same view was mentioned by S.C in recent judgements of Resurgence India vs Election

⁵ SLP Case no. 2040 by 2011 Decided on 2nd September 2011.

⁶ 2002 5 SCC 294.

commission of India⁷ and others, held that the citizens Right to know of the candidate who represent him in the parliament will constitute an integral part of Art 19(1)(a) of the constitution and any act which is derogative of the fundamental rights is the ultra vires of the constitution.

In CPIO Supreme court of India vsSubhas Chandra Agarwal⁸ it was stated that the independence of judiciary and the fundamental right to free speech and expression are of a great value and both of them are to be balanced.

The Supreme court has brought new dimensions and interpretations of the law relating to the Right to information in two judgments .In first case Union of India vsNamit Sharma⁹ the court held that the Right to privacy or person protected under Art 21of the constitution should be affected by furnishing any particular information.

In T.S.RSubramaniyan and others vsUion of India¹⁰ and others the court held that democracy requires an informed citizenry and transparency of information.

The major objectives of the R .T I. Act

1) Greater Transparency in functioning of Public authorities;

2) *Informed Citizenry for promotion of partnership between citizens and the government in decision making process.*

3)*Improvement in Accountability and performance of the government and*

4)*Reduction in Corruption in the government departments.*

All these Parameters are critical elements of good governance ,which entails full accountability to stakeholders who are partners in development process and have the powers to enforce accepted policies ,common norms and recognized bench marks. It is expected therefore ,that the citizen armed with information obtained through their exercise of their right to know , would be able to protect life and liberty as well as secure equity and justice before the Law.

With a view to ensuring maximum disclosure of information regarding government files regulations and reports including decision making processes every public authority is to required to "maintain all its records duly catalogued and indexed in a manner and the form which facilitates the right to information under the act.The public authorities are therefore expected to make pro-active disclosures through publication of relevant documents including web- based dissemination of information .Besides the public authorities are also required to provide as much information suomotu to the public at regular intervals through various means of

⁷ WPC no. 128 of 2008 decided on 13 September 2013.

⁸ SL PCC No. 32855 of 2009.

⁹ Review petition civil no. 2675/2012 decided on 3 September 2013.

¹⁰ WPC no. 82 of 2011 Decided on 31st October 2013.

communication including internet so that the public have minimum resort to the use of this act to obtain information.

To facilitate the access to information a citizen has U/Sec 2(i) of the act the right to:

- 1. Inspection of Work, documents ,records;*
- 2. Taking notes extracts or certified copies of the documents or Records;*
- 3. Taking certified sample of material and*
- 4. Obtaining information in electronic form,if available*

Thus all the public authorities have duly placed the information in public domain and a citizen has a right to observe as to what is going on inside organization. The Media and civil society have raised development issues based on facts about the use of funds as well as the best practices in formulation and implementation of pro-poor schemes .The citizens are thus better informed about the performance and contributions of the elected representatives which augurs well for a healthy democracy and democratic governance of projects .

Promotion of Citizen –Government partnerships

The RTI act provides a framework for promotion of citizen –government partnership in designing and implementation of development programmers for improving quality of life which calls for increasing peoples options for higher earnings better education and health care a cleaner environment a richer culture life. Under the RTI regime , citizens participation has been

Promoted through (a) access to information and involvement of affected groups /communities in design and implementation of projects and (b) empowerment of local government bodies at village level through the involvement and cooperation with NGOs/self help groups.

Until the implementation of the RTI act ,it was not possible for any ordinary person to seek the details of a decision making process ,which was found most often as ineffective in terms of its outcome. It was therefore not possible to hold a free and frank discussion on issues of common concern of people or to fix the responsibility for any action .such an era of darkness in policy planning including monitoring and evaluation of schemes by affected persons is over. Due to effective implementation of the flagship programmes for poverty alleviation ,and infrastructure development ,the mis-match between the planned targets and actual realization has, of late been minimized which has enabled the people to build their strengths and abilities to realize their socio- economic objectives.

As a result of increased government s accountability in delivery of services rural to urban migration has ,of late decelerated as widely reported in the media. This is also

corroborated by the findings of a national level survey conducted by the transparency international and the centre for media studies. The survey has revealed that in the opinion of 40 percent of respondents (all below the poverty line)corruption and mal-practices in implementation of poverty alleviation programmes have declined due RTI induced accountability of the government and its functionaries at various levels.

2) Reduction in Corruption

Under the RTI regime there is there is unprecedented transparency in working of public departments. There is thus better understanding of the decision making process and greater accountability of government .This led to reduction in corruption in the country as evident from the following

a) The transparency international (TI) has reported that perceived corruption in india has declined ,due to mainly the implementation of the RTI act .This is evident from corruption reduction score of 3.4 (out of 10) in 2008, after an initial rise of 3.5 in 2007, compared to 2.99 in 2006 which indicate a decline in corruption to the extent of 15%

b)The TI-CMS has recently accomplished an all india survey study of the poor below the poverty line.The views of the poor have been elicited in respect of all the flagship programmes that have been implemented for alleviation of poverty .At least 40 percent of the respondents have reported that corruption has declined.

c) It has also been observed that wherever NGOs are actively involved in the development activities, the perceived corruption is abysmally low.

3) RTI and Its Impact On Major Indicators of Development.

- a) poverty alleviation
- b) Guaranty of income and food security.
- c) Implementation of NREGA
- d) Mid- Day Meals to school children
- e) Integrated child development scheme
- f) Grant of food security and pension for the poor senior citizens
- g) public distribution system to poor
- h) shelter for poor
- i) National rural health mission
- j) Environmental pollution
- k) Empowerment of weaker sections.

Right to information and voice accountability

The administrators and other representatives of the state can be held responsible for their ill-fated actions and inactions, if public at large is given a voice in administration decision making process. Tomorrow

Right to information and political stability

Political stability means "not so frequent change in government, not so frequent elections and stability in actions of the political establishment (ie) ministerial actions. It is the only when sufficient opportunity is given to the elected representatives in the government they can hold them accountable for their decisions. The political instability leads to delay in taking important decisions which hamper growth and development of the nation. In other words, knowledge of important facts and figures related to political establishment including ministerial actions can be used as a handy tool to take wise decision while casting his vote by the voter and this wise selection of candidate to inform would bring much political stability.

Regulating mechanism

The success and failure of grievance is depends up on the redressal mechanism which includes regulatory authorities. It means howsoever the strong are rules regulations and powers there is strong in implementation mechanism but if there is no redressal mechanism to regulate the implementation and to look in to grievances the system is bound to fail either today or

The most unique feature of the Act is it provides the best redressal mechanism to regulate implementation of the act in true spirit of its objectives. It provides for establishment of appellate authority. The redressal mechanism provided in the act can not be used to regulate the functions of any authority unless the requested function is of providing information to the person making such request. By seeking and receiving relevant information from authority and by filing a writ of mandamus under Art 226 used to regulate the administrative function of the government.

Right to information And Rule of law

The goals and objectives laid down in constitution may be termed as goal to ensure the enforcement of Rule of Law and ensuring access to information is termed as goal and objectives of a democracy. It may be said that ensuring the enforcement of Rule of law will lead to ensuring enforcement of Right to information.

Right to information and control of corruption

The relation between corruption and transparency is inversely proportionate to each other. It means greater transparency will lead to control of corruption higher rate of corruption means transparency is no where. The provisions of the act can be used to enforce the authority to perform its other duties in fair manner element of corruption in administrative function of the government.

Right to information and government effectiveness

Effective government machinery is that ,there is optimum utilization of resources available (ie)efficiency with the enactment of the act with its subsequent application the Indian constitutional governance in true spirit has started and the day is not far when we will reach the fruits of good governance.

CONCLUSIONS

The Right to information ACT 2005 to secure constitutional governance has made special emphasis on future prospects. The judiciary has expanded the scope of constitutional rights by terming right to know as fundamental right and how right to know can bring transparency in functioning of the public authorities and how it can control corruption that prevails in functioning of such authorities and to achieve the good governance of the country. Right to know, as tool to access public held information, has significant bearing on good governance development and the implementation of flagship programmes for all alleviation of poverty.

The central and state information commission has played a critical role in enforcing the provisions of the act as well as educating the information seekers and providers. The implementation of the law on right to know for setting up information regime therefore augurs well for strengthening the knowledge society as well as for increasing the accountability of public bodies. RTI promotes and protects the socio-economic interests of citizens, particularly the poor who are receiving the benefits of development as per their entitlements. With a view to realizing the development goals the following are suggested to strengthen the RTI regime.

First- All the development projects should incorporate transparency and accountability.

Second;- The government should develop the capacities for access to information.

Third;- In view of high illiteracy among the poor a multimedia approach should be added to educate and train people of diverse linguistic backgrounds.

Fourth;- Increase in awareness about the human rights and to create necessary conditions for good governance of which all the stakeholders would be duly proud of.

Finally;- The strengthening of information regime is therefore since quo non for promoting democratic governance and to development

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UNDERSTANDING THE CONCEPT OF INTERNET OF THINGS (IOT)

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Abstract

The paper traces in brief the development of the Internet of Things (IOT) since the beginning of the century. Today, the majority of IoT devices are intended for healthcare, industrial and commercial purposes. The major chunk of personal devices in the IoT realm is taken up by mobile phones, wearable devices, smart homes, smart appliances etc. The World Economic Forum says that by 2020, more than 5 billion people will be connected. The main components of IoT are the Things, Sensors, Data and the Analyzing Systems. Though IoT has a huge potential, there are a number of hurdles to overcome for it to reach its full potential. Current constraints include the lack of technology for handling massive amounts of data, indexing the data for searches, organizing and connecting it to corresponding locations etc. The major challenge IoT faces now is the lack of a standard communication protocol. IoT also faces environmental challenges in the form of exponential growth in e-waste in the future when IoT devices become obsolete with time and use.

Key Words: Internet of Things, Market, Concept

The concept of the Internet of Things first became popular in 1999, through the Auto-ID Center at MIT and related market-analysis publications. Radio-frequency Identification (RFID) was seen as a prerequisite for the Internet of Things in the early days. If all objects and people in daily life were equipped with identifiers, computers could manage and inventory them. Besides using RFID, the tagging of things may be achieved through such technologies as near field communication, barcodes, QR codes and digital watermarking.

Although the concept wasn't named until 1999, the Internet of Things has been in development for decades. The first Internet appliance was a Coke machine at Carnegie Mellon University in the early 1980s. The programmers could connect to the machine over the Internet, check the status of the machine and determine whether or not there would be a cold drink awaiting them, should they decide to make the trip down to the machine. In 2008, the number of devices connected to the internet exceeded the number of people on earth. Currently it is approximately two devices per person. That is, the number of devices connected to the IoT is double the number of people on earth. This is expected to grow to approximately 4.3 devices per person by 2020.

Today, the majority of IoT devices are intended for healthcare, industrial and commercial purposes. The major chunk of personal devices in the IoT realm is taken up by mobile phones, wearable devices, smart homes, smart appliances etc. It is estimated that:

1. 90% of the cars will be connected to the internet by 2020, compared to 10% in 2012.
2. The connected kitchen will contribute at least 15% savings in the food and beverage industry by 2020.
3. Cities can save 70-80% in energy by equipping street lights with sensors and connecting it to the IoT network.

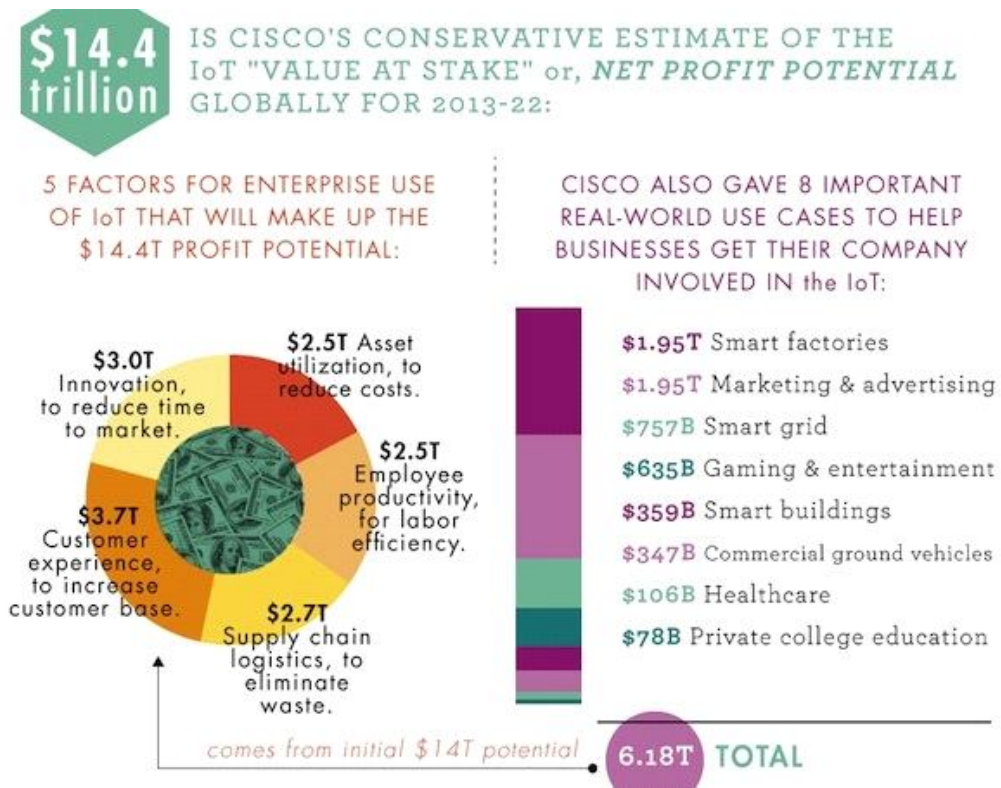


Fig 1: Stats on sensor enabled objects

4. More than two-thirds of consumers plan to buy connected technology for their homes by 2019, and nearly half say the same for wearable technology.
5. Wearables will become a \$6 billion market by 2016, with 171 million devices sold.
6. Currently, 7% of consumers own a wearable IoT device, and 4% of consumers own an in-home IoT device. Nearly two-thirds of consumers plan to buy an in-home device in the next five years, and wearable technology ownership will double by 2015-increasing from 7% in 2014 to 14% by 2015. By 2016, wearable technology is expected to double again and reach a total of 28% adoption rate.
7. Wearable fitness applications and technology stand to see the most growth in the short term, with 13% of consumers planning to purchase within the next year and a total of 33% looking to adopt in the next five years. The popularity of YuFit and Mi Band in India is an example.
8. Smartwatches are the second most popular wearable device, with 5% planning to purchase in the next year and a total of 23% planning to adopt in the next five years. Industry giants like Apple and Google focusing on smartwatches is an indicator.

Market Statistics

CISCO estimates that IoT shall create USD 14.4 trillion of value for the Industry. Tech Navio says that the Global Internet of Things (IoT) market is expected to grow at a CAGR of 31.72 percent from 2014. Gartner predicts that IoT products and service suppliers will generate incremental revenue exceeding USD 300 billion in 2020. According to GE, 'Industrial Internet' has the potential to add USD10 to USD 15 trillion to global GDP over the next 20 years and the convergence of machines, data and analytics will become a USD 200 billion global industry over the next three years. The World Economic Forum says that by 2020, more than 5 billion people will be connected, not to mention 50 billion things. IDC says that by 2017, ninety percent of datacenter and enterprise systems management will rapidly adopt new business models to manage non-traditional infrastructure and BYOD device categories.



Booz and Company, an international strategy consultancy advisor in its survey on the economic and social effects of digitization, opine that a ten percent increase in a country's digitization rate leads to a 0.75 percent higher gross domestic product (GDP) per capita and a 1.02 percent lower unemployment rate. China, for instance, is planning to invest 5 billion Yuan in the IoT industry during the current year 2015-16. It has set up the Chengdu Internet of Things Technology Institute in Sichuan Province, which is developing a "healthcare capsule". According to this initiative, village residents will be able to step into a telephone-booth-sized capsule and obtain a diagnosis and also a prescription for medicines from a doctor located in a distant hospital.

IoT COMPONENTS

The main components of IoT are the Things, Sensors, Data and the Analyzing Systems.

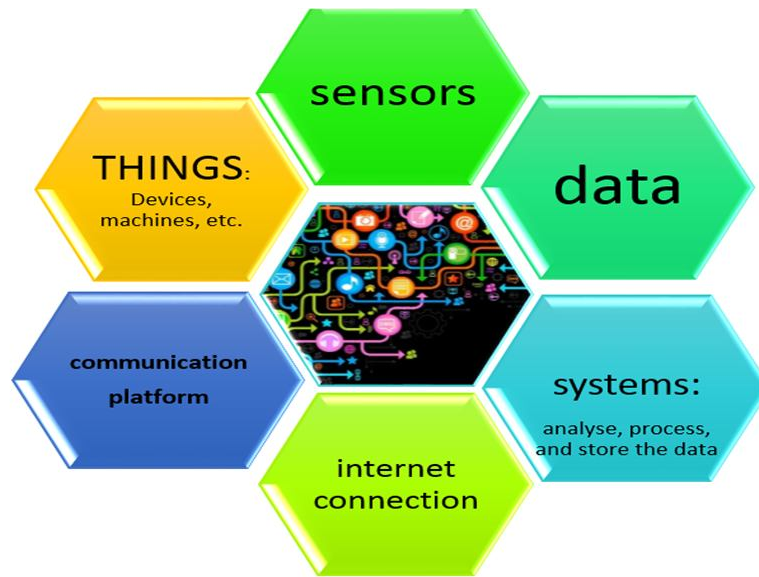
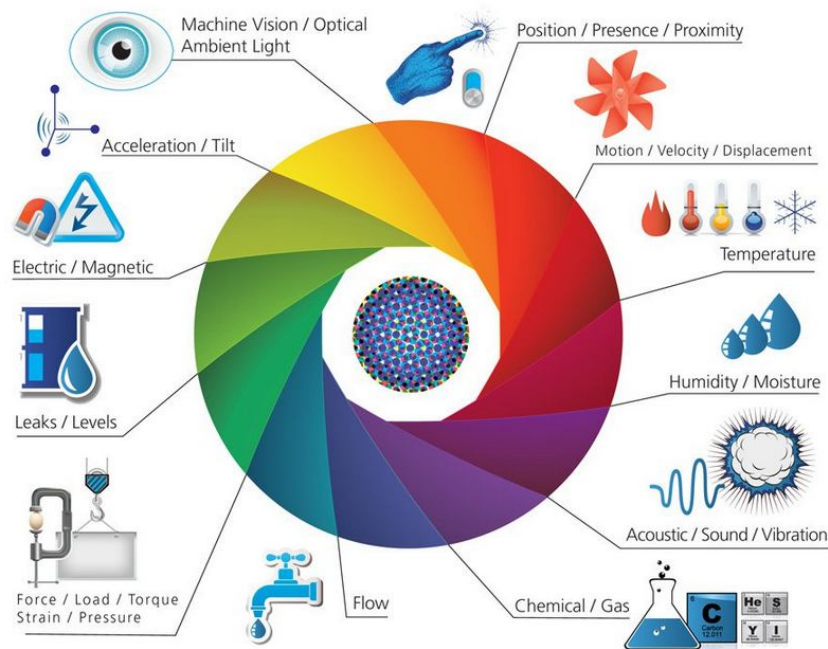


Fig2 : IoT Components

The 'Things' are the devices that are part of the IoT. Any object that is equipped with a sensor and can connect to the internet becomes a thing of the Internet of Things. It can vary from trees that are RFID (Radio Frequency ID) tagged to pacemakers in the patient or sensors in an industrial turbine.

Sensors are the primary data collection units in the Internet of Things. They help in giving each object a unique Id among the millions of objects in the IoT realm. Sensors can carry out a variety of functions like measuring temperature, motion, humidity/moisture, acoustic/vibration and much more depending on the application.



The analyzing systems are the final process in the chain of processes involved in an IoT operation. It can be either of the following:

1. Human to Machine interaction
2. Machine to Machine (M2M)
3. Cloud Server

Human to machine are as simple as a person operating a smart TV. An example of machine to machine is a wearable fitness band communicating data with your smart phone. Cloud server is the method in which the data is uploaded to a server in the Cloud and the data processed within the Cloud system.

Applications

Internet of Things has innumerable possibilities. Any object in our daily life or machines in critical applications can be embedded with sensors and data transfer capability to make it a part of IoT. Some examples of existing IoT applications are:

1. Media: The IoT creates an opportunity to collect data and analyze behavioral statistics. This enables companies to target individuals with specific products and services relevant to them.

2. **Environmental Monitoring:** Sensors can be used to monitor water quality, air quality, atmospheric changes, wildlife movements, habitats, wildlife census, resource management and much more.
3. **Infrastructure Management:** Monitoring and controlling operations of urban and rural infrastructures like bridges, railway tracks and wind-farms are key applications of IoT. Sensors can alert structural changes, loads etc. and schedule maintenance and repairs accordingly.
4. **Industrial:** IoT can be used for optimizing manufacturing and other concerned processes in industries by collection of data and analyzing it. Sensors enable in the automation of processes within a company and thus reduce human resources and time. RFID tagged personal ID cards for employees are a simple example of such an application.
5. **Energy Management:** One of the most valuable contributions of IoT will be in energy management. Utility supply companies can use sensor embedded devices to automatically switch off or on by sensing its environment or user patterns. It is estimated that sensor embedded street lights can save up to 80% energy. Users can also remotely control energy devices for efficient management of resources.
6. **Medical and Healthcare Systems:** IoT devices can be used to enable remote health monitoring and emergency notification systems. These health monitoring devices can range from blood pressure and heart rate monitors to advanced devices capable of monitoring specialized implants, such as pacemakers or advanced hearing aids. Wearable fitness devices help in monitoring the health and lifestyle of the user.
7. **Building and Home Automation:** IoT devices can be used to monitor and control the mechanical, electrical and electronic systems used in various types of buildings (e.g., public and private, industrial, institutions, or residential). Home automation systems, like other building automation systems, are typically used to control lighting, heating, ventilation, air conditioning, appliances, communication systems, entertainment and home security devices to improve convenience, comfort, energy efficiency, and security.
8. **Transportation:** The IoT can assist in integration of communications, control, and information processing across various transportation systems. Application of the IoT extends to all aspects of transportation systems, i.e. the vehicle, the infrastructure, and the driver or user. Dynamic interaction between these components of a transport system enables inter and intra vehicular communication, smart traffic control, smart parking, electronic toll collection systems, logistic and fleet management, vehicle control, and safety and road assistance.

9. Smart Cities: Everything in a smart city will be wired, connected and turned into a constant stream of data that would be monitored and analyzed by an array of computers with little, or no human intervention. This will enable proper and efficient management of resources, energy and services within a city. Electronic cards (known as smart cards) are another common platform in smart city contexts. These cards possess a unique encrypted identifier that allows the owner to log in to a range of government provided services (or e-services) without setting up multiple accounts. The single identifier allows governments to aggregate data about citizens and their preferences to improve the provision of services and to determine common interests of groups.

Challenges

Though IoT has a huge potential, there are a number of hurdles to overcome for it to reach its full potential. Current constraints include the lack of technology for handling massive amounts of data, indexing the data for searches, organizing and connecting it to corresponding locations etc. The major challenge IoT faces now is the lack of a standard communication protocol. Of the millions of devices present today, the communication protocols used vary from devices to devices depending on the manufacturer and applications. This restricts the Machine to Machine (M2M) communication between devices across the entire range of the Internet of Things network. Some device use WiFi, while others use Low Energy Bluetooth, Near Field Communication(NFC), Zigbee (Z wave) etc.

Another major criticism IoT faces is the issue of security and privacy. Concerns have been raised that the Internet of Things is being developed rapidly without appropriate consideration of the profound security challenges involved and the regulatory changes that might be necessary. Computer controlled devices in automobiles such as brakes, engine, locks, hood and truck releases, horn, heat, and dashboard have been shown to be vulnerable to attackers who have access to the onboard network. In some cases, vehicle computer systems are internet-connected, allowing them to be exploited remotely. Privacy concerns exist wherever personally identifiable information is collected and stored- in digital form or otherwise. Improper disclosure is the root cause for privacy issues. Data privacy issues can arise in response to information from a wide range of sources, such as health records, residence and geographic records and records pertaining to banking transactions to name a few.

IoT also faces environmental challenges in the form of exponential growth in e-waste in the future when IoT devices become obsolete with time and use. We are already faced with the problem of properly managing and recycling e-waste and this will only add to the woes of managing it.

Conclusion

Whether we want to be a part of it or dislike it, the common man is already a part of the Internet of Things and soon IoT will be an integral part of every human life. The technological advancements of today and the applications of it in the society and in our environment make it impossible for us to escape from IoT. We will barely have a choice but to embrace it. What we can do though is strive to make IoT efficient, moral and beneficial to humanity and our environment on the whole and reduce the cons of IoT by finding cordial solutions to the problems IoT faces today and may face in the future.

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