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Index

MARKETING SKILLS AMONG STUDENTS IN COLLEGES OF HARYANA

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Abstract
In a developing economy like India, marketing has a very significant role in economic development of economy. The study of marketing skills is essential not only to solve the problem of unemployment but also to success of any business. Today students are faced with an array of stream selection and on the other hand competition is fierce among students. That's why an understanding of marketing skills is vital to the success of a commerce or management student. This paper is a humble attempt to sketch the various important dimensions of marketing skills in India. A major part of the work is devoted to deal with themarketing skills of commerce and management students.
Key Words: *Marketing Skills, Commerce, Management.*

Introduction

With Liberalization, Privatization and Globalisation, there is a major change in the availability of opportunities in world. Today's marketplace is fundamentally different as a result of major societal forces that have resulted in many new consumer and company capabilities. These forces have created new opportunities as well as challenges and changed marketing significantly as companies seek new ways to achieve marketing excellence. As per Philip Kotler, "Marketing is an organizational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders".

Marketers play a critical role in the overall economic growth of a country. The contribution is significant in both developed and developing countries. However, the role of an marketer and the factors that affect the marketing activity are different in developed and developing countries. Students will become marketer in future. Marketers are skilled at managing demand: they seek to influence its level, timing and composition for goods, services, events, experiences, persons, places, properties, organizations, information and ideas. They also operate in four different marketplaces: consumer, business, global and non-profit.

Today students are faced with an array of stream selection and competition is fierce among students. This is why an understanding of marketing skills is vital to the success of a commerce or management student. The paper covers students of two streams - commerce and management.

Marketing Skills

The prime skills of marketing are:

1. Interpersonal Skills
2. Good Oral and Written Communication Skills
3. Numeracy And Analytical Ability
4. Creativity and Imagination
5. Influencing and Negotiation Skills
6. Teamwork
7. Organisational Ability
8. IT Skills

9. Business and Commercial Acumen
10. Drive and Ambition

Just as individuals differ in their ability to translate their creative talents into results, organizations differ in their ability to translate the talents of their members into new products, processes or services. In this study, we will concentrate on marketing skills among commerce and management students as well as male and female students.

Objectives of the Study

The present study is taken up to achieve the following research objectives:

RO_1: To compare the marketing skills of commerce and management students in selected colleges of Haryana.

RO_2: To compare the marketing skills of male and female Students in selected Colleges of Haryana.

Justification of the Study

In today's world the economic activities have become very important. The growth of any economy depends on, how efficiently it performs its economic activities, especially marketing. Hence, knowledge of different areas of marketing skills like; Interpersonal skills, Good oral and written communication skills, Numeracy and analytical ability, Creativity and imagination, Influencing and negotiation skills, Teamwork, Organisational ability, IT skills, Business & commercial acumen and Drive & ambition is necessary. To cope up with this need of the hour, various dimensions of marketing skills have studied among commerce and management students as well as male and female students in selected Colleges of Haryana.

Research Methodology

Results and discussion

Research design of the present study is exploratory cum descriptive in nature. The study is based on quantitative data primarily. Survey method has been used to collect the primary data. Structured questionnaire has been used as data collection tool. Total 34 statements were asked from the respondents on a five point scale ranging from strongly agree to strongly disagree. These statements were already grouped in ten categories representing ten dimensions of marketing skills. Review of previous studies had suggested that these ten dimensions are important for measuring marketing skills.

Summated mean scores were taken for ten dimensions and analysed using t-test. The t-test was used to compare mean scores of any variable for two categories. Mean scores of all ten dimensions individually were compared for male & female students and for commerce and management students. The t-test was applied and P-value is calculated using SPSS software. Any P-value which is less than .05 (at 5% level of significance) was taken significant which depicts significant difference in the mean score of given categories.

Sample : Total twenty colleges from four districts (Rohtak, Sonepat, Hissar and Rewari) of Haryana were chosen for data collection. These colleges comprise of PG colleges and management institutes. Ten students from final year from Commerce / Management streams were taken at random from each college / institution. Total sample comprised of 100 commerce students and 100 management students. The sample constituted male and female students equally.

Table 1
Comparison of Mean Score of Commerce and Management Students on Various Dimensions of Marketing Skills

Group Statistics					
	Stream	N	Mean	Std. Deviation	P-Value
Interpersonal Skills	Commerce	100	2.12	1.16	.49
	Management	100	1.88	1.16	
Good Oral and Written Communication Skills	Commerce	100	2.00	1.21	.19
	Management	100	2.86	1. 35	
Numeracy and Analytical Ability	Commerce	100	2.77	1.33	.12
	Management	100	2.72	1.50	
Creativity and Imagination	Commerce	100	2.46	1.49	.54
	Management	100	2.87	1.47	
Influencing and Negotiation Skills	Commerce	100	2.88	1.33	.34
	Management	100	2.85	1.46	
Team Work	Commerce	100	2.73	1.36	.22
	Management	100	2.79	1.49	
Organisational Ability	Commerce	100	2.59	1.33	.04
	Management	100	2.70	1.07	
IT Skills	Commerce	100	2.80	1.83	.14
	Management	100	2.75	1.73	
Business and Commercial Acumen	Commerce	100	2.57	1.47	.14
	Management	100	3.19	1.51	
Drive and Ambition	Commerce	100	3.99	1.37	.11
	Management	100	3.14	1.55	

Table 1 shows the comparison of mean score of commerce and management students on various dimensions of marketing skills. It is evident from the table that the calculated value of P-value for the dimension 'organisational ability' is less than 0.05. Therefore, there is a significant difference between the mean score of commerce and management students on this dimension. However, there is no significant difference between the mean scores for the dimensions Interpersonal skills, Good oral and written communication skills, Numeracy and analytical ability, Creativity and imagination, Influencing and negotiation skills, Teamwork, IT skills, Business & commercial acumen and Drive & Ambition.

Table 2
Comparison of Mean Score of Male and Female Students on

Various Dimensions of Marketing Skills

Group Statistics					
	Gender	N	Mean	Std. Deviation	P-Value
Interpersonal Skills	Male	100	3.42	1.41	.19
	Female	100	2.98	1.40	
Good Oral and Written Communication Skills	Male	100	3.10	1.21	.18
	Female	100	2.86	1.35	
Numeracy and Analytical Ability	Male	100	2.97	1.23	.04
	Female	100	2.92	1.51	
Creativity and Imagination	Male	100	2.96	1.91	.03
	Female	100	2.87	1.47	
Influencing and Negotiation Skills	Male	100	2.88	1.63	.04
	Female	100	2.98	1.86	
Team Work	Male	100	2.93	1.26	.30
	Female	100	2.89	1.49	
Organisational Ability	Male	100	2.79	1.43	.04
	Female	100	2.87	1.07	
IT Skills	Male	100	2.91	1.83	.66
	Female	100	2.89	1.73	
Business and Commercial Acumen	Male	100	2.87	1.47	.03
	Female	100	3.19	1.51	
Drive and Ambition	Male	100	2.98	1.37	.26
	Female	100	3.14	1.35	

Table 2 shows the comparison of mean score of male and female students on various dimensions of marketing skills. It is evident from the table that the calculated value of P-value for the dimensions Numeracy and analytical ability, Creativity and imagination, Influencing and negotiation skills,Organisational ability and Business & commercial acumen is less than from 0.05. Therefore, there is a significant difference between the mean score of male and female students on these dimensions. However, there is no significant difference between the mean scores for the dimensions Interpersonal skills, Good oral and written communication skills, Teamwork, IT skills, Drive and ambition.

Concluding Remarks

This paper intends to help academicians and researchers to understand to what extent the students in Haryana possess marketing skills. The study of marketing skills is qualitative in nature. Yet an effort has been done to analyse it quantitatively. As the markets are dynamic in nature and national

&international business scenario is changing day by day, commerce and management students are required to possess the marketing skills as discussed in the previous section of the paper. The students from both commerce and management stream seem to possess these skills equally with one exception i.e. organisational ability. Management students have more organisational ability as compared to commerce students. Further, male and female students differ in Numeracy and analytical ability, Creativity and imagination, Influencing and negotiation skills,Organisational ability and Business & commercial acumen.

SUSTAINABLE DEVELOPMENT THROUGH SUSTAINABLE TOURISM: A CONCEPTUAL FRAMEWORK

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Abstract
Sustainable development has become in a very short time in the center of every aspect of socio-economic planning. Having a close relationship with environment, sustainable tourism is a pillar of sustainable development and a continuous challenge for academic and especially for governments and local communities. This paper is a conceptual note that aims to identify the meaning of connections between sustainable development-environment-sustainable tourism. Also, watch how that can reach from theory to practice and highlighted the way from growth and development to tourism and tourism activity itself, principles, goals and responsibilities for sustainable tourism.

Introduction

Concept of sustainable development has appeared and individualized 30 years ago, as a part of new thinking and economic theories of 50-60 years ago, a strong response to ecological crisis caused by intense industrial exploitation of resources and environmental degradation. This concept is an old expression of ethical principles that define relationship between humans and the environment as well between present and future generations. Currently, the concept of sustainable development has expanded on all aspects of life, being a complex one and, comprehensive, both in economic aspects, as well as social issues. In Stockholm in 1972, during the Conference of Environment, was another issue raised the impact of human activities on the environment, a negative perspective for the planet and its inhabitants. In 1987, within the United Nation, was published Bruntl and report. Known as Our Common Future, report define sustainable development as a viable and environmentally supported as "Guarantee of the present needs without compromising the ability of this coming generations to meet their own needs." (World Commission on Environment and Development). Between 3 and 11 June 1992 in Rio de Janeiro, within United Nations Conference on Environment and Development - Sustainable development is defined as "a new development path to support human progress for the entire planet for a long future." Also then was developed Agenda 21 - a complex and comprehensive plan for sustainable development. In the European Union, sustainable development became a priority after 1997, when the concept and its meanings were included in the Maastricht Treaty. In 1999 the European Union has developed an integrated strategy for sustainable development and a viable set of environmental policies - European Spatial Development Perspective. In 2001, the Gotheborg Summit was adopted the EU Sustainable Development Strategy, and a year later in Barcelona, was added an external dimension (Golusin, Ivanovic, 2009). Durability refers to the ability of a

society, ecosystem, or any such existing system to work continuously in an undefined future, without reaching exhaustion of key resources (Bran, Rojanschi, 2006). UICN- the International Union for Conservation of Nature, WWF - The World Wide Fund for Nature, PNABE defined, in 1991, the concept of sustainable tourism as "all forms of tourism development, management and marketing of tourism that respects the integrity of natural, social and economic environment, ensuring the exploitation of natural and cultural resources for future generations" Sustainable tourism has been intended to manage all resources, such as economic needs, social and esthetic to be satisfied, while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems" (World Tourism Organization).Further developments of this concept tries to materialize the idea of integrating the environment into economic and social development, underlining that sustainable development is an evolving concept and comprehensive involving all sides of human activity (Ioncică et al, 2004).

Sustainable Development-Sustainable Tourism Pair

The goal of sustainable development is, broadly, to find an optimal interaction of four systems: economic, ecological (environmental), social (human) and technological. The optimum level of sustainable development is achieved when the four systems support a continuous and well balanced growth, in a dynamic and flexible process. Sustainable development also means that economic activities may not be based only on the Idea of obtaining the benefits by entrepreneur for short-term, but priority should be evaluated long-term costs for society (Glăvan, 2003). A complex analysis of the concept of sustainable development follows environmental issues closely related with quality of life and population needs. In a broad acceptation from the sustainable development is expected solving the great problems of humanity: poverty, inequality, environmental degradation, increasing levels of urban, inflation rate, unemployment, financial, geopolitical and economic crises, or even removal traditional values. Sustainable development approach can be made from many anglers can appreciate the sustainable development on two ways - material and spiritual. Concept of sustainability refers to the management and how to use resources.

Management of resources is considered to be sustainable as long as, knowing her capacity of recovery, do not go over a certain limit in its exploitation. If sustainability is to mean anything, it must act as an integrating concept. In particular, it is clear that the social dimensions of sustainability must be integrated with the biophysical dimensions (Robinson, 2004). The theme of sustainability refers strictly to those resources that have the capacity to regenerate or replicate (oceanic fauna, forest and land). Depending on how the approach, the topic of sustainability is viewed differently. Economists follow the evolution and functioning of the market, considering that, under certain conditions, just the market balance can lead to sustainability. The explanation for this is that, through resource intensive use of a resource, increasing demand and the lack of alternative

sources, would make the price increase and this would help rebalance the system.

In "Squaring the circle? Some thoughts on the idea of sustainable development" paper, Robinson suggests that concept of sustainability follows two ways. "First, it provides a focus for a series of concerns that go to the heart of the interconnected debates over environmental, social and economic conditions [...]Second t hat it is possible to conceive of sustainability in a way that is sensitive to these concerns, and even offers some useful avenues forward in addressing them"(Robinson, 2004) In "Sustainable development in a post-Brundtland world" paper, Sneddon, Howarth and Norgaard embracing pluralism: ecological economics, political ecology and freedom-oriented development.

A sustainable development covers a number of minimum requirements, such as resizing growth (more equitable distribution of resources, increased qualitative aspect of production), eliminating poverty, controlled demographic growth, conserve natural resources, reorienting of technologies, cooperation in the decision making process at local, regional, national and international level.Sustainability involve permanence, which means that sustainable tourism requires the optimal use of resources (including biodiversity), minimizing the negative economic, socio-cultural and ecological benefits of maximizing local communities, national economies and nature conservation. As a natural consequence, sustainability refers to the management structures needed to meet these goals.

Sustainable tourism development should be seen as an adaptive paradigm, a part of the parental concepts of development and sustainable development, and it should aim at contributing to objectives of sustainable development and development in general by determining specific principles in the light of its parental concepts (Tosun, 2001).

Among the principles that development of sustainable tourism contribute to a sustainable development, Tosun in "Challenges of sustainable tourism development in the developing world: the case of Turkey" paper identify: contribute to the satisfaction of basic and felt needs, reduce inequality and absolute poverty in local tourist destinations, accelerate not only national economic growth, but also regional and local economic growth.

A sustainable tourism system is based on three important pillars:

1 Natural pillar-physical-geographical potential

2 Local pillar-local community

3 Human pillar-tourists, tour operators, other categories of stakeholders.

In "Confronting tourism's environmental paradox: Transitioning fo r sustainable tourism" paper, Williams and Ponsford suggests an approach by tourism-environment planning and management for a sustainable future. The future of sustainable tourism hinges on action from all stakeholders. On a more pessimistic note, current business and destination level environmental initiatives generally fail to address tourism-induced contributions to broader global climatic and environmental changes (Williams, Ponsford, 2009). A growing number of those involved, one form or another, in tourism activities, are aware of the effects of tourism

development, the impact of these activities on population and environment.

In last year's, ninth and tenth decades of the twentieth century, has followed that expansion of tourism to realize balanced accordance with standards that guarantee the preservation of ecological balance and avoid overloading resources, pollution and other negative environmental impacts.

Tourism resources belong to the common heritage of mankind: communities the territories which they are situated have particular rights and obligations in on them (from Global Code of Ethics for Tourism, World Tourism Organization, October 1999, Santiago de Chile).

Tourism-environment relationship is of particular importance, protection and conservation being important condition for progress and development of tourism.

This relationship is complex and is manifested in two directions: environment natural resources are the basic components of tourism and tourist activities on the other hand has an impact both positive and negative ecological environment, changing components.

Sustainable tourism seeks not only environmental protection. When we say sustainable development we say impacts (environmental or socio-cultural, etc.), and sustainable development requires sustainable management of these impacts. Has been demonstrated over time that any type of tourism (mass tourism or alternative), achieve to a several impact elements, felt both by society and the natural environment. It is obvious that mass tourism is responsible for profound negative influences and visible to the destination.

Williams, Ponsford (2009) revealed tourism-environment paradox, defining the relationship between the tourism industry and the natural environment as not easy one and on a center of tourism policy in the future.

Sustainable Development of Tourism Or Sustainable Tourism Development

The concept of sustainable development in tourism is relatively new, emerged in the past 20 years, its adoption taking the form of "sustainable tourism" as a branch with a significant increase in important economic activity, tourism industry, academic and environment research.

The principle of sustainable tourism is dissociation by mass tourism dissociation and association in some ways with some forms of alternative tourism. In other words, sustainable tourism can be viewed simply as opposed to classic tourism. The question arises "What is more appropriate: "Sustainable development of tourism" OR "Sustainable tourism development" ".Some experts prefers "Sustainable development of tourism" when referring to all aspects of development, and "Sustainable tourism development" when talking about some aspects or as constituents of tourism.

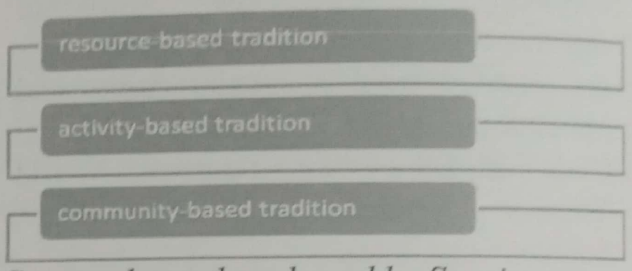
Sustainable tourism development is a requirement and, at the same time, a tendency of contemporary evolution, its integration in economic and social dynamics (Hornoiu, 2009). In "Ecotourism – a priority direction in local communities' sustainable development" book, Hornoiu provides several features of sustainable tourism: global and integrated approach between

economic sectors, stakeholder engagement, long-term planning included in a regional strategy, negative factors management, promoting sustainable consumption and production. In a receiving regions approach, sustainable tourism meeting the needs of improving resources for future generations, aimed at integrated management of all resources, in parallel with economic needs, social and aesthetic, without threatening the integrity of cultural, biological diversity, ecological and environmental processes. Sustainable tourism integrates three elements: quality, continuity and balance. Quality is that sustainable tourism is a valuable experience for visitors, in the context of improving quality of life of communities and spotlight on the natural environment. Sustainable tourism cannot exist without the continuity of natural resources, culture and customs of host communities. Also, sustainable tourism aims to ensure a balance between the tourism industry, tourism and the need for environmental enthusiasts and local communities. In a broad sense, we can define a series of goals of sustainable tourism: improving quality of life of host communities, intergenerational equity, environmental protection, ensuring cultural integrity, creating high quality experiences for visitors. Sustainable tourism is growing on a number of guiding principles: access to tourism for a large number of people, solidarity between generations and intra-generation, quality, services environmental protection, involving all stakeholders, coherent and congruent policy development, impact analysis and research results use. Principles acting on the rate of expansion of tourism and their application are based on the motivation reducing the negative impacts.

Following Sustainable Tourism

In "Traditions of sustainability in tourism studies" paper, Saarinen identifies three traditions in research on sustainable tourism: resource-based tradition, activity-based tradition, community-based tradition.

Fig.1. **Traditions in research on sustainable tourism**



Source: by author, based by Saarinen (2006)

The resource-based tradition reflects the limits of the natural or original conditions of the related resources and the needs to protect nature (natural capital) and the local culture (cultural capital) from unacceptable changes caused by tourism activities. The activity-based tradition refers to the resource needs of the industry with respect to its present and future development, aiming to sustain the economic capital invested in tourism. The community-based tradition stresses the wider involvement and empowerment of various actors, especially host communities, in development by emphasizing the elements of social capital in a local context. All these perspectives have their advantages, but also limitations and different outcomes if utilized in (sustainable) tourism processes

(Saarinen, 2006)

In "Beyond the rhetoric OF SUSTAINABLE TOURISM" paper, authors aim to show that the debate on sustainable tourism must go to the next level: "from defining the concept to a more thorough consideration of how it may best be implemented in practice" (Garrod, Fyall, 1998).

Garrod and Fyall suggested a methodology for implementing the concept of sustainable tourism. This methodology relies on applying the so-called 'constant capital rule', as developed within the field of environmental economics, which serves to objectivist. It should be noted that economically advanced countries need to protect and preserve both the environment and peace in the developing world since people of these countries have already accepted cross-border holidays as part of their felt-need (Tosun, 2000)

That tourism to be included in a sustainable approach is needed to achieve objectives: support tourism activities with low environmental impact, reduced forms of pollution from tourism, respect for diversity, cultural identity, reducing discrimination, creating and implementing innovative projects and competitiveness both economically and socially , adherence to relevant legislation.

All those objectives must be consistent with the connections between tourism industry and other sectors. Therefore, we reach a constant balance between tourism development, durability and environmental protection.

In the context of sustainable development, the limits of growth cannot be established and rounded solely on local or global perspectives. Sustainability is a matter of both local and global responsibilities (Saarinen, 2006)

To achieve sustainable tourism should be followed all socio-economic aspects involved directly or not starting from political, civil society, to human resources.

Sustainable tourism development plans must follow national and regional economic and social development. The actions serve economic ends (revenue growth), improve social (poverty), and environmental (conservation and sustainable use of biodiversity).

In tourism development, the ideal is both - political involvement in a planned manner, and non-governmental organizations.

Human resource development for tourism is a priority to get quality services on the tourist market. So it is necessary to design a systematic approach to personal needs and ways of training to provide qualified personnel.

Sustainable tourism is a goal, so any development including tourism development should give rise to changes in limits collectively maintained. Clearly, sustainable tourism can be achieved through planning, development, proper management of the tourism sector, respecting some well defined principles.

On the other side, sustainable tourism is not a tourism product directly salable to tourists. It is a way to design, plan and manage sustainable tourism activities. It involves a change in management style, in mentalities, behaviors and habits.

There are no miracle potions in developing sustainable tourism, but there

are links: communication for sustainable development, promoting partnerships between the actors involved, the integration of sustainable development as a factor in recovery of the tourism industry, promoting successful cases of sustainable development.

In "Sustainable tourism as an adaptive paradigm" paper, Hunder a pproaches relationship between tourism and development in terms of sustainability in four ways:

- Sustainable Development through a "Tourism Imperative".
- Sustainable Development through 'Product-Led Tourism ".
- Sustainable Development through "Environment-Led Tourism".
- Sustainable Development through ""Neotenous Tourism".

The remit of sustainable tourism is extended to consider the role of tourism in contributing to sustainable development more generally (Hunder, 1997)

Sustainable tourism can be seen from the perspective of resource management and tourism destination. So, in terms of destinations, sustainable tourism is the ability to be competitive to attract visitors and to retain, to remain unique cultural and co-exists in equilibrium with the environment.

Sustainable tourism meets the needs of tourists and receiving regions on integrated management of all resources with economic needs, social and esthetic, without endangering preservation of cultural, ecological, biodiversity and environmental

Conclusion

Very long time, tourism was seen only in terms of its economic advantages, increase revenue, multiplying jobs, less-known resources exploitation. These have been preconditions for uncontrolled development, which brought prejudices. The solution was born in adopting integrative concept of sustainable development, sustainable tourism as spring out. This includes conventional mass tourism, but under other principles, cultural tourism, rural, business, cruise, religious, sports and urban tourism. Sustainability orientation processes must be coordinated and supported by government factors of local factors and to achieve sustainable tourism plans under national and regional socio-economic development. The responsibilities are divided: if public sector planning, support research, aims to accomplish the basic infrastructure, private sector are responsible for development of accommodation, food, marketing and commercial operations. Sustainable development of tourism, or sustainable tourism development, is an evolving process based on knowledge, stability over time, planning and sustained involvement of all stakeholders.

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ARCH AND GARCH MODELS ESTIMATING FINANCIAL TIME SERIES DATA

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Abstract

Direct statistical analysis of financial prices is difficult, because consecutive prices are highly correlated, and the variances of prices often increase with time. This makes it usually more convenient to analyze changes in prices. Results for changes can easily be used to give appropriate results for prices. The volatility in the financial time series always exhibit some stylized facts i.e. unit root problem, heavy tails in data, serial correlation, unconditional variance etc. All these properties require the use of non-linear models for the analysis of financial time series data. In this study, two nonlinear models are discussed which are popularly used to analysis the financial time series data.

Introduction

Recent developments in financial econometrics suggest the use of nonlinear time series structures to model the attitude of investors toward risk and expected return. For example, Bera and Higgins (1993,) remarked that "a major contribution of the ARCH literature is the finding that apparent changes in the volatility of economic time series may be predictable and result from a specific type of nonlinear dependence rather than exogenous structural changes in variables." Campbell, Lo, and MacKinlay (1997,) argued that "it is both logically inconsistent and statistically inefficient to use volatility measures that are based on the assumption of constant volatility over some period when the resulting series moves through time." In the case of financial data, for example, large and small errors tend to occur in clusters, i.e., large returns are followed by more large returns, and small returns by more small returns. This suggests that returns are serially correlated. When dealing with nonlinearities, Campbell, Lo, and MacKinlay (1997) make the distinction between:

- Linear Time Series: shocks are assumed to be uncorrelated but not necessarily identically independent distributed (iid).
- Nonlinear Time Series: shocks are assumed to be iid, but there is a nonlinear function relating the observed time series $\{X_t\}_{t=0}^{\infty}$ and the underlying shocks, $\{\varepsilon_t\}_{t=0}^{\infty}$.

They suggest the following structure to describe a nonlinear process:

$$\begin{aligned} X_t &= g(\varepsilon t-1,\varepsilon t-2,\ldots) + \varepsilon h(\varepsilon t-1,\varepsilon t-2,\ldots) \\ E[Xt|\Psi t-1] &= g(\varepsilon t-1,\varepsilon t-2,\ldots) \\ Var[X_t|\Psi_{t-1}] &= E[\{(X_t - E[X_t])|\Psi_{t-1}\}^2] \\ &= E[\{\varepsilon h(\varepsilon t-1,\varepsilon t-2,\ldots)|\Psi t-1\}2] \\ &= Var[\varepsilon h(\varepsilon t-1,\varepsilon t-2,\ldots)|\Psi t-1] \\ &= \{h(\varepsilon t-1,\varepsilon t-2,\ldots)\}2 \end{aligned} \quad (1)$$

Where the function $g(\cdot)$ corresponds to the conditional mean of X_t, and the function $h(\cdot)$ is the coefficient of proportionality between the innovation in X_t and the shock ε_t.

The general form above leads to a natural division in Nonlinear Time Series literature in two branches:

- Models Nonlinear in Mean: $g(\cdot)$ is nonlinear;
- Models Nonlinear in Variance: h $(\cdot)^2$ is nonlinear.

(G)ARCH model

Noting the above difficulties, Engle (1982) was the first to propose a stationary non-linear model for y_k, which was termed ARCH (Auto-Regressive Conditionally Heteroscedastic; it means that the conditional variance of y_k evolves according to an autoregressive-type process). Bollerslev (1986) and Taylor (1986) independently generalised Engle's model to make it more realistic; the generalisation was called "GARCH". GARCH is probably the most commonly used financial time series model and has inspired dozens of more sophisticated models. Literature on GARCH includes Giraitis et al. (2005), Bera and Higgins (1993), Berkes et al. (2003), and the book by Straumann (2005).

The GARCH (p, q) model is defined by

$$\sigma_t^2 = \omega + \beta(L)\sigma_{t-1}^2 + \alpha(L)\eta_t^2$$

Where $\omega > 0$, $\alpha_i \geq 0$, $\beta_j \geq 0$, and the innovation sequence $\{\varepsilon_i\}_{i=-\infty}^{\infty}$ is independent and

Identically distributed with $E(\varepsilon_0) = 0$ and $E(\varepsilon^2_0) = 1$.

The main idea is that σ_k^2, the conditional variance of $\beta(L)$ given information available up to time t − 1, has an autoregressive structure and is positively correlated to its own recent past and to recent values of the squared returns α^2. This captures the idea of volatility (= Conditional variance) being "persistent": large (small) values of α^2_t are likely to be followed by large (small) values.

Basic properties

Following Bera and Higgins (1993), two important concepts should be introduced at this point:

Definition 1 (Law of Iterated Expectations): Let Ω_1 and Ω_2 be two sets of random variables such that $\Omega_1 \subseteq \Omega_2$. Let Y be a scalar random variable.

Then, $E[Y|\Omega_1] = E[E[Y|\Omega_2]|\Omega_1]$.

Note (Conditionality versus In conditionality): If $\Omega_1 = \emptyset$, then $E[E[Y|\Omega_2]] = E[Y]$.

Without loss of generality, let a ARCH (1) process be represented by

$$u_t = \varepsilon_t \sqrt{\alpha_0 + \alpha_1 u_{t-1}^2} \quad (4)$$

Where $\{\varepsilon_t\}_{t=0}^{\infty}$ is a white noise stochastic process? Johnston and Di Nardo (1997) briefly mention the following properties of ARCH models:

- u_t have mean zero.

Proof:

$$\begin{aligned} u_t &= \varepsilon_t \sqrt{\alpha_0 + \alpha_1 u_{t-1}^2} \\ E_{t-1}[u_t] &= \underbrace{E_{t-1}[\varepsilon_t]} \sqrt{\alpha_0 + \alpha_1 u_{t-1}^2} \\ &= 0 \\ E_{t-2}E_{t-1}[u_t] &= 0 \\ &(\ldots) \\ E[u_t] &= 0 \end{aligned} \quad (5)$$

u_t have conditional variance given by $\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2$.

Proof:

$u2_t = \cdot^2_t[\alpha_0 + \alpha_1 u_{t-1}^2]$

$$E_{t-1}[u_{2t}] = \sigma\varepsilon 2[\alpha 0 + \alpha 1 u_{2t-1}] \quad (6)$$
$$= 1[\alpha 0 + \alpha 1 u_{2t-1}]\sigma t2$$
$$=$$

- u_t have unconditional variance given by $\sigma^2 = \frac{\alpha_0}{1-\alpha_1}$.

Proof:

$$E_{t-2}E_{t-1}[u_{2t}] = E_{t-2}[\alpha_0 + \alpha_1 u_{t-1}^2]$$
$$= \alpha_0 + \alpha_1 E_{t-2}[u_{t-1}^2]$$
$$= \alpha_0 + \alpha_0\alpha_1 + \alpha_1^2 u_{t-2}^2$$

$$E_{t-3}E_{t-2}E_{t-1}[u_{2t}] = E_{t-3}[\alpha_0 + \alpha_0\alpha_1 + \alpha_1^2 u_{t-2}^2]$$
$$= \alpha_0 + \alpha_0\alpha_1 + \alpha_1^2 E_{t-3}[u_{t-2}^2]$$
$$= \alpha_0 + \alpha_0\alpha_1 + \alpha_0\alpha_1^2 + \alpha_1^3 u_{t-3}$$

(...)

$$E_0E_1E_2(...)E_{t-2}E_{t-1}[u_t^2] = \alpha_0(1 + \alpha_1 + \alpha_1^2 + ... + \alpha_1^{t-1}) + \alpha_1^t u_0^2$$
$$= \frac{\alpha_0}{1-\alpha_1}$$
$$= \sigma^2$$

(7) Therefore, unconditionally the process is Homoskedastic.

- u_t have zero-auto co variances.

Proof:

$$E_{t-1}[u_t u_{t-1}] = u_{t-1}E_{t-1}[u_t] = 0 \quad (8)$$

Regarding kurtosis, Bera and Higgins (1993) show that the process has a heavier tail than the Normal distribution, given that

$$\frac{E[\varepsilon_t^4]}{\sigma_\varepsilon^4} = 3\left(\frac{1-\alpha_1^2}{1-3\alpha_1^2}\right) > 3 \quad (9)$$

Heavy tails are a common aspect of financial data, and hence the ARCH models are so popular in this field. Besides that, Bera and Higgins (1993) mention the following reasons for the ARCH success:

ARCH models are simple and easy to handle

- ARCH models take care of clustered errors
- ARCH models take care of nonlinearities
- ARCH models take care of changes in the econometrician's ability to forecast

In fact, the last aspect was pointed by Engle (1982) as a "random coefficients" problem: the power of forecast changes from one period to another.

Extensions of GARCH

There are many extensions of the GARCH model. Two of them, EGARCH and IGARCH are probably the most popular and are covered in Straumann (2005). The Exponential GARCH (EGARCH) model reads $\log \sigma_k^2 = \alpha + \beta \log \sigma_{k-1}^2 + \gamma\varepsilon_{k-1} + \delta|\varepsilon_{k-1}|$.

The Integrated GARCH (IGARCH) process is a GARCH process for which $\sum_{i=1}^{R} \alpha_i + \beta_i = 1$.

Software for fitting GARCH models

Both S-Plus, R and E-Views have their own packages containing routines for fitting and forecasting GARCH models. The S-Plus module is called Fin Metrics, is described on http://www.insightful.com/products/finmetrics/and is a commercial product. Sadly, it is much better than its (free) R counterpart, the t series package, available from http://cran.r-project.org/src/contrib/Descriptions/tseries.html . The R package is only able to fit GARCH models, while the S-Plus module can fit GARCH, EGARCH and a number of other models.

Empirical Example of GARCH (1, 1) using S&P 500 returns

The following table shows the results on the S&P 500 Index from January 1980 to December 2003. There are 6060 observations; representing the active trading days over the entire sample. Continuously compounded returns are

computed as the first differences of the log of the S&P 500 price index. The ARCH and GARCH coefficient have the value less than one and non-zero. It shows the equation is well specified. The sum of both terms is less than one but close to one it specified that the volatility in the S&P500 returns index was highly persistent during the study period. These variations in any financial time series can be analyzed with the use of GARCH model using e views software and it provides superior results than linear models or earlier non-linear models.

Table: 1 GARCH (1, 1) Results for S&P 500 returns

Dependent Variable: SP500
Method: ML - ARCH (Marquardt)
Date: 02/04/04 Time: 17:34
Sample(adjusted): 2 6060
Included observations: 6059 after adjusting endpoints
Convergence achieved after 55 iterations
Variance back cast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000562	0.000109	5.139571	0.0000
SP500(-1)	0.039152	0.014432	2.712788	0.0067
	Variance Equation			
C	1.23E-06	1.43E-07	8.607399	0.0000
ARCH(1)	0.073459	0.001711	42.92278	0.0000
GARCH(1)	0.918176	0.003127	293.6124	0.0000
R-squared	-0.000199	Mean dependent var		0.000389
Adjusted R-squared	-0.000860	S.D. dependent var		0.010728
S.E. of regression	0.010733	Akaike info criterion		-6.498312
Sum squared residual	0.697403	Schwarz criterion		-6.492776
Log likelihood	19691.64	Durbin-Watson stat		2.032775

Relevance of GARCH Models

GARCH models are useful for analysing the financial time series data. Different extensions of this model provide help to researchers for the analysis of different dimensions of time series data.

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PESTLE ANALYSIS OF MULTIBAND: A CASE STUDY

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Abstract

India has opened its doors to attract investors and foreign companies to promote growth. Fast food is one of the world's fastest growing food types. India has long had a reputation as being unfriendly to foreign businesses, but when it comes to fast food, international chains are being warmly welcomed by a young, upwardly mobile population. In the present paper, PESTLE analysis of fast food chains in India has been done to get a better understanding of their business environment. The main reason behind the success of the multinational chains is their expertise in product development, sourcing practices, quality standards, service levels and standardized operating procedures in their restaurants, a strength that they have developed over years of experience around the world.

Introduction

India, officially is the seventh largest country by area, and the second most populous in the world with more than 1.2 billion people. Attaining independence in 1947, the South Asian country is known for its cultural diversity and is also among the world's leading democratic countries. For the past decade or so, India has been experiencing a constant growth in its GDP, along with a continuous growth of liberalization from 1991 till date. The country has also been opening its doors to attract investors and foreign companies to further promote growth. Fast food is one of the world's fastest growing food types. India's fast food industry is growing by 40% a year and is expected to generate a billion dollars every year. India's population stands at 1.2 billion, but it has only a little over 2,700 chain fast food outlets, leaving most people unreached, according to Euro monitor International. Fast food has yet to broadly expand beyond the largest cities. India's fast-food industry is expected to double in size between 2013 and 2016, to $1.12 billion. Because of the availability of raw material for fast food, Global chains are flooding into the country. To get a better understanding of the business environment of fast food chains in India, PESTLE analysis has been done. Major players in fast food are: Mc Donald, KFC, Pizza, hut, Dominos pizza, Coffee day.

PESTLE Analysis

It's basically a framework used for scanning and analyzing an organization's external macro environment by considering factors which include political, economic, socio-cultural, technological, legal and environmental as well as ethical too.

Political Factors

Being one of the largest democracies in the world, India runs on a federal form of government. The political environment is greatly influenced by factors such as government's policies, politician's interests, and the ideologies of several political parties. As a result, the business environment in India is affected by multivariate political factors. The taxation system is well-developed and several taxes, such as income tax, services tax and sales tax are imposed by the Union Government. Other taxes, such as octopi and utilities, are taken care of by local bodies. Privatization is also influenced and the government encourages free business through a variety of programs.

Economic Factors

The economy of India has been significantly stable, since the introduction of the industrial reform policies in 1991. As per the policy, reductions in industrial licensing,

liberalization of foreign capital, formation of FIBP and so on, has resulted in a constant improvement of India's economic environment. The country registered a GDP of $5.07 trillion in 2013 following a further improved GDP growth rate of 5% in 2014 as compared to 4.35% in 2013.

Social Factors

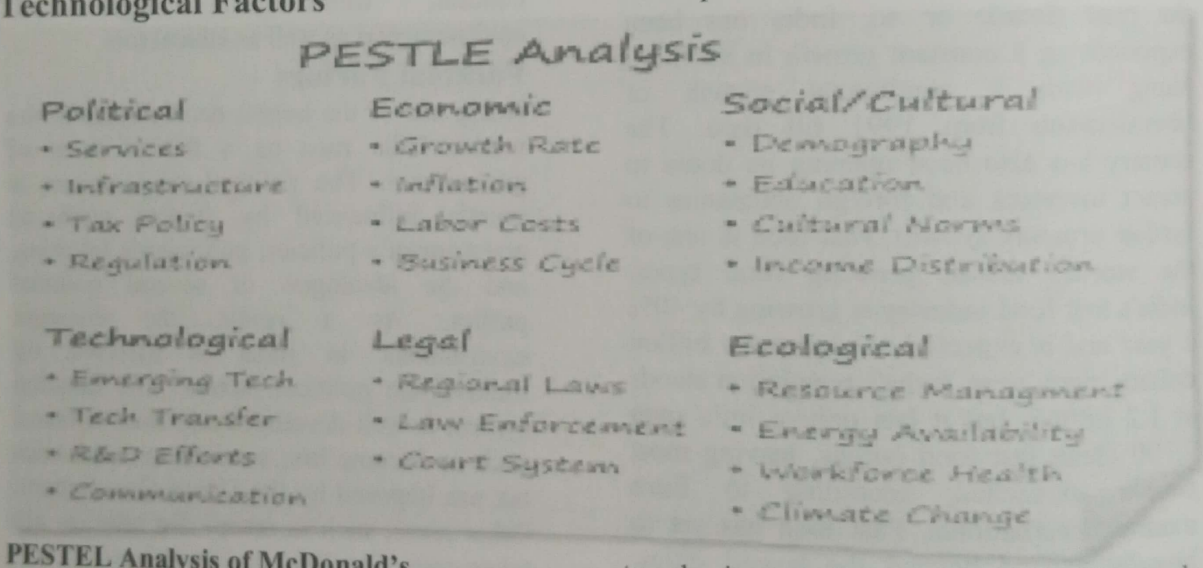
The social factors refer to any changes in trends which would impact a business environment. For instance, the rise in India's ageing population is resulting in a considerable rise in pension costs and increase in the employment of older workers. India has a population of more than 1.2 billion people with about 70% between the ages of 15 and 65. Therefore, there are structures with percentages according to age. These structures contain varying flexibility, in education, work attitudes, income distribution, and so on.

Technological Factors

Technology significantly influences product development and also introduces fresh cost-cutting processes. India is served with both 3G and 4G technology which has facilitated several of their technological projects. Furthermore, the country also possesses one of the strongest IT sectors in the world, promoting constant IT development, software upgrades and other technological advancements. Recently, India has also attempted to launch their satellites into space.

Legal & Environmental Factors

In the recent past, a number of legal changes have been implemented in India, such as recycling, minimum wage increase and disability discrimination, which has directly affected businesses there. However, As a result, there have been establishments of environmental pressure groups, noise controls, and regulations on waste control and disposal.



PESTEL Analysis of McDonald's

Political Factors

McDonald's operates in over 100 countries, so its political exposure is all over the board. Generally, McDonald's, like any other restaurant, has to comply with government regulations pertaining to health and hygiene. Some governments have been pressuring the fast food industry, because fast food has increasingly been seen as junk food, leading to obesity, cardiovascular difficulties and high cholesterol. Moreover, the current tumult in relations between the United States and Russia may threaten McDonald's ability to function and turn a profit in the Russian Federation.

Economic Factors

Economic factors are of paramount importance to McDonald's, especially considering that it operates in over 100

countries. The decision whether to import raw materials or buy them locally is one important factor; another is tax rates. How much are tariffs on imported raw materials? How much are foreign corporations taxed? What is the unemployment rate, and how much are unemployment taxes in a given country? How much severance pay must an employer pay an employee upon termination?

Socio-Cultural Factors

Evolving lifestyles can have an effect on sales performance. People increasingly are seeking more sophisticated fare when they eat out. Hamburgers and fried potatoes are not as special as they once were. Moreover, while people in western countries such as the United States may enjoy hamburgers and French fries, people in Asian countries, for example, prefer rice. A few years back, McDonald's promoted a rice burger in China; it is now promoting rice for dinner in that nation.

Technological Factors

While technology may seem to play a very limited role in the fast food industry, nothing could be further from the truth. In fact, high technology helps organizations improve their management and productivity, while reducing wasted time and resources. It can help with scheduling, ordering, forecasting sales and foot traffic, and easy customer payment for food. Technology can also be used for easy, inexpensive advertising on the Internet, providing Wi-Fi and even computing devices to satisfy customer needs.

Environmental Factors

Today more than ever, people care about protecting the environment. They care about problems such as air and water pollution, and the effects waste packing are having on the environment. A few years ago, McDonald's found itself in the crosshairs of environmentalist wrath over the polystyrene packaging it was using for its sandwiches. With over 60 million people buying food from McDonald's daily, that was a great deal of polystyrene waste packaging finding its way into landfills. McDonald's responded to criticism by phasing out polystyrene in favor of paper-based packaging, which breaks down into organic ingredients much more quickly in the environment.

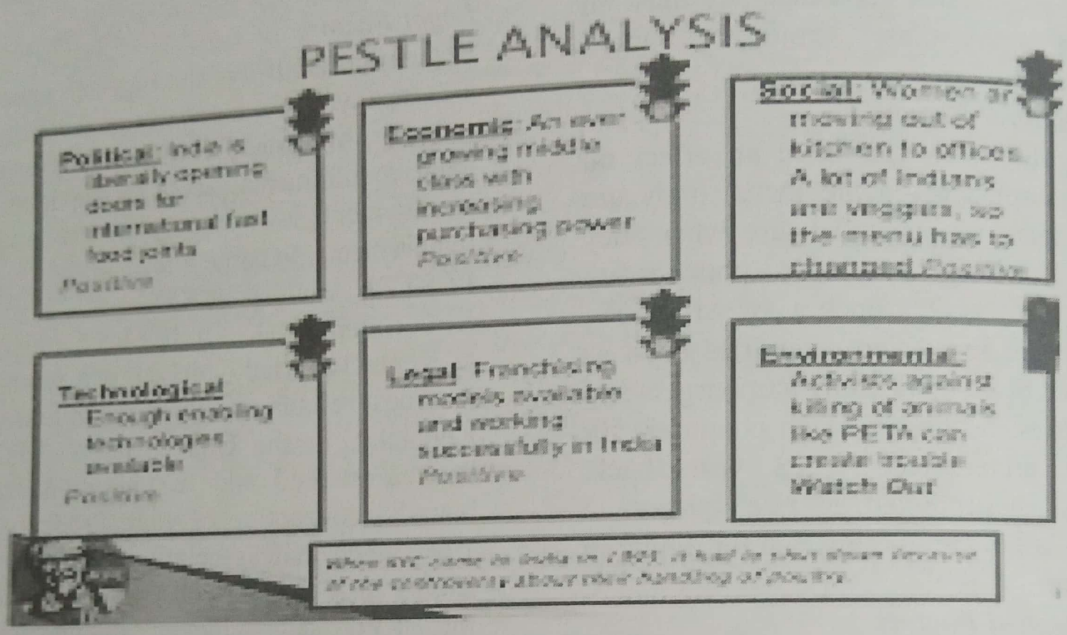
Legal Factors

Regulation is always the biggest concern to a company. As a company in the fast food industry, McDonald's must adhere to many legal requirements, such as the labor and employment law, corporate law and tax requirements, to name a few.

PESTEL Analysis of KFC

KFC Company (KFC), has been anticipated as Kentucky Fried Chicken, is a promise of fast meat restaurants supported in Louisville, Kentucky, in the United States. KFC has been a marked and in operation section, bound a conception of yum, Products since 1997 when that association was turned off from PepsiCo as Tricon Global Restaurants Inc. KFC sells chicken helping, wraps, salads and sandwiches. While it's original focuses on its fried chicken, KFC also propose a mark of grilled and roasted chicken products, side stunner and desserts. The grouping was based as Kentucky Fried Chicken by Colonel Harland Sanders in 1952, however the model of KFC's fried earliest frankly goes back to 1930. The circle accepted the reduced structure of its name in 1991. Preliminary in April 2007, the accumulation set about worn its creative name, Kentucky Fried Chicken, for its signage, packet and announcements in the U.S. KFC India Overseas fast food society were permit to join India during the soon 1990s due to the economic liberalization object of the Indian Government. KFC was between the first fast food multinationals to begin in India. On embrace sufferance to candid 30 unspent openings through the rude, KFC open its first durable-meat muse in Bangalore in June 1995. Bangalore was preferred as the pierce cushion as it had a real higher mid place people, with a drift of

family's corrosion out. Though, KFC got disturbed in variable disagreements even before it got full- mature occupation in India. When the upshot of yield permits to multinational nutriment giants to obstruct up office in the rude came up for parley in the Indian assembly, some associates from the obstacle partly were vowel in their distaste. Pest Analysis on KFC:



Political

When KFC came into business with India many health and safety guidelines were introduced to them by the government, to protect the standard the company went to tough time because they had to train their staff which was from India to follow the hygiene carefully, they were careful about the people being food poisoned and their outlets to get close. So the health and safety were to strictly been followed by the company. Labelling foods was also introduced by FSSAI to KFC so that food safety is conducted by company. Labelling is introduced so that people come to know what company adding into their product and what are the nutrition facts in it. When Animal right campaign came into action KFC was one to suffer in 1998 because of that KFC business was disrupted in some manner.

Economic

Low setup cost, when KFC went into setup their outlets or when they gave their franchise in some place the setup cost was to low because, the setup was all done by their own people who use to come from the headquarters of their company and should install the equipment's and all the other stuffs. If they would have chosen to install the setup by an local guy, it would have been coasted them a lot more than they have expected. For procurement of raw products they started contacting local major suppliers who use to give them the best of the products in low cost, which could have coasted them a lot then which they use to import from outside, which use to cost them fortune because of the excise duty and a lot more. Due to growing market of people eating non-veg food or fast food they started producing more but they also raised the price of their product. Due to demand in the market they raised their price but decreased the quantity of their product, but customer still use to go to them because of their good food quality. This gave them to grow in the market and to stay for long time.

Social

Due to busy lifestyle in todays world, people don't have time to sit and eat so this concept is the best for the people who are busy running their business. KFC introduced many of such easy and fast food that could be prepare in not more than 15 min. like sandwiches, burger, samosa and etc. this benefited them a lot and so the customers were happy to eat a product which was worth spending money on. In today world people have started to care about what they eat and what goes in their food, they are concerned about that they eat healthy food and are worried about their obesity. To this KFC came up with a idea of introducing sandwiches both veg and non-veg which was added up with fresh vegetable tossed with extra virgin olive oil and chicken was steamed and cooked with the virgin oil which they use to advertise as health and fat free food in their menu which gave their company a new rise in the market and was started to come up in the social life of customer who wanted to eat out and which was healthy and fat free.

As customers wanted more from chicken, KFC came up with the theme which was all about vegetarian food, like another menu which showcased a menu for customers who weren't for chicken. To get the local community and social support they started giving veg burgers, veg sandwiches, veg samosa, veg tacos, and many more which helped them to grow their profit and gain the trust and confidence of the customers who were vegetarian.

Technological

Technology is the base for any company who wants to stay in the business. People nowadays want their food to come to them, like home delivery and etc. so KFC started online computer ordering which helped many old age customers who wanted to have some of it and also to the business people and others. By this customers were to go online to the company site and were to order what they want and how they want. This helped the company in their profit and also to the transportation.

Conclusion

PESTEL analysis consider at the foreign business surrounding and is an suitable strategic instrument for clarification the "massive picture" of the surrounding in which business conduct, enabling the association to take benefit of the opportunities and diminish the menace faced by their business activities. When strategic scheme is done accurately, it supplies a valid project for an association to enlarge into the future. With a PEST analysis, the company can see a longer skyline of opportunity, and be skilful to clarify premeditated opportunities and menace that the organization faces

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NATURAL RESOURCES DEPLETION AND ECONOMIC GROWTH IN PRESENT ERA

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Abstract

Resources depletion refers to the situation where the consumption of natural resources is faster than it can be replenished. The natural resources of a nation can be divided as renewable resources and non renewable resources. The natural resources contribute at large to the economic development of a nation. Current patterns of energy and natural resource use, agricultural practices, and urbanization appear to be largely unsustainable and require urgent remediation. The consumption pattern of natural resources did not seem to be justifiable which can have economic downfalls for the nation. Population Explosion is acting as a catalyst for resources depletion. Consumption pattern if not addressed will lead to irreversible climate change and declined economic growth, as a result of increased social, economic, and environmental costs and decreased productivity. In order to achieve economic growth, developing countries are abusing their lands on the grounds of economic interests. Whether is in the form of air and water pollution, deforestation and soil erosion or the extraction of natural resources itself, the fact is that developing countries are currently accounting for remarkable depletion of natural resources. It seems evident that much of the economic growth activities enforced by governments, account for significant resources depletion. Additionally, developing countries remain largely dependent on exports of natural resources to generate economic dividends. Withstanding, pulling raw material from forests to fulfill exportation needs is subject to enormous domestic and international pressure, causing overexploitation of the natural resource base. Furthermore, it is highly relevant to add that the disproportional level of resources exploitation being caused due to economic policies. Resource utilization has always been part of human history; however, the acceleration of economic growth activities together with the pursuit of an urgent economic development is the core cause of resources overexploitation. In conclusion, one may argue that economic growth and associated development usually results in increased levels of resources exploitation. However, that is not to say that an inevitable consequential relationship exists between these trends. It seems evident that developing countries pursuing rapid economic growth disregard environmental concerns.

Introduction

The pattern of resource consumption differs in economically developed and developing countries. The people in developed countries have higher demand for resources than necessary for reasonable living due to their aspirations for better quality of life. Therefore, they exploit the resources to the level that degrade the global environment seriously. On the other hand people in developing countries have lesser demand for resources due to their simpler quality of life. However, their increasing population, less environmental awareness and aspirations for rapid upgrading their living conditions, causes reckless destruction of resources. The consumerism based pattern of resource use which is prevalent in developed countries, is also spreading fast in developing countries. Current patterns of energy and natural resource use, agricultural practices and urbanization appear to be largely unsustainable and require urgent remediation. Left unchecked, these patterns will lead to dangerous climate change and reduced economic growth, as a result of increased economic, social, and

environmental costs and decreased productivity. The present paper discusses about the economic concerns of exploitation and depletion of resources. Resources depletion refers to the situation where the consumption of natural resources is faster than it can be replenished. The exploitation of natural resources is the use of natural resources for economic growth, sometimes with a negative connotation of accompanying environmental degradation.

Natural Resources and Sustainable Economic Growth

In the third quarter of the Twentieth Century, economists and policy makers were more concerned with economic growth with development, while during the last quarter, there was greater concern about the challenge o f economic development, specifically the challenge of sustainable development to secure human well-being forever. In the poor countries, economic growth viz. the acceleration of economic growth rate is the prerequisite for sustainable development. However, the challenge of sustainable development requires a paradigm shift in the economic growth process and broadening the base for economic development (inclusive economic growth), an understanding of the ecosystem-economy relationship, and the critical role of natural environmental resources in economic development as well as incorporating the environmental-ecological concerns in planning and programming sustainable development.

Dynamics of Economic Growth

In the neo-classical economic growth model, man-made capital and technology played a vital role in accelerating economic growth and it was assumed that economic growth has a tendency to trickle down the gains of economic development on its own and so there would be growth with justice. Natural capital was assumed to be not a constraint for economic growth, and human capital and social capital were, by and large, assumed to be catalytic agents. So obviously, in this model sustainability of economic growth was not at all an issue to be bothered about! As against this, in the case of sustainable economic growth model, natural capital/ environmental resources, social capital and environment-friendly: 'appropriate technology' and methods of enhancing-augmenting resources are considered quintessential for sustaining economic growth. Besides, human development and human well-being are considered human rights This change in the perspective and objectives of economic growth and hence the change in development strategies, economic policies and governance mechanism aiming at sustainable development is now recognized as a paradigm shift in the economic growth model.

Role of Natural Resources in Economic Development and Human Well-Being

In 1970s, development economics was concerned with the issue of economic growth with justice i.e. growth with equitable distribution of the gains of economic development. But it has been observed that the gains of economic growth did not trickle down on its own and the problem of poverty - 'the pronounced deprivation of well being' - was found to be continually aggravating over time. Human development and

human well-being now are considered human rights and, therefore, the challenge of sustainable development - to end poverty by breaking the vicious cycle of impoverishment and environmental degradation - can be met by a compact amongst nations. Thus, it becomes a "shared responsibility" of the developed and developing countries. It has been realized that the materialistic life style of the western world and their ever-increasing 'ecological footprints' to sustain their conspicuous consumption level are responsible for all the environmental ills. Also, it is now a resolved issue that the poor - the third world developing countries- are adding to the global environmental degradation and natural resource depletion and hence responsible for the hole in the ozone layer, global warming, climate change induced natural calamities etc. and doomsday scenario. Unless the vicious circle of impoverishment is taken care of, sustainable development may remain a far-fetched dream.

Nature - Economy Interaction

The concept of the environment-nature is so wide, which includes the natural resource base which not only supports the life on earth, but also provides the productive base for sustainable development. Nature, on the one hand, provides the stock of environmental resources, by and large non-renewable-exhaustible resources as well as the flow of environmental services, by and large renewable - non-exhaustible to the economy to produce material goods and services for consumption to reach the expected level of satisfaction and, on the other, regenerates the bio-mass most needed for a steady state as well as absorb or assimilate or recycle the 'high entropy' wastes generated through production-consumption externalities. Thus, nature or environment or natural resource base is both a 'source' of natural capital and a 'sink' for the economy. And there is two-way interconnection or interdependence or interconnectedness between these two systems: (1) Productive resources from nature to economy and (2) High entropy wastes from economy to the environment.

Reasons for Resources Depletion and Exploitation

Increase in the sophistication of technology enabling natural resources to be extracted quickly and efficiently. E.g., in the past, it could take long hours just to cut down one tree only using saws. Due to increased technology, rates of deforestation have greatly increased

A rapid increase in population that is now decreasing. The current number of 7.132 billion humans consumes many natural resources.

Cultures of consumerism. Materialistic views lead to the mining of gold and diamonds to produce jewelry, unnecessary commodities for human life or advancement.

Excessive demand often leads to conflicts due to intense competition. Organizations such as Global Witness and the United Nations have documented the connection.

Non-equitable distribution of resources.

Impacts of Natural Resource Depletion

A number of drivers suggest that the impacts of natural resource depletion

will accelerate in the future, especially for resources outside or only partially within the marketplace, such as water, soil, ecosystem services, and climate. An increase in the world population by more than 2 billion people between 2010 and 2050 will place additional pressures on natural resources. Although environmental stresses brought about by population growth are significant, of even greater impact will be rising incomes. During the two decades since 1990, the size of the global middle class rose from 1 billion to 2 billion. In the coming two decades, it is probable that another 3 billion will join the middle class. This transition—in which the majority of the world will be able to afford a private motor vehicle, modern appliances and a diet that includes meat daily- represents an important threshold in human pressure on the natural world. Other major problems that will arise out of exploitation of natural resources are:

Deforestation
Desertification
Extinction of species
Forced migration
Soil erosion
Oil depletion
Ozone depletion
Greenhouse gas increase and
Climate Change
Extreme energy
Water pollution
Natural hazard/Natural disaster

Economic Development and Resources Exploitation

The patterns of economic globalization have significantly intensified the relationship between economy and ecology in the past few decades. This correlational trend is stressed on a debate between ecologists and economists regarding the impacts of economic development upon the resources exploitation. The ecologist argument is based on immediate consequences of economic growth. In order to achieve economic growth, developing countries are abusing their lands on the grounds of economic interests. Whether is in the form of air and water pollution, deforestation and erosion or the extraction of natural resources itself, the fact is that developing countries are currently accounting for remarkable environmental degradation. It seems clear that much of the economic growth activities enforced by governments, account for significant environmental damage. Additionally, developing countries remain largely dependent on exports of natural resources to generate economic dividends. Withstanding, pulling raw material from forests to fulfill exportation needs is subject to enormous domestic and international pressure, causing overexploitation of the environmental resource base.

Environmental exploitation has always been part of human history, however, the acceleration of economic growth activities together with the pursuit of an urgent economic development is the core cause of environmental overexploitation. Notwithstanding, neoliberal economists argue on the contrary, claiming that environmental degradation is not a by-product of economic growth, rather being a phenomenon directly related to poverty. At a World Bank meeting, economists have publicly stressed their concerns regarding the relationship between the environment and poverty: "A world free of poverty is critical for the long-term effect of the planet. The struggle of the poor to survive is a core

cause of problems such as deforestation, desertification, and unsanitary water. The poor exhaust nearby natural resources, such as fresh water, seafood, and wildlife. They cultivate unsuitable land to grow food and earn income. And they despoil local waterways with rubbish and sewage."

Concluding Remarks

The purpose of natural resource exploitation is generally to trigger economic growth and development. The controversial negative relationship between the abundance of natural resources and economic growth and development has been at the centre of several development research discourses. It is often explained that, natural resources when exploited can be used to generate economic growth and development. However, this assertion is often rebuffed by other explanations that, natural resource abundance rather create more difficulties than benefits. Governments in developing countries with large amounts of resource have pursued policies that seek to expand the exploitation of existing natural resources to generate income for economic development. Over the years not much attention has been paid to the negative effects of policies that centre on the exploitation of natural as the main tool for economic growth and development. Natural resource exploitation has proven of potentially causing irreparable distortion on the environment and the livelihood of the people in the affected communities.

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ENERGY CONSERVATION IN HARYANA: A CASE STUDY OF JIND

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ABSTRACT

The paper is an attempt to have an insight into the perception of university student towards the problems related to electricity generation, supply, and conservation in the State of Haryana. To achieve the objectives of the study, a sample of 100 students comprising of 60 male and 40 female was selected from the campus of Chaudhary Ranbir Singh University, Jind and the data were collected with the help of a questionnaire. The study is purely based on primary data and revealed that the electricity generation and its supply is not sufficient in the state as per the responses of the respondents.The study also found that people use more electricity at work places than at homes, which needs to be controlled to overcome the problem of short supply of electricity in the state. The majority of the respondents also highlighted the wastage/theft of electricity as a main cause of gap between demand and supply and further, it was suggested by the respondents that the gap can be filled by energy conservation and, by publicizing it more.

Keywords: Perception, Energy Conservation, University students, Electricity.

INTRODUCTION

"The earth, water and the air are not a gift to us from our parents but a loan from our children. Hence we need to make energy conservation a habit."

Energy is the capacity of a physical system to perform work. Energy exists in many different forms such as light energy, heat energy, mechanical energy, gravitational energy, electrical energy, sound energy, chemical energy, nuclear or atomic energy and so on. Each form can be converted or changed into the other forms.

Energy demand in rural areas is on a steady rise. India is the fourth largest energy consumer in the world. The present energy use is mostly in the areas of domestic cooking and lighting, agriculture, transport and industrial sectors. India's energy basket has a mix of all the resources available including renewables. The largest energy source is coal, followed by petroleum and traditional biomass. According to the 2011 Census, the household-level data indicates that only 55.3 per cent of rural homes used electricity as the primary source for lighting. Energy access, with about one fourth of the population lacking access to electricity and energy security, with the country relying on imports for a considerable amount of its energy use, particularly for crude petroleum are key challenges that the country faces with respect to energy.

In India, of the 121 crore Indians, 83.3 crore live in rural areas while 37.7 crore stay in urban areas. Energy availability, access and affordability are vital if our country is to keep its pace of development. 21 per cent of our villages and about 50 per cent of rural households are as yet not electrified. During 2013-14, the per capita energy consumption in India is 19522.15 Mega Joules. According to the official data the total installed capacity of the country stood at 258701.45 MW as on January 31, 2015.

Thermal power plants constitute 69.7 per cent of the installed capacity and hydropower about15.79 per cent.There are 21 nuclear power reactors in the country with a total installed capacity of 5780 MW. Share of the nuclear power generation in the total electricity production in the country in

2014-15 was of the order of 3.6 per cent. The peak power deficit or shortfall in supply of electricity when demand is maximize was down to 2.1 per cent during March 2015 as against 3.6 per cent in the same month, last year. As on February 28, 2015 96.68 per cent of villages (577629) were electrified.

Why energy conservation is a must, are outlined below:

We use energy faster than it can be produced - Coal, oil and natural gas - the most utilized sources take thousands of years for formation.

Energy resources are limited - India has approximately 1 per cent of world's energy resources but it has 16 per cent of world population.

Most of the energy sources we use cannot be reused and renewed - Non renewable energy sources constitute 80 per cent of the fuel use. It is said that our energy resources may last only for another 40 years or so.

We save the country a lot of money when we save energy - About 75 per cent of our crude oil needs are met from imports which would cost about Rs.1,50,000 crore a year

We save our money when we save energy - Imagine your savings if your LPG cylinder comes for an extra week or there is a cut in your electricity bills

We save our energy when we save energy - When we use fuel wood efficiently, our fuel wood requirements are lower and so is our drudgery for its collection

Energy saved is energy generated - When we save one unit of energy, it is equivalent to 2 units of energy produced

Save energy to reduce pollution - Energy production and use account to large proportion of air pollution and more than 83 percent of greenhouse gas emissions

OBJECTIVES OF THS STUDY

The study was attempted to realize the following objectives:

1. To examine the attitude of the university students towards electricity supply, wastage and shortage, etc. in the state of Haryana.
2. To investigate the attitude of the university students towards the attainment of self-sufficiency through energy conservation and creating awareness among the people against wastage, theft, mismanagement, etc. of the power in the State.
3. To make the viable suggestions on the basis of the findings.

RESEARCH METHODOLOGY

In the study the following research methodology is used:

Research design

The study was descriptive-cum-exploratory in nature and based on survey questionnaire.

Sample design

Sample was selected from students ofC.R.S.U., Jind, who were categorized according to gender. The required data were collected from 100 respondents (60 male and 40 female).In the present study convenient sampling technique was followed, while getting questionnaires filled from different University Students.

Population

Under Graduates, Post Graduates, M.Phil., Ph.D. Scholars of C.R.S.U., Jind constituted the population of this survey study.

Sample unit

The student of C.R.S.U., Jind was taken as the sample unit.

Data collection

The study entirely based on primary data. The primary data was collected through structured questionnaires duly filled by University students.

Statistical techniques

Crosstab technique of SPSS was used to analyze available data and to reach at the conclusion of the study. Data was also

analyzed, interpreted and evaluated with required statistical tools like tabulation, graphic presentation and percentage.

RESULTS AND DISCUSSIONS

An analysis of total 100 (60 male and 40 female) was made with the help of crosstab technique of SPSS under the study.The analytical Table 1 exhibited that out of total, 60 male and 40 female respondents, 23.33 per cent male and 20 per cent female respondents agreed that electricity generation is sufficient in the state, but on the other hand a very significant number, (76.67 per cent) male and (80 per cent) female respondents believed that the generation of electricity is not sufficient in the state. The table further indicated that, 33.34 per cent male and 30 per cent female respondents believed that the supply of electricity is sufficient to meet the needs of people but the mainstream of male and female (66.34 per cent and 70 per cent respectively) students were found to be against the above statement. The results can be assessed through figure 1.

Table 1

Gender-Wise Responses of Respondents towards Energy Conservation

Gender	Sufficient electricity generation in state		Sufficient supply to meet the needs		Total
	Yes	No	Yes	No	
Male	14 (23.33)	46 (76.67)	20 (33.34)	40 (66.67)	60 (100)
Female	8 (20)	32 (80)	12 (30)	28 (70)	40 (100)
Total	22	78	32	68	100

Note: Figures in brackets show the percentage

Figure 1:Gender-Wise Responses of Respondents towards Energy Conservation

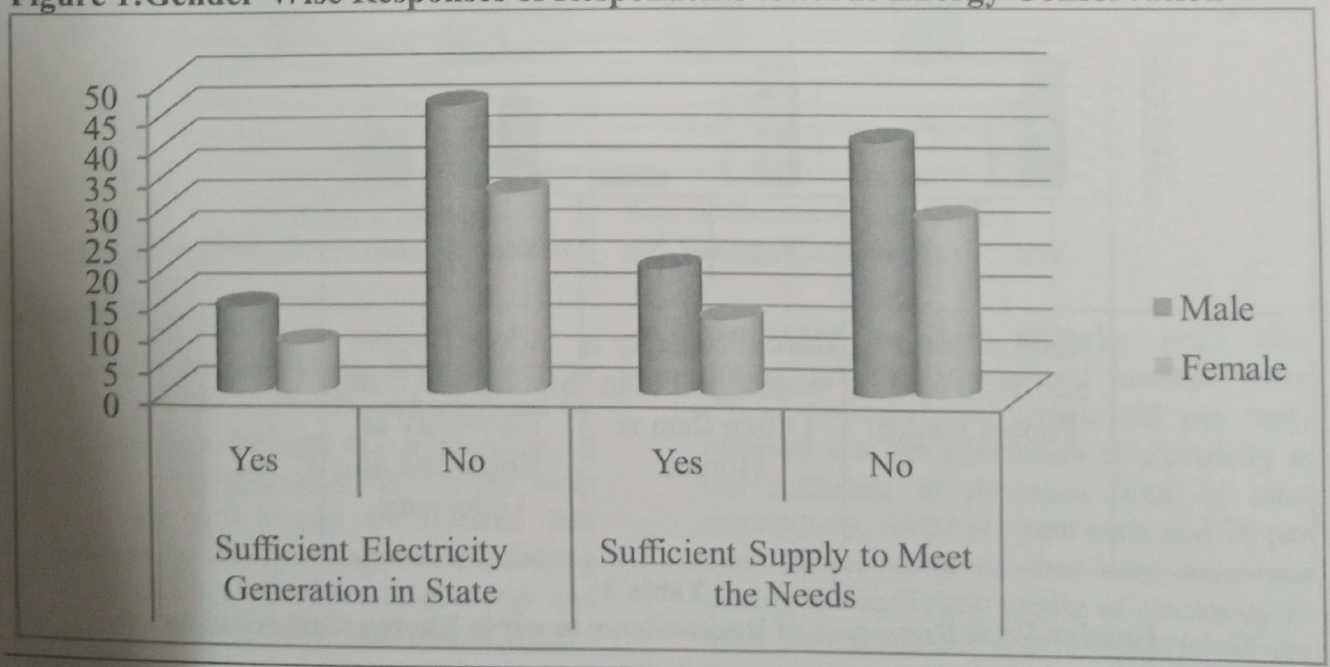


Table 2

Gender-Wise Responses of Respondents towards Energy Conservation

Gender	Need of serious efforts to make people aware		More electricity is wasted in public office than at homes		Adopt double standard in using electricity at home and at University		Total
	Yes	No	Yes	No	Yes	No	
Male	58 (96.67)	2 (3.33)	54 (90)	6 (10)	38 (63.34)	22 (36.67)	60 (100)
Female	38 (95)	2 (5)	40 (100)	0 (00)	22 (55)	18 (45)	40 (100)
Total	96	4	94	6	60	40	100

Note: Figures in brackets show the percentage

The analytical Table 2 revealed that out of total, a very large number of 96.67 per cent male and 95 per cent female respondents strongly believed that there is a dire need of making big hype to make people aware of energy conservation, albeit, a very few number of respondents (3.33 per cent male and 5 per cent female) did not agree with the statement. Mainstream of respondents (90 per cent male and 100 per cent female) were of the belief that more electricity is wasted in public offices than at homes, while; only 10 per cent male respondents having the reverse view. Out of total sampled respondents 63.34 per cent male and 36.67 per cent female respondents admitted that they adopted double standards in using electricity at home and at university, but on the other hand, 36.67 per cent male and 45 per cent female students were found to be having no significant difference in using electricity at home or at university. The results can be assessed through figure 2.

Figure 2: Gender-Wise Responses of Respondents towards Energy Conservation

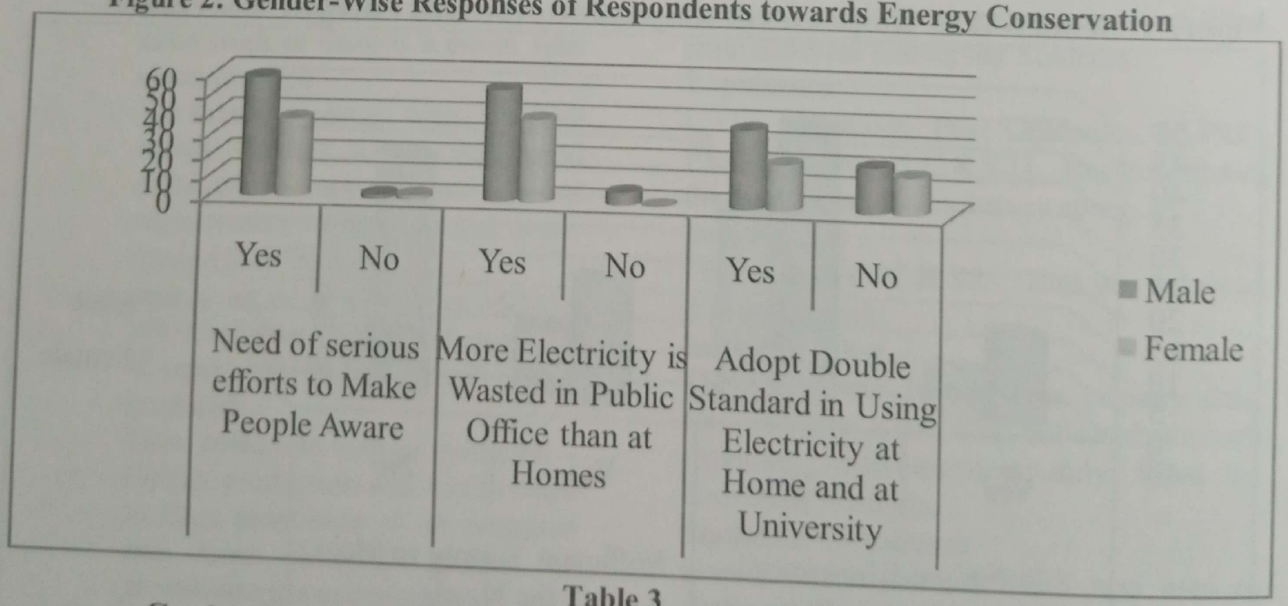


Table 3

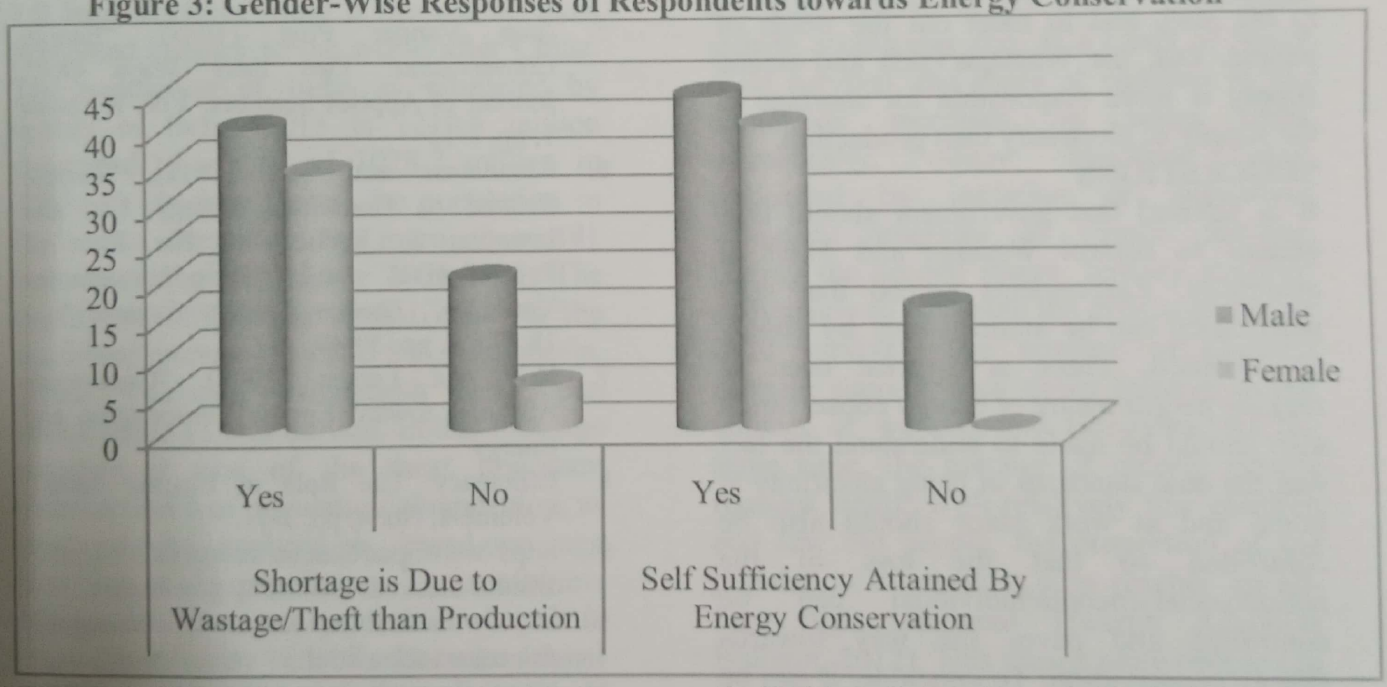
Gender-Wise Responses of Respondents towards Energy Conservation

Gender	Shortage is due to wastage/theft than production		Self-sufficiency attained by energy conservation		Total
	Yes	No	Yes	No	
Male	40 (66.67)	20 (33.33)	44 (73.33)	16 (26.67)	60 (100)
Female	34 (85)	6 (15)	40 (100)	0 (00)	40 (100)
Total	74	26	84	16	100

Note: Figures in brackets show the percentage

The analytical Table 3 showed that out of total, the majority of students 66.67 per cent male and 85 per cent female opined that the Wastage/Theft is more responsible for shortage in the supply of electricity than production. In contrast to this figure, fewer respondents were against the situation. On the question of self-sufficiency attainment, 73.33 per cent male respondents agreed that self-sufficiency can be attained only by energy conservation and very few respondents (26.67 per cent) denied the fact; while all female respondents thought that self-sufficiency can be attained by energy conservation. The results can be assessed through figure 3.

Figure 3: Gender-Wise Responses of Respondents towards Energy Conservation



CONCLUSION

The perception of students towards energy conservation were studied and analyzed by the researchers through the application of cross Tab technique of SPSS. On the basis of analysis and it can be realized that students from various categories are linking their attitude towards the saving energy and resources. Despite the differences, many similarities in their attitudes were also noticed. A very significant number, male (76.67 per cent) and female (80 per cent) believed that the generation of electricity is not sufficient in the state. Out of total respondents, 66.67 per cent male and 70 per cent female believed that they were not getting the sufficient supply of electricity to meet their needs out. Surprisingly, 96.67 per

cent male and 95 per cent female respondents strongly believed that there is a dire need of making big hype to make people aware. Mainstream of respondents (54 male and 40 female) were of the belief that more electricity is wasted in public offices than at homes. Out of total respondents,63.34 per cent male and 55 per cent femalerespondents admitted that they adopted double standards in using electricity at home and at university. The majority of students, 66.67 per cent male and 85 per cent female opined that the Wastage/Theft is more responsible for shortage in the supply of electricity than production. Out of total respondents, 73.33 per cent male and all female (100 per cent) respondents agreed that self-sufficiency can be attained only by energy conservation.Hence, on the basis of the above discussion, it can safely be said that generation of electricity is not sufficient in the state and to meet out the needs of people. But, the Wastage/Theft and erratic supply is more responsible for shortage in the supply of electricity than production.

SUGGESTIONS

It is advised that government should take actions to control Wastage and Theft of electricity. Respondents agreed that self-sufficiency can be attained only by energy conservation. There is a great need of making people aware of energy conservation also should be made to understand the fact that the dual standards of using electricity at home and at work place should also be controlled so that the loss of the nation/society/people/individual can be controlled and paves the way towards energy conservation. To conclude, it can be said that students have a high degree of awareness and concern for energy conservation.

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DEMOGRAPHIC DIVIDEND AND NEED OF VOCATIONALISATION OF EDUCATION

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ABSTRACT
Age structure is one of the most important characteristics of population composition and changes in age structure of population is an inevitable consequence of the demographic transition. Currently, majority of the population in India is of a working age and this is steadily increasing. The census reports shows that the majority of the population in India is of a working age which is steadily increasing in India. The working age population is projected to increase from approximate 60 % in 2011 to more than 64% by 2021. Such a trend would make India one of the youngest nations in the world. This means more people can contribute to India's economic growth, giving the country what is known as a "demographic dividend". Furthermore, it is one of the competitive advantages of India wherein the proportion of working age population need to be engaged in economic activities to augment its productive capacity to pull up the country to a substantially higher plane of living standards. Here, employability of working age population is a major cause of concern. This paper analysis issues related of employability of working age population with special reference to vocationalisation of education.
Key Work: Demographic Dividend, Employability, Vocationalisation of Education.

1.0 Introduction: India is the second most populated country in the world after China. The population of India as estimated by census of India, 2011 is 1210.5 million compared to a total of 1028.7 million in 2001. In absolute terms, the population in India has increased by more than 181 million during the decade 2001-2011. The population of India is almost equal to the combined population of U.S.A., Indonesia, Brazil, Pakistan, Bangladesh and Japan which totals 1214.3 million. In this line, age structure is one of the most important characteristics of population composition, as most of the analysis is based on age structure of the population. The usefulness of age data is more noticeable when it is cross classified by variables like educational attainment, skill development and employment status of population which vary with age in different patterns.

Changes in age structure of population is an inevitable consequence of the demographic transition, which can be divided into three broad phases. The first phase begins with high fertility balanced by high mortality, but then mortality— particularly infant and child mortality—starts to go down. Population growth accelerates and, as a result of better child survival, the share of children in the population increases, in some cases dramatically. Many countries have responded by initiating or expanding voluntary programs to reduce fertility. During the second phase, fertility declines sufficiently to outweigh the effects of higher child survival. The number of children needing support goes down relative to the number of workers and taxpayers. At the same time, the number of elderly people remains small. With relatively few children and few old people, the proportion of the population in working ages reaches an all-time high (National Transfer Accounts Bulletin, 2012). This means more people can contribute to India's economic growth, giving the country what is known as a "demographic dividend".

Demographic dividend refers to a change in the age distribution of population from child ages to adult ages. Demographic dividend is the economic benefits that derive from demographic change. It leads to larger proportion of population in the working age

group compared to younger and old age groups which may translate into higher per capita income for the economy. It is essentially due to 2 factors: first the declining birth rate and the second one is improvement in life expectancy (Roy and Roy, 2014). It occurs when a falling birth rate changes the age distribution of a population so that fewer investments are needed to meet the needs of the youngest age groups and resources are released for investment in economic development and family welfare. It may occur only once during a demographic transition and lasts for just a few decades. Apparently, given the diversity in the fertility transition in India, the demographic dividend is likely to continue as it shifts from one state to another based on the pace of demographic changes in the respective states. As such, India is seen as being in an advantageous position, despite being the second most populous country in the world.

1.1 Demographic Dividend in India: Growth optimists are confident in India's demographic dividend -the fact that India's dependency ratio, as measured by the share of the young and the elderly as a fraction of the population, will come down more sharply in the coming decades (Economic Survey, 2012-13). Currently, majority of the population in India is of a working age and this is steadily increasing. India's population trend shows that people in the age group 15–59 years constitute the majority, thereby reducing the size of the dependent population. It is projected that by 2026 the dependency ratio[Dependency ratio gives the proportion of persons whom the persons in economically active age group need to support.] will fall to around 36 per cent, from the current 40 per cent.

Table-1: Percentage of Population by Age-Groups: India 1991-2026.

Age Group in Years	1991	2001	2011*	2021*	2026*
All Ages	100	100	100	100	100
0-4	12.2	10.7	9.6	8.3	7.5
5-9	13.3	12.5	9.5	8.4	7.9
10-14	11.8	12.2	9.9	8.4	8.0
15-19	9.4	9.7	10.2	8.4	8.0
20-24	8.9	8.7	9.9	8.7	8.0
25-29	8.3	8.1	8.5	8.9	8.3
30-34	7.0	7.2	7.5	8.6	8.5
35-39	6.2	6.9	6.8	7.4	8.2
40-44	5.1	5.4	6.2	6.5	7.0
45-49	4.3	4.6	5.5	5.8	6.1
50-54	3.7	3.5	4.5	5.2	5.4
55-59	2.6	2.7	3.6	4.5	4.8
60-64	2.7	2.7	2.7	3.6	4.1
65-69	1.5	1.9	2.0	2.7	3.2
70+	3.1	3.0	3.5	4.3	5.2

Note: Total may not addup to 100 due to rounding off the figures

Source:(1) Census of India, 1991

(2) Census of India, 2001

(3) * Report of the Technical Group on Population Projections, 2006. Population Projections for India and States 2001-2026, National Commission on Population, Government of India.

It is clear from table-1 that the proportion of working age population between 15 and 59 years has been increasing over the years. The census projection report shows that this proportion is likely to increase from approximately 60 % in 2011 to more than 64% by 2021. Such a trend would make India one of the youngest nations in the world. More working age people will mean more workers, especially in the productive age groups, more incomes, more savings, more capital per worker, and more growth. Also, because demographic change is associated with fertility declines, the transition period may be accompanied by greater female participation in the labour force (Bailey and Bailey, M.J., 2006). So one of the India's competitive advantages is its demographic dividend and thus the proportion of working age population need to be engaged in economic activities to augment its productive capacity. If sensibly utilised, this can raise per capita income level dramatically – pulling up the country to a substantially higher plane of living standards (Majumder, R. 2013).

1.3 Pattern of Change in the Age structure of India

Broadly, the age groups have been studied under three categories. The first one is 0-14 years age-group, which is predominantly young age group largely dependent on their parents for their well-being. This age group contributes little but consumes more of the resources. The second one is of 15-59 age-group, which is the main working group. In this paper, population aged between 15-59 years has been considered as the working age population.This group is the contributor to the national income by their productive capacity. The third group is of population aged sixty plus. The first and the last group are demographically labelled as dependent population whereas the middle one is the independent population. The data on age structure of India's population reveal that 0-14 years age-group constitutes 30.8 percent of the total population in 2011 which has been the lowest ever. Population in this age group has been declining and is projected to decline to 23.4 percent of total population by 2026. This is evidently because of a significant decline in the fertility rate. The age structure of a population plays a key role in promoting economic growth through an increase in the ratio of the working age population.In 1991, the percentage of population in 15-59 years age-group was 55.4 percent of total population and has witnessed continuous and uniform increase. As per census data 2011, the percentage of population in this age group is 60.3 and is projected to increase to 64.3 percent by 2026 (Table-2).

Table-2: Population by broad Age-Groups: India 1991-2026

Age/ Population	Percent to Total				
Ages in Yrs	1991	2001	2011	2021*	2026*
0-14	37.3	35.4	30.8	25.1	23.4
15-59	55.4	57.7	60.3	64.2	64.3
60+	7.3	6.9	8.9	10.7	12.4

Source: Statistical Pocket Book, 1999
Census of India, 2001
* Report of the Technical Group on Population Projections, 2006. Population Projections for India and States 2001-2026, National Commission on Population, Government of India.

The percentage of population in the age group of 60+ years has been experiencing an increasing trend and has increased from 7.3 percent in 1991 to 8.8 percent in 2011. Due to increasing life expectancy, this percentage is projected to be 12.4 percent by 2026.

Thus, India is experiencing an unprecedented increase in the working age ratio and this is being hailed as India's opportunity to undergo faster growth as people of working age are on average more productive than those outside this age group (Table-2).

2. Objectives of the Study:

1. To underline the importance of demographic dividend in India.
2. To highlight the Current Status of Employment in India.
3. To analyse the conditions to unemployed labour force to employable labour force.
4. To suggest policy measures to reap the benefits of demographic dividend.

3. Review of Literature:

As per U.N. Report 2013, India stands at a historical juncture, with the potential to reap rich economic benefits in the next few decades. The rapid growth in the country's population would be accompanied by an unprecedented demographic transition, with far-reaching consequences on economic growth. India is expected to become one of the most populous nations by 2025, with a headcount of around 1.4 billion. The country's population pyramid is expected to "bulge" across the 15–64 age bracket over the next decade, increasing the working age population from approximately 761 million (CRISIL,2010) to 869 million during 2011–2020 (http://ibnlive.in.com/news/india-to-have-28-pc-of-worlds-workforcesoon/112213-3.html, accessed 12 August 2013). Consequently, until 2020, India will be experiencing a period of "demographic bonus," where the growth rate of the working age population would exceed that of the total population.

It is generally argued that the demographic change in India is opening up new economic opportunities (James, 2008). There is generally high optimism both based on the experience of many other countries and from India that demographic changes will take the country to newer economic heights (Bloom and Williamson, 1998; James 2008; Aiyer and Modi 2011). Along with high optimism, there are also larger concerns on the ability of the nation to take full advantage of the demographic dividend. The literature in this area also makes clear that there is nothing automatic about the effects of demographic change on economic growth i.e., that "demography is not destiny" (Bloom, Canning, and Sevilla, 2003, Bloom and Canning, 2003, Bloom and Canning, 2008).

It is often argued that demographic dividend might turn into a nightmare given the composition of the Indian population in terms of educational level and skill levels (Altbach and Jayaram, 2010; Chandrasekhar, Ghosh and Roychwdhury, 2006). It is argued that large segments of adult population in the country are illiterate and do not have the capacity to contribute substantially to the modern economy.

The demographic dividend provides India great opportunity but it also poses a great challenge. It will benefit India if our population is healthy, educated and appropriately skilled (Roy S.K. and Roy S., 2014). Thus, in order to take full advantage of the demographic dividend, it is imperative for India to transform its labour force into an

employable asset. Employability refers to a person's capability for gaining and maintaining employment (Hillage and Pollard, 1998). For individuals, employability depends on the knowledge, skills and abilities (KSAs) they possess, the way they present those assets to employers. As such employability is affected by both supply-side and demand-side factors which are often outside of an individual's control (Rathi, S.K., and Behera, B. 2014).This naturally brings to the forefront not only issues related to the increasing demand for labour but also the nature of the labour force and its employability. In this context, the quantity, quality and relevance of education are all crucial. Several indicators suggest that, during the liberalisation years, there has been a setback on the literacy and education fronts, improvements in which are seen as not just conducive but even necessary to exploit the demographic dividend (Chandrasekhar, C.P., Ghosh, J., Roychowdhury, A.,2006).

While there is a sizeable literature on demographic trends and their economic ramifications, the econometric evidence for the growth impact of the working age ratio is more limited. Bloom and Canning (2004) is a landmark contribution: for a panel of countries from 1965– 1995, the authors find a sizeable impact of the working age ratio on economic growth but only if the economy is "open." Thus, they conclude that the potential for a dividend exists but that it is realized mainly when incentives are in place to exploit that potential. In addition, the fertility decline that is the source of the changed age structure may act directly to induce greater female labor supply (Bailey, 2006) and increase attention to primary education and health (Joshi and Schultz, 2006).

4.0 Current Status of Employment and Need to Expand Labor Markets for all Categories of Workers in India:

Employment has always been characterised as an element of development policy in India. Ensuring an adequate and quality workforce has remained a matter of greater concern of policy makers. NSSO provides estimates of work population ratio (WPR[Number of persons / person days employed per 1000 persons / person days.]) for different category of workers in the age group of 15-59 years (Table -3).

WPR for persons of age 15-59 years in the usual status (ps+ss) was 57 per cent at the all- India level. This was 59.8 per cent in rural areas and 50.8 per cent in urban areas. Among the four segments of the population, WPR for rural males was the highest i.e. 82 per cent followed by urban males (78.4 per cent), rural females (37.2 per cent) and it was the lowest for urban females (21 per cent).

WPR for persons of age 15-59 years in CWS was 53.7 per cent at the all-India level. This was 55.5 per cent in rural areas and 49.7 per cent in urban areas. The WPR in CWS in the rural areas was 4 percentage points lower compared to that in *usual status (ps+ss)* and it was one percentage point lower in the urban areas. WPR for females in both rural and urban areas were much lower compared to their male counterparts. According to CWS approach, WPR for rural males was 79.6 per cent compared to 31 per cent for rural females. The corresponding figures for males and females in the urban areas were 77.5 per cent and 19.8 per cent, respectively.

Estimates of WPR in CDS were further lower than those obtained in *usual status (ps+ss)* and this happened across all four segments of the population. In CDS approach, WPR at the all-India level was about 50.1 per cent. This was about 76.2 per cent, 25.3 per cent, 76 per cent and 18 per cent for rural males, rural females, urban males and urban females, respectively. Thus, the country is still far short of achieving the target of 'employment for all'.

Table-3: WPR (per 1000) according to usual status (ps), usual status (ps+ss),CWS and CDS for different categories of persons of age 15-59, All India.

Category of Persons		Nature of Employment			
		Usual status (ps)	Usual status (ps+ss)	CWS	CDS
Rural	Male	808	820	796	762
	Female	262	372	310	253
	Person	538	598	555	510
Urban	Male	778	784	775	760
	Female	179	210	198	180
	Person	490	508	497	480
Rural+ Urban	Male	799	809	789	762
	Female	237	323	276	231
	Person	523	570	537	501

Source: NSSO, Government of India, Key Indicators of Employment and Unemployment in India, NSS 68th Round, July 2011-June 2012, p.12.

Ps- The estimates of employed (or worker) according to the usual status(US) gives the number of persons who worked for a relatively long part of the 365 days preceding the date of survey.

Ps+ss- The work force according to the usual status (ps+ss) includes (a) the persons who worked for a relatively long part of the 365 days preceding the date of survey and (b) those persons from among the remaining population who had worked at least for 30 days during the reference period of 365 days preceding the date of survey.

CWS- The workforce measured in terms of current weekly status (CWS) gives number of persons employed on an average in a week of 7 days during the survey period. The estimate of workforce, according to CWS provides the number of persons worked for at least 1 hour on any day during the 7 days preceding the date of survey.

CDS- The workforce measured in terms of current daily status (CDS) gives the average picture of the person-days where a person was found employed on an average on a day during the survey period. For each person, 7 person -days were assigned for the 7 days preceding the date of survey and the estimate of the number of person days worked in the reference week was obtained on the basis of the person days worked according to the CDS approach. The number of person-days worked on a day during the survey period was obtained by dividing the person-days worked in a week by 7.

4.1 Need of Education and Skill Development

In India, 729 million persons are in the age group of 15-59 years (Census, 2011). The Census of India projections show that by the year 2021 more than 64 per cent of the population will be in the working age group of 15-59 years. In order to fully utilize this demographic dividend (increasing share of the working age population) it is important that the population in the working age group is productively employed. As per data provided by 66th round of NSS, the total labour force **(PS+SS)** aged between 15-59 years was 431 million in 2009-10. Here, one of the major challenge posed by the level and type of education is that the level of general education of India's labour force remains extremely low. Of the labour force of 431 million in 2009-10 nearly 126 million or 29 per cent of the labour force, are not even literate. An additional 102 million, or nearly 24 per cent, of the labour force either has below primary or only primary level of education. In other words, well over half of the labour force between 15-59 years of age

has extremely low levels of education or none at all. An additional 17.6 per cent had middle level education in 2009-10 and a further 12 per cent had attained secondary level education. In other words, the remainder of only 17 per cent has higher secondary and higher levels of education (including diploma/certificate, graduates, and post graduation levels of education).

There is the further problem that even those who have been educated find it hard to get jobs. Vocational training and technical education appears to be doing little to resolve this problem. Technical and vocational education in the national policy on Education (Federal Republic of Nigeria, 2004) is that aspect of education which leads to the acquisition of practical and applied skills as basic scientific knowledge. It provides trained manpower equipped with technical knowledge and vocational skills necessary for agricultural, industrial, commercials and economic development. The importance of technical and vocational education system lies in the fact that it imparts necessary skills which improves employability of the workers and thereby improves quality of life for the workers, and enhances industrial productivity.

The absolute number of those receiving formal vocational training is 1.9 million or 0.4 percent of total labour force (15-59 years) in 2009- 10. An additional 9 million or 2 percent of total labour force in the labour force have already received vocational training formally. Finally, an additional 32.7 million or 7.6 percent of total labour force have received non-formal vocational training. Thus, the total number of those received or receiving vocational training in the labour force (15- 59 years) was 43 million in 2009-10. In other words, only 10 per cent of the labour force and workforce in the working age group is vocationally trained (receiving or received) in 2009-10. Those with technical education are a sub-set of those with vocational training. Their total number is 11.76 million. Only about 2.5 per cent people in the labour force for all age groups (470 million) are receiving or have received technical education.

Moreover, the data on the type of education received by students aged 5-29 years in India shows that the major or basic course of education is the general education i.e. 97.8%, with 99% in rural areas and 95% in urban areas. Not only this, more than 93% of students are in level higher secondary (HS) or below, which essentially comes under general education. Therefore, at post-HS level, the proportion of students in general education was another 4.8%, while only 1.9% was in technical education and 0.3% were in vocational education. The percentage of students pursuing technical education was 4.7% in urban areas (with little difference in the percentage for females and males) and only 0.9% in rural areas (1.2% among rural males and 0.6% among rural females). The proportion receiving vocational education was 0.2% for rural students and 0.3% for urban students (NSSO, 2007-08). Thus, general education is the major or basic course of education in India.

5 Conclusion and Suggestions: From the above discussion it is clear that demographic dividend can accelerate economic growth. But the challenge is that the reward from the demographic dividend is not automatic, but has a finite window for which the timely policy action is quite important. In order to reap the benefits from demographic dividend, there must be population, social and economic policies. India faces a major deficit in the areas of education which could adversely affect the conversion of a growing labour force into an effective workforce. Here, increasing education levels starting at the primary and secondary level, especially in less developed regions. Moreover, vocationalisation is the need of the time and should be emphasized. India needs a flexible education system, basic education would provide the foundation for learning,

secondary and tertiary education would provide full capabilities and through technical skills further means of achieving lifelong learning. In this line, females also need to be empowered through education and skill development to contribute effectively in labour market. Therefore, additional investment in education sector is needed in India to open the window of opportunity. Countries need to develop and enforce policies that enable girls to go to school and equip them with skills to compete for higher-paying jobs. Education and skill development can help only when the labour market provides employment opportunities and labour mobility is possible across and within sectors. Hereby, it is necessary to create productive employment opportunities for the new entrants into the labor force. Moreover, access to employment must be equal for both men and women. Most women in the working age population do not seek employment in the labour market because of what they term personal or family responsibilities. Hereby, it is needed to reduce the burden of household work and break down of traditional mindsets. Last but not the least, the value of India's demographic dividend will depend in great measure on the political will and foresightedness not only to create job opportunities but also to improve the education system to match the requirements of labour market, train the new young workforce, support invention and innovation, and implement policies that engender confidence in the economy.

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SERVICE QUALITY LEADS TO CUSTOMER SATISFACTION AND CUSTOMER SATISFACTION LEADS TO CUSTOMER LOYALTY: A STUDY

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Abstract
Customer satisfaction and service quality are prerequisites of loyalty. Service quality is users' opinion about library services. It provides a curative to the inner view assessed by other measures. The service quality model of Parasuraman, Berry & Zeithaml (1985); Parsuraman, Berry & Zeithaml (1988), and the later model for the electronic environment by Parasuraman, Zeithaml & Malhotra (2004) used gap analysis to assess service quality. The core of this assessment method is just to compare users' expectations for service with their perceptions of actual performance of library services. Describes loyalty and its various phases and factors along with attributes of users loyalty in the Context of University Libraries in Haryana. Besides emphasizing the need and rationale of the study also highlights the significance of the Study. The purpose of this study is to examine the relationship between customer loyalty and two perquisites: customer satisfaction and the image of the library with regard to its service quality from the point of view of the library customers who are the ultimate judge. Awareness, reputation, image, perceived service quality and innovation are five important factors of customer loyalty.

Keywords: **Cognitive loyalty, Affective, Co native, Action loyalty, Phases of loyalty**

1. Introduction

Customer satisfaction is so critical to the marketing of services that there is a constant effort to decide how to improve customer satisfaction and build customer loyalty. American Customer Satisfaction Index (ACSI) evolved indicators for satisfaction and its quantifications. Service quality is both individual and collective. Content of service and the circumstance in which service is delivered are its important equipment. It is influenced by the value of information supplied, used, and the desires of the users. Normally it is based upon the use of the library but it could be added to other assessments such as user satisfaction, loyalty of users, reputation of libraries for service quality, feedback from stakeholders, complaints, etc.

Oliver (1999)[1] defined loyalty as "a deeply held commitment to re-buy or re-patronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing". Loyalty can be described in four ways: Cognitive, affective, co-native, and action loyalty.

Several researchers pointed out that high customer satisfaction and service quality result in higher customer loyalty and willingness to recommend the service. The word-of-mouth becomes more positive as satisfaction increase. Management emerged from three main perspectives which are: (1) service marketing, (2) industrial marketing, and (3) general management. From the service marketing perspective, the way to retain customers is to improve customer service quality and satisfaction (Berry & Parasuraman, 1991; Zeithaml & Bitner, 1996). Customer emotions play an important role in driving customer satisfaction and loyalty. The importance of face recognition and recalling library customers by name affects customer loyalty. Gummesson(1987) proved that in case of service providers the quality of relationships between customers and front line employees, which provides both a professional and social dimension, can strongly contribute to customers'

loyalty. Price and Arnould (1999) showed a positive correlation between "friendship towards a service employee" and "overall service satisfaction." Gutek et al.(1999) indicated that customer having a personal relationship with a specific employee shows higher levels of service usage.

1. Phases of Customer Loyalty Development

Customer loyalty development had been categorized into four sequential phases by Oliver (1999):

1.1 Cognitive loyalty: The customer believes the product to be superior than others and thus, chooses it over others. Here information about the brand and its perceived benefits affect the buying decision.

1.2 Affective loyalty: Reiterated confirmations of customers' expectations lead to affective form of loyalty. Here a particularly favourable attitude gets developed towards the brand.

1.3 Co-native loyalty: High involvement and motives fuelled by strong buying intentions give way to the development of an intense form of loyalty i.e., co-native loyalty.

1.4 Action loyalty: Strong motivations that ultimately lead to actions directed by the 'need to remove' every possible problem that might hinder the loyalty driven decision of purchasing a specific brand or using a specific service.

Oliver (1999)[2] also suggested that action loyalty is perceived as a necessary result of engaging previous phases of loyalty and is accompanied by an additional desire to overcome obstacles that may prevent a customer from patronizing the service organization.

Dick and Basu (1994)[3] brought out the idea of relative attitudes while defining various forms of loyalty as depicted below. They described loyalty as the strength of the relationship between a customer's relative attitude and repeat patronage and they identified four dimensions of loyalty: true loyalty, latent loyalty, spurious loyalty and no loyalty.

Jones and Taylor (2007)[4] affirmed that advanced literature has proposed loyalty to be a three dimensional construct as the resultant outcomes of loyalty can broadly be classified into behavioural, attitudinal and cognitive loyalty. The following section enlists these outcomes of customer loyalty as identified through extensive survey of literature:

Outcomes of Customer Loyalty:

Loyalty is principally valued for its outcomes since it is the outcome behaviours of loyal customers that exercise a huge impact over the revenues and growth of a firm. The literature provides a multitude of behavioural, attitudinal and cognitive outcomes of customer loyalty some of which are widely recognized and accepted whereas others demand further probing for clarity.

2. Rationale of the study

Libraries must be aware of customer preferences and develop their services in line with targeted market needs and must effectively know how to manage image to increase the library chance for success. The demographic profile of customers may also affect their satisfaction and loyalty towards the libraries. This suggests that libraries may need to consider the demographic behaviour of customers when developing the image and service quality of the library The purpose of this study is to examine the relationship between customer loyalty and two perquisites: customer satisfaction and the image/reputation of the library with regard to its service quality from the point of view of the library customers who are the ultimate judge.

3. Determinants and Factors of Customer Loyalty

There are five important factors of customer loyalty:

Awareness: Libraries need to expose their services to more customers to create and increase loyal customers. Loyalty begins with the users' awareness.

Reputation: The library which develops a reputation for high quality can often command respect in administrative circles and gets more funds. In order to build and maintain a reputation, the promised quality of services must be delivered.

Image: Building and sustaining a positive image is an important step in maintaining customer loyalty.

Promotion: Promotion is one of the reasons for customer to use a university library.

Perceived quality: A customer will choose a familiar university library because it carries higher perceived quality. Once the customers believed that the library offers what they expect of a good service, they develop loyalty to that specific library.

Innovation: Innovation allows the library to remain up-to-date and demonstrates attentiveness to the changes in customer style with the consideration of the customers' perceptions and attitudes. To keep pace with changes in the marketplace is the biggest challenge for libraries.

Customer loyalty has emerged as an effective means of business growth. Loyalty experts such as Rosenberg et al. (1984) have proposed that it is cheaper to retain a customer than acquire a new one as far as cost is concerned. Moreover, loyal customers tend to stay with the library for a long duration. This results in higher buying frequency as well as larger volumes of purchases over a period of time saving advertising and other promotional costs that generally occur in case of attracting new customers. Companies with steady customer loyalty enjoy better financial results triggered from higher and more frequent purchases, shorter sales cycles, positive word-of-mouth and a strongly favourable attitude. The factors leading to loyalty and their consequences in terms of loyalty behaviours are worth discussing. The clear understanding of these factors can lead to effective loyalty practices for they provide a concrete base for designing efficient loyalty programmes.

Service quality decides the level of customer satisfaction and satisfied and happy customers are the proof of customer loyalty. Service quality is an antecedent to customer satisfaction. Customer satisfaction (confirmation of expectations); positive behavioural intentions (Repurchase, recommendation, etc.); and positive word of mouth are the determining factors of service quality

3.1 Users' Satisfaction

Future Purchase Intentions (Repeat purchases); customers' active participation in terms of buying additional services and spreading favourable word-of-mouth communication; decrease in customers' sensitivity towards competitive offers; and increased market share from repeat business and referrals

3.2 Trust

Repurchase intentions; reduction in the cost of negotiations and removal of the customer's fear of opportunistic behaviour by the service provider; formation of highly valued exchange relationships; and maintenance of long term relationships decide the level of trust.

3.3 Commitment

Commitments are to prove but promises are to made. It is liking and emotional attachment to the firm. Any resistance to switching behaviour prove commitment of the customer towards service providers.

3.4 Switching Cost

Switching cost has an impact on customer satisfaction; dissuade customers' attraction towards competitive brands and repeat purchase behaviour.

3.5 Reputation and Corporate Image

Reputation and image play an important role in determining the customer loyalty. Reinforcement of self-image and repeat patronage helps in improving customer loyalty.

3.6 Service Recovery

Behavioural intentions; impact on switching intentions and affecting favourable condition helps in this respect.

3.7 Emotions

Behaviour such as - repeat visit, recommendation, and repurchase intentions influence the post consumption satisfaction judgement and impact on post-purchase.

3.8 Communication

It is building awareness in the early stage, developing customer preference, convincing and encouraging the customers to make the decision to buy and assurance for follow up action.

4. Implications of Customer Loyalty

Survival and growth of an organization in today's complex business environment characterized with ever-increasing competition and entry of new market forces demand a broad vision as well as strong strategies directed at customer relationship management. Companies need to understand and assess the potential of retaining customers in the long run and make customer focus a focal point.

Vimal Sukumar (2001)[5] contended that customer satisfaction contributes to profitability, reduces complaints and build customer loyalty and reputation for service. He suggested 20 ways to increase customer loyalty: 1) Convenient hours, 2) toll free telephone access, 3) automated attendant, 4) guarantee about security and safety, 5) helpful suggestions about frequently asked questions, 6) regular communication, 7) acknowledging presence and thanks, 8) being enthusiastic, 9) holding a customer appreciation day, 10) recognising long term customers, 11) making realistic promises, 12) listening to customer, 13) responding promptly, 14) making decisions on the spot, 15) creating fun and excitement, 16) introducing something new, 17) making brochure/invoices simple, clear and easy to read, 18) showing customers how to save money and time, 19) answering all telephone calls and developing a reputation for talking to people, 20) doing something extra and dramatising the added value.

5. Customer satisfaction and service quality: A conceptual analysis

Originally, researchers compared satisfaction to an attitude which can be assessed as the sum of the satisfaction with the various features of the product or service. **Parasuraman, Berry & Zeithaml (1985)**[6] introduced the value of gap measurement in customer satisfaction by comparing expectations against standards or perceptions of actual performance. This gap was used for determining importance of service quality in satisfaction.

Service quality is generally more objective and holistic than satisfaction and can be affected by very small matters. **Reichmann (2001)**[7] conducted users' survey to evaluate user satisfaction and user frustration. He described subjective and objective quality control indicators for the calculation of user satisfaction. Both types of these indicators can be used in practical application of quality control in academic libraries. Findings indicate that user satisfaction is based on book availability, acquisition, circulation, technical, user performance, and overall effectiveness with regard to collection, technical processing, reading room facility and floor management, documentation services and reader services.

Andaleeb & Simmonds (1998)[8] found that overall user satisfaction of a library may be influenced by many factors of service quality. They proposed five propositions: i) "the higher the perceived quality of the library's resources, the greater the level of user satisfaction" ; ii) "the greater the responsiveness of the library staff, the greater the level of satisfaction among academic library users"; iii) "the greater the perceived competence of the library staff, the greater the level of user satisfaction"; iv) "the better the overall perceived physical appearance of the library, the greater the level of user satisfaction"; v) "the more positive the demeanour (assurance level) of the library staff, the greater the level of user satisfaction".The construct "demeanour", is described by staff understanding, willingness, politeness, courteousness,

sympathetic and reassuring attitude towards user needs, desires and their problems.

6. Service quality, satisfaction and loyalty: a relationship

Zaithaml (1998) defined service quality as the customer judgment about a product overall excellence.**Hernon & Altman (1998)**[9]contendedthat quality of library services leads to user satisfaction and user satisfaction becomes most important predecessor of user loyalty. Regular users who spend time in library should be recognized as valued and loyal.

Rowley & Dawes (1999)[10] found that loyalty has three predecessors: i) rational (objective and technical aspects of service quality); ii) affective (emotional aspect of service outcome); and iii) behavioural outlook which has no closeness within service quality framework but front line staff can easily recognize it.

Calvert (2008)[11]found that effective complaint handling turns dissatisfied customer into a loyal one and sustains and strengthens customer loyalty. Loyalty is interrelated with satisfaction and the correlation can be either positive or negative. Although there is no clear-cut connection between loyalty and satisfaction, but acknowledged strength of satisfaction is an element of customer loyalty. This leads to the fact that quality of library service is very important element and predecessor to user satisfaction. This is the reason why service quality has received so much attention from librarians and researchers.

In line with this, **Chadha (2002)**[12]found customer satisfaction important for customer loyalty but satisfaction alone does not ensure customer loyalty. For loyalty you have to give something special and win the trust. Just to know something special you have to be friendly and develop personal relations with customer.

From the above it is clear that 'satisfaction' and 'service quality' are used relatively in a loose sense in library literature but both are related directly. The components of user satisfaction i.e. loyalty of users, users' retention, and relationship marketing revolve around three important components of service quality, i.e. service delivered, outcome/value derived, and service desired. User satisfaction is based on a personal decision about a particular transaction and overall user satisfaction depends on the number of transactions with the library. It may also be influenced by some important dimensions of service quality, i.e., staff quality and services of the library. Therefore, users' satisfaction is also dependent on the quality of staff and services of a library.

7. Determinants of user satisfaction and service quality

Satisfaction is closely associated with value derived and price paid, but service quality is not dependent on price, if the user is generally satisfied with other aspects of service quality. Satisfaction is a personal and emotional aspect. It examines a specific transaction, actual worth, and customer preferences. Service quality is also a subjective concept which differs from but is related to satisfaction. Service quality is more objective than satisfaction and is based on global judgement. It is most likely "an antecedent (predecessor) of customer satisfaction".[13]

7.1 Service elements of university libraries on which users' expectations are based

Hernon & Altman (1996) based users' expectations from academic libraries on four service elements: 1) Resources, 2) service environment, 3) service delivery staff, and 4) library systems (technical staff). These service elements cover content and context of library service. Users' interactions with content and context help in forming opinions about the library and their expectations influence satisfaction with content and context of library service.

1) Library resources must be appropriate, relevant, accurate, aesthetical,

comprehensive and of all mediums and forms along with web based resources.

2) Library services must be responsive to user needs. The maintenance of physical condition of material and physical surroundings must be ambient. Equipments are accessible to user as per their choice and convenience. Noise level, safety and security measure, location of reference desk, signage, spatial layout, temperature, service costs, service reputation, and loyalty of users must be within acceptable levels.

3)Service delivery staff must be able to educate, train, and instruct user accurately. Staff should be well behaved, approachable, courteous, kindhearted, friendly, pleasant, helpful, attentive, promptness in service with appropriate body language and smile. Staff must be equipped with communication skills, knowledge, ability, competence, and presentable appearance.

4)Library system (technical staff) must be able to communicate with users and must have knowledge and ability to anticipate user needs and standards, service orientation, speed of service delivery, and technical knowledge of library systems and technological equipments.[14]

7.2 Customer Service and the Libraries

Customer service is a process which provides time and place utilities for the customer and which involves pre-transaction, during transaction and post transaction considerations relating to the exchange process with the customer. A customer seeks a product or a service and spends money, time or energy in the process. "The service Triangle" includes a well conceived service strategy, customer–driven systems and customer-friendly staff (Miao and Wang Bassham (2007)[15].

7.3 Relationship Marketing

Relationship marketing is a continuous process to enrich users' satisfaction. It is concerned with getting and retaining user through quality, customer service, and marketing. Those attributes that contribute to user expectations and perceptions of service quality are known as dimensions or attributes of service quality. Marketing is concerned with the exchange of relationships between libraries and users and quality and customer service are the key linkages in this relationship.

Table 1: Service quality level of libraries based on respondents' perceptions

Dimensions/Indicators/Measures/Features of service quality as understood/defined by respondents most to least important are: Library Service; Library Staff; E-Services; Resources/Information Content; Physical Facilities & Environment; Timeliness; and Convenience	KULK N=167	HAUL N=172	MDUL N=179	GJUL N=174	CDUL N=168	Total 860
	Sum (Us. Mean)	Sum (Us. Mean)	Sum (Us. Mean)	Sum (Us. Mean)	Sum (Us. Mean)	Sum We Mean
1) Physical facilities and environment My library is easy to access; has good layout; space for silent reading; good lighting & ventilation; clean, tidy & hygienic, and good appearance; comfortable furniture; heating and cooling facilities; assurance for personal safety; attractive interior & exterior; fresh and clean water facility; clean & well maintained toilets; neat & professional appearance of staff; and conducive & inviting	**510** (3.05)	**614** (3.57)	**680** (3.8)	**446** (2.56)	**316** (1.89)	**2560** (2.98)
	Rank 3	**Rank 2**	**Rank 1**	**Rank 4**	**Rank 5**	**Rank 6**

environment for study						
2) Resources: information content My library has adequate collection; displays books, journals and documents attractively; range of material meets all needs; material is available in clean & good condition; provides multiple copies of useful items; tells quickly position of a document; purchases new material relevant to courses; purchases text books in various medium; web page contains correct and useful information	526 (3.15) Rank 3	686 (3.99) Rank 1	692 (3.86) Rank 2	456 (2.62) Rank 4	342 (2.06) Rank 5	2702 (3.14) Rank 3
3)Timeliness My library provides prompt services to users; acquires new documents in time; preserves returned documents immediately; keeps documents always in correct order; processes and makes available new documents very fast; checks in and checks out documents quickly; staff readily respond to users queries; library acts promptly on users' complaint; waiting time of library is three minutes for all services; requested material comes within time frame quoted.	348 (2.08) Rank 5	640 (3.72) Rank 1	642 (3.59) Rank 2	560 (3.22) Rank 3	474 (2.82) Rank 4	2664 (3.1) Rank 4
4) Library staff quality Staff of my library helps to locate a needed document; staff is approachable and welcoming; available when needed: knowledgeable staff is always available to answer questions accurately; staff gives personal attention to the users; staff understands the specific needs of users; Behavior of staff develops confidence; staff demonstrates cultural sensitivity	356 (2.13) Rank 5	678 (3.94) Rank 2	708 (3.96) Rank 1	578 (3.32) Rank 3	416 (2.48) Rank 4	2736 (3.18) Rank 2
5) Convenience Location of my library is very easy to access; directional signs are clear, understandable and helpful; provides information about defective equipments; easy to find out where to go for help; library catalogue (OPAC) are available on all	468 (2.8) Rank 4	624 (3.62) Rank	618 (3.45) Rank 2	572 (3.29) Rank 3	362 (2.15) Rank	2644 (3.07) Rank 5

floors; OPAC is accurate, updated and extensive; easy to find out when the library is open and closed; easy to use internet, CD-ROM, and online databases; easy to find where all types of reading material is located; working hours are convenient; assistance and guidance is provided for physical, bibliographical, & intellectual access.		1			5	
6) Library services My library Issues number of documents as per needs; gives maximum personal help; displays regularly the list of new documents acquired; educates users how to use the library well; librarian interacts with the users regularly; provides services free of cost; provides personalized help in locating material; staff conducts interview to know actual needs of users; staff has knowledge and ability to anticipate user needs; staff suggests where to go for information inside and outside the library.	**478** **(2.86)** **Rank 4**	**624** **(3.63)** **Rank 2**	**672** **(3.75)** **Rank 1**	**586** **(3.37)** **Rank 3**	**388** **(2.31)** **Rank 5**	**2748** **(3.2)** **Rank 1**
7) E-Service quality My library provides an adequate number of computers workstations in good working order; website of my library provides information about working hours, location, services, and policies; provides access to a wide range of electronic resources / online databases in subject / course/ areas; website is easy to navigate; online catalogue of library is easy to search; library's computer network is good, easy and quick to log on and log off.	**448** **(2.68)** **Rank 4**	**598** **(3.48)** **Rank 1**	**608** **(3.4)** **Rank 2**	**575** **(3.3)** **Rank 3**	**302** **(1.79)** **Rank 5**	**2531** **(2.94)** **Rank 7**
The overall average perception about actual level of library service quality provided . Based on understanding and importance given						**21.61/7** **(3.08)**

Table 1 depicts the rating level of the service quality of five university libraries on the basis of seven important features/indicators of service quality. On the basis of overall ranking by the sample of the study, services are rated at the top position with mean value of 3.2, followed by staff with mean value of 3.18, resources with 3.14, timeliness with 3.1, convenience with 3.07, physical facilities with mean value of 2.98, and e-service quality with 2.94 mean values. The overall average perception score on all the resources and services of the library is 3.08 which is below the expectation score of 3.82.

University wise, MDUL got the top position in services with mean value of 3.75, followed by HAUL with 3.63, GJUL with 3.37, KULK with 2.86 and CDUL with 2.31. MDUL got top position with regard to staff quality with mean value of 3.96, followed by

HAUL with 3.94, GJUL with 3.32, CDUL with 2.48, and KULK with 2.13.

HAUL got top position in resources with mean value of 3.99, followed by MDUL with 3.86, KULK with 3.15, GJUL with 2.62, and CDUL with 2.06. Similarly, with regard to timeliness HAUL got first rank with mean value of 3.72, followed by MDUL with 3.59, GJUL with 3.32, CDUL with 2.82, and KULK with 2.08 mean value. As regard to convenience, HAUL got 1st position with mean value of 3.62, and CDUL got the last position with 1.9 mean value. HAUL ranked at the top position in e-service quality with mean value of 3.48, whereas MDUL and GJUL ranked at 2nd and 3rd position with mean value of 3.4 and 3.3 respectively. But score of KULK and CDUL slided to 4th and 5th position with mean value of 2.68 and 1.79 respectively.

Conclusion

Regarding overall position of each university on all aspects, table depicts that MDUL got top rank in library services, staff quality, and physical facilities with mean value of 3.75, 3.96, and 3.8 respectively, whereas HAUL got top position in resources, timeliness, convenience, and e-service with mean value of 3.99, 3.72, 3.62, and 3.48 respectively. GJUL got 3rd rank in five out of seven aspects, KULK got 3rd rank in two, 4th rank in three and 5th rank in two features, whereas CDUL got 4th position in two and 5th position in five out of seven features of a good library.

Loyalty is a deeply held commitment to re-buy or re-patronize a preferred product/service consistently in the future. It is of four types, i.e. cognitive, affective, co-native, and action loyalty. It is thereby cause repetitive same-brand or same brand-set purchasing. Loyalty describes the strength of the relationship between a customer's relative attitude and repeat patronage and can be conveyed with four dimensions i.e. true loyalty, latent loyalty, spurious loyalty and no loyalty at all. There is an interaction between customer satisfaction, customer loyalty and customer retention.. When customers perceive good service, each one of them will tell nine to ten people. It is estimated that nearly one half of American businesses is built upon this informal, communication "word-of-mouth". Customer retention is increasingly being seen as an important managerial issue. Improvement in customer retention by even a few percentage points can increase profits by 25% or more. From the above literature review it is clear that the concept of positioning the academic libraries in a marketing strategy calls for the creation and identification of an image. Libraries must be aware of customer preferences and develop their services in line with targeted market needs and must effectively know how to manage image to increase the library chance for success. The demographic profile of customers may also affect their satisfaction and loyalty towards the libraries. This suggests that libraries may need to consider the demographic behaviour of customers when developing the image and service quality of the library. Customer satisfaction and service quality are prerequisites of loyalty.

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MAKE IN INDIA: HOW TO MAKE INDIAN MANUFACTURING GLOBALLY COMPETITIVE

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Considering the focus on "Make in India", the paper employs a Macro to Micro approach, wherein the Indian Manufacturing Sector is discussed against a global backdrop and its competitiveness is evaluated. Growth and trends in productivity are followed by exports, while competitiveness of other nations is examined on similar factors. This is important in light of the fact that the Indian manufacturing sector employs about 30% of the Non-agricultural workforce.

Further, different sectors are probed individually. The sectors researched include textiles, steel and aluminium, petrochemicals, fertilisers, dairy products, automobiles & auto ancillaries, cement, paper & glass, engineering, mining, electricity and construction. After summarization of the current state in each sector in India and also against the international backdrop, a need gap analysis enables identification of required strengths. Drawing from the analysis of each sector, conclusions are derived to sort out what all can make Indian manufacturing globally competitive.

The Indian manufacturing sector: Overview

Labour intensive exports, on a global scale constitute a 1.5 trillion dollar market, and that relatively high wage rate economies should have a share higher than India is rather ironical. While average labour cost in Germany is about $ 20 per hour that in India is less than $ 1 per hour. With not high levels of literacy, in terms of higher education achieved, it is exploitation of this labour intensive export market alone that can make India competitive globally, despite the promising service and knowledge sectors.

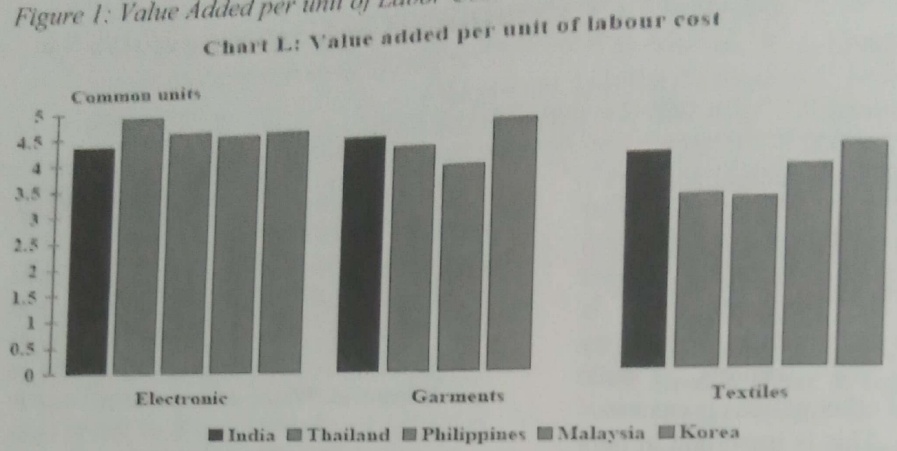
The need for globally competitive Indian Giants is triggered as much by the competitiveness of the nations abroad as is by the spurt in the number of Small and Medium Enterprises (SMEs). The SMEs have contributed positively to entrepreneurship and employment generation but their growing number has seen loss of competitiveness, especially in light of inadequate resources to achieve economies of scale.

Table 1: Assessment of Indian Manufacturing Competitiveness

Category	% of Value Added	% of Capital Employed	% of Labour Employed	Competitiveness in the domestic market	Competitiveness in the global market
Consumer Centric	33%	25%	39%	Medium – High	Low
Labour/Skill Intensive	13%	13%	22%	High	High
Naturally protected	14%	14%	7%	Medium – High	Low-Medium
Capital/Scale Intensive	25%	34%	21%	Low-Medium	Low
Technology Intensive	14%	13%	11%	Low	Low

Source: 'Making Indian Manufacturing Globally Competitive', Accenture

Figure 1: Value Added per unit of Labor Cost



Source: Competitiveness of Indian Manufacturing Results from a Firm-Level Survey, CII & World Bank

India has started being viewed as a potential manufacturing hub, next to China. The manufacturing sector in India has been going through a major restructuring for quite a while and is now establishing a place for itself in the larger global market. The results of a survey to get an idea of the competitiveness of Indian Manufacturing are shown in the chart given below.

Crucial segments for India's manufacturing sector - textiles, steel and chemicals are already over the hump, having crossed the stage of plant closures and seen the emergence of new capacities on a global scale. These industries are likely to emerge competitive in the near future. The remaining sectors that are yet to reach the stage are taking necessary measures to make themselves globally competitive.

The key aspects of some of the important sectors which comprise the Indian Manufacturing Sector are discussed briefly below.

Engineering Manufacturing Sector

The advantages in this sector which can exploited by Indian MNC are:

Skilled technical manpower
Competitive labour cost
English speaking population
Managerial excellence to deliver quality goods on time
Indigenous availability of raw materials
Large domestic market allowing economies of scale
Strategic location allowing exports to near and far countries
Diversified industrial base with supporting ancillary Industries
Strong technological capabilities exist, particularly in certain sectors such as electrical machinery, process plant machinery and general-purpose machinery

Pharma Sector

The Indian pharmaceutical industry is globally competitive in cost and innovation. Efficient manufacturing abilities due to multiple processes enable Indian companies to launch products early vis-à-vis regulated markets and also aid the companies to develop non-infringing processes. Indian Pharma Companies are now also engaging in Contract Manufacturing which is being looked upon as a growth engine for them in the future.

Bulk drug manufacturing is expected to migrate slowly from Western Europe and the US to India and China due to their inherent advantages, such as low-cost manufacturing, easy availability of qualified workforce and lax environment laws that favor investment in these two countries. India's eligibility as a manufacturing base is evident from the recent decision of SmithKline Beech Consumer

Products Ltd, the Indian subsidiary of pharma major SmithKline Beecham Plc, to set up a Rs2.5bn manufacturing unit at Sonepat in Haryana. The 26,000-tonne facility is built with the aim of catering to the company's global requirements of OTC.

Textiles

India possesses a huge textile industry, which carries tremendous potential with itself. For staying competitive in this ares, the need of the hour for the firms is to go for technological upgradation.

The inherent strength of the Indian textile industry lies in its strong raw material base, skilled manpower and vast entrepreneurial expertise. In spite of this, India's share in global market in textile and clothing is only around three per cent. With fast approaching WTO regime and continued lowering of import tariffs in India, the textile industry must take urgent steps to bridge the existing technological gap in order to make the quality of its textiles comparable with that of major competitors. To graduate to high value, high quality category, Indian industry must absorb the latest technology and install state-of-the art equipments, which can produce fault-free goods at higher efficiency and productivity.

Cement

The Indian cement industry is getting consolidated with 60 per cent of the cement production being controlled by the top five players. However, the only concern that seems to be faced by the industry is the extremely low pricing as compared to other countries.

The industry is in need of internal changes like process technology; harnessing scale advantages through higher capacities; and, undertaking technological innovations and process improvement measures to increase operating efficiency. Management of critical issues associated with external variables (such as coal, power and freight) and Government duty are yet other areas before the Indian Cement industry becomes globally competitive.

The likely measures which the industry can take to enhance competitiveness in the future are: switching over to bulk transportation; going in for value added products such as Ready Mix Concrete; and, setting up split location plants

Construction Industry

As economic growth gathered momentum in the last couple of years post liberalisation, the construction industry has benefited. Growing foreign investments and favourable fiscal policies have improved industrial growth rate to double digit. Increasing capital investment has translated into more business for the construction industry which is evident from higher sales and better performance reported by leading construction companies.

However, it is necessary to create an autonomous central valuation board in the Ministry of Finance, Government of India. Countries like Singapore, Malaysia, Sri Lanka, Australia, New Zealand, Jamaica, England, Nigeria, Kenya, Tanzania, Zambia, Zimbabwe, South Africa and Mauritius have separate agencies headed by a Chief Valuer possessing academic qualification coupled with experience in Valuation to undertake valuation for various fiscal and non fiscal purposes. To achieve these objects, it is necessary to create an autonomous Central Valuation Board in the Ministry of Finance, Government of India.

Petrochemicals

The demand for petrochemical's has close linkages with the economic growth and it is also to some extent, supply driven. Although, the domestic petrochemicals consumption has been growing rapidly in the last few years. the per capita consumption in India continues to remain far below the international average, indicating the tremendous growth potential for the industry.

Input costs form nearly 50% to 60% of the raw material costs. Further, gas prices are regulated but in short supply, while naphtha is an expensive source of feedstock. Refineries realize the import parity prices on naphtha produced and in case of high feedstock prices, petrochemical players have little bargaining power against the suppliers. These players are therefore vulnerable to raw material prices.

The domestic per capita polymer consumption is nearly 4 kgs while the global average is nearly 20 kgs. This underlines the fact that there is immense scope of capacity expansion

in the country as the market to be tapped is huge. Further, spending on R&D activities is around 2% of sales as compared to an international average of 18%. This leaves enough room for product development. Also, currently, India has a chemicals trade deficit of about US$ 1.5 bn a year, which leaves enough investment opportunities in the industry.

Steel

India is world's 10th largest producer of steel, with liquid steel capacity of over 25 mn tons - domestic steel industry turnover in FY15 exceeded Rs. 500 bn. India's high rate of industrial growth (10%.) has created a strong domestic market. With currently-high international prices reducing dependence on imports, domestic industry has had new highs in sales quantity and value. The industry is likely to grow at 7-9 % over the next few years, nearly doubling in size by the turn of the century. Industry sources expect domestic production to reach 81 mn tons by 2020 and 100 mn tons by 2025.

Automobile

The Indian automobile industry has undergone a dramatic transformation in the recent past. With the introduction of the new vehicles generation, *several tie-ups with foreign companies have been put in place for substantial upgrading of technology of the components industry. The* prospects of the auto industry are indeed bright with India offering significant advantages in terms of factors such as:

- Trained and skilled human resources
- Growing domestic market
- Expanding global markets
- Transnationalisation of world economy
- Investments by non-resident Indians
- Economic liberalization

Conclusion

Globalisation creates conditions, in which a national economy need not maintain a producing presence in every industry. In fact, there are economists who argue that a nation should not attempt to keep its presence floating in all industries through government interventions, such as subsidies or higher protection levels. Michael Porter, who popularised the discussions on competitiveness, wrote in his celebrated book 'The Competitive Advantage of Nations': "No nation can be competitive in (and be a net exporter of) everything."

Inevitably, there is clearly a sense of paradox about the current situation in the Indian manufacturing sector and economy at large. While there are ample signs of resurgence in several segments, especially those in sync with global market dynamics, the macro-level statistics on industrial performance still paint a mood of diffidence. While IT, pharmaceutical, automobiles, and fast moving consumer goods (FMCG) sectors have shown unprecedented growth in the past five years, conventional sectors like engineering goods, chemicals and small scale manufacturing, that had strong presence in Indian economy, have been on decline, bearing the brunt of new global competitive pressures

The relentless pressure on prices as a result of heightened competition that several sectors of the Indian economy face show that it is time Indian firms adopted the following:

Lean manufacturing that forms a triad along with total quality maintenance and total productive maintenance provides Indian firms with an attractive option to meet two vital ends - improve quality and provide for cost cutting of production and operations at the same time.

Adapting to information technology is a key competitive tool in managing the business processes, both within and outside the enterprise, which effectively redefines the manufacturing systems and supplier and customer-led business processes.

Focus should also be given on logistics and supply chain pipeline with an attempt to achieve objectives such as shortening the production turnaround time and formulating small outsourcing strategies to cut down distribution and operation costs if possible

GREEN CHEMISTRY&DEGRADATION OF NATURAL RESOURCES BY INDUSTRIAL EFFLUENTS

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ABSTRACT
There is a rapid increase in the pollution of our environment due to an increase in industrialization and developmental processes and other factors of pollution in the world today. If this increase is allowed , the problem of pollution of the environment will become more acute as the amount of pollutants being introduced to the environment continues to be on the increase. Industrial activities contribute a lot of toxic wastes to the environment in general, hence thisstudy was carried out to investigate the effect of industrial effluent on the nearby surrounding. The present study evaluates the impact of industrial effluent on degradation of natural resourcesin Rohtak (Haryana), one of the fastly develping industrialized district in Haryana. The present survey study was conducted based on pre prepared questionnaire in two locations viz, IMT- Rohtak and Bhaali Anandpur, Rohtak during October 2014 to Jan. 2015, with sample size of 80 persons. Almost 100% of the respondents identified that untreated industrial effluents degraded surface water and soil along with negative impact on crop, insect pests and animals. The health and proper growth of human, domestic animals and aquatic animals are also affected by harmful effects of untreated industrial effluents. Even though the presence of tiny part of untreated industrial effluent decreases the quality of ground water. To address this alarming sign, immediate action should be taken for saving protecting the ecosystem from unplanned and untreated discharges of industrial effluents here and there.
Key Words:- Industrial effluents, Environment, Pollutants

Introduction:-Industrialization has become an important factor to the development of a country's economy,
through the establishment of plants and factories. However, the waste or by-products discharged from them are severely disastrous to the environment consists various kind of contaminant which contaminate the surface water, ground water and soil. There are a number of reasons the waste are not safely treated. It has been realized that discharges of untreated or incompletely treated wastes containing algal nutrients, non-biodegradable organics, heavy metals and other toxicants will produce the deterioration of receiving water bodies. Industrial effluents coming from different industrial and commercial establishments posing serious threats to environment, particularly in urban and semi urban areas. It becomes the source of pollution for surface and subsurface
water, soil and air. Its proper management and disposal is one of the most serious challenges all over the world and also in Haryana. Rohtak is one of the fastly develping industrialized district in Haryana. Newer one coming regularly which also threaten about the increasing level of chemical effluents. The production of industrial effluents in this district is also higher as compared to other areas. Industrial wastewater deteriorates not only the quality of soil, crop and environment but are also directly harmful to the human, animal and aquatic lives. Unplanned discharges of industrial wastewater degrades the quality of food crops. Even though the textile effluent is the most polluting among all industrial sectors considering both volume and composition of effluents in developed & developing countries. Although other industries like paint, leather, sugar mill etc. also producing large amount of chemical effluents. Disposal of industrial effluents in rivers or water bodies decreased the crop production and was a potential cause of environmental degradation . The heavy

metal content in the soil will be increased by about 18 - 98%, compared to the present unpolluted soil. Industrial Effluents entering the water bodies is one of major sources of environmental toxicity. It not only affects the quality of drinking water but also has deleterious impact on the soil microflora and aquatic ecosystems. For mills that have an attached distillery, the numerous distillation stages produce a highly contaminated effluent, with BOD and COD concentrations of about 40,000 –100,000 mg/l, called stillage. In general, sugar mill effluents contain acidic and alkaline compounds, a significant concentration of suspended solids and a high

BOD, COD, and sugar concentration. Survey is an important and effective way of getting relevant field level information required for any research and development program. The aim of the present study was to generate information about the impact of wastewater on socio-economic, health and environmental aspects of urban and semi-urban areas of Rohtak district .There has been growing awareness of the need for effective treatment of various effluents before discharging into any public water body.

Methodology

In order to achieve the objectives of the study, an intensive field survey was conducted in locations of IMT- Rohtak and Bhaali Anandpur, Rohtak (Table-1)& effluent samples from the paint as well as sugar industry were collected as per standard procedure and were analyzed in the Laboratory. An arrangement has been made in order to have responses of the residents living near these industrial areas about open discharges of industrial effluents. In this regard, seventy five respondents living adjacent to each industry were interviewed, based on the pre-designed interview schedule during from during October 2014 to Jan. 2015. Data gathered through direct interviewing were coded for processing and analysis.

Table:1 Name, type and location of the industries in the study area.

Sr.No	Name of Industry	Type of Industries	Location
1.	Asian Paint	Paint	IMT
2.	Various Small Plants	Leather and others	IMT
3.	Sugar Mill	Sugar Industry	Bhalli Anandpur

Physico-chemical analysis of the paint industry effluents

The site of sample collection was identified at point where the effluent is discharged from the factory. The color of the effluent and odor was observed at the time of collection of the sample in sterile bottles. The wastewater discharged from the paint industries is characterized by a variety of chemicals generated from different processes. It also constitutes suspended solids, organic and inorganic matters, acid and alkalis. Paints wastewater contains substantial pollution loads in terms of BOD, COD, TSS and heavy metals. The environmental concern of discharged paint wastewater is mainly its high chemical oxygen demand (COD) as well as high strength of color content. The analysis were carried out as per the standard methods.

Physico-chemical analysis of the sugar industry effluents

Wastewater from sugar mills were collected and analysed in the laboratory. The effluents with its high BOD rapidly deplete available oxygen supply when discharged into water bodies endangering fish and other aquatic life. The high BOD also creates septic conditions, generating foul-smelling hydrogen sulphide, which in turn can precipitate iron and any dissolved salts, turning the water black and highly toxic for aquatic life.

Results and Discussion:- ***1. Quality of surface water:***-Surface water is a vital source of irrigation,

household usages etc. However, the discharges of untreated industrial wastes have been deteriorating the quality of surface water. Table 2 shows that all of the respondents (100%) identified surface water as unusable for drinking in terms of quality, taste, color and odor. Surface water is completely unusable for cooking, bathing, irrigation and other domestic uses. About 44 - 66% respondents report that the surface water could still being used for their bathing and also for domestic animals considering low decreasing of taste and color (Table 2). Such water was considered unsuitable due to bad odor. About 100% respondents opined that such water is not suitable for irrigation purpose due to indiscriminate discharge of untreated industrial wastes. Thus, quality of surface water in those areas was seriously deteriorated for various kinds of usages.

Table :-2 Distribution of the respondents according to their responses on decrease in quality of surface water.

Types of used	Types of quality	Respondents					
		LD		MD		HD	
		No	Percent	No	Percent	No	Percent
Drinking	Taste	-	-	-	-	35	70
	Color	-	-	-	-	32	64
	Odor	-	-	-	-	32	64
Cooking	Taste	-	-	5	10	40	80
	Color	-	-	7	14	44	88
	Odor	-	-	9	18	42	84
Bathing	Taste	15	30	19	38	44	88
	Color	16	32	22	44	45	90
	Odor	22	44	28	56	50	100
Domestic Animal Use	Clarity	10	20	16	32	13	26
	Color	12	24	23	46	16	32
	Odor	15	30	34	68	20	40
Irrigation	Color	-	-	7	14	34	68
	Odor	-	-	23	46	26	52

*LD= Low Decrease, MD= Moderate Decrease, HD= High Decrease

The parameters analysed for the textile effluents in Table 3 are higher than the permissible limits for pH, TSS, TDS, BOD and COD.

Table-3

Parameters	S1	S2	S3	S4	FMENV Limit
pH	9.1	8.3	8.1	8.5	6-9
TSS	360	310	340	280	30
TDS	2470	2375	2260	3480	2000
BOD	181	230	195	280	50
COD	3570	3260	3090	3980	80

The results indicate the high levels of the ph (8.1 – 9.1) and fall within the permissible limits. The pH in the effluent is towards the higher value indicating the alkalinity conditions and thus will have an adverse effect on the soil permeability and soil microflora. The values of TSS and TDS are (280 – 360) and (2260 – 3480) respectively. These exceed the permissible limits and are high for the control sample as well indicating pollution of the sample. The concentration of the solids is another matter of concern and the carcinogenicity of the paint used adds to it. The values of BOD

(181 - 280) and COD (3090 – 3980) as compared to the control sample is indicating the high level of pollution in the waters discharged from the industries into the environment. The high levels of BOD are indicators of the pollution strength of the waters. They also indicate that less oxygen is available for the living organisms in the wastewaters. The high levels of COD indicate the toxicity of the effluents and the presence of large amounts of biologically resistant organic substances .

Table 4: Physico-chemical analysis of the sugar industry effluent samples

Parameters	S1	S2	S3	S4	BIS
pH	8.3	7.9	8.1	9.0	5.5-9.0
TSS	310	290	284	370	200
TDS	2560	2950	3290	3440	2100
BOD	2310	2670	2890	3200	100+
COD	9800	10200	10890	10345	250

The values of TSS are 284 – 370 and TDS also 2560 – 3440 are also very high. Total Dissolved Solids (TDS) refers to all dissolved materials present in the water. Combined sugar mill effluents generally do not have a TDS measure high enough to have an adverse environmental impact. Discharge of water with a high TDS level would have adverse impact on aquatic life, render the receiving water unfit for drinking, reduce crop yields if used for irrigation, and exacerbate corrosion in water systems and Industrial effluents generally change the natural pH level of the receiving water body to some extent. Such changes can tip the ecological balance of the aquatic system, excessive acidity particularly; can result in the release of hydrogen sulphide to the air . The BOD is 2310 - 3200 and COD is 9800 - 10890. The values of BOD and COD exceed the limit. A high COD, a measure of the inorganic and partly organic non-biodegradable content of the effluents, has effects on the receiving water body similar to that of a high BOD. Suspended solids reduce light penetration and, as a result, plant production in the receiving water body by increasing turbidity and can also clog fish gills. Benthic decomposition of components can decrease oxygen availability while anaerobic decomposition can produce hydrogen sulphide and release by-products that increase BOD. The results are in correlation with those as observed in other studies .

2. ***Quality of ground water:-*** Ground water is the most important source ofdrinking water. At present almost all depends onground water for drinking purpose. As per theresponses of the respondents presented in Table

5, it is observed that drinking water still remains uncontaminated due to haphazard discharge of industrial waste water though a very few of them expressed their concern about gradual deterioration of quality of the ground water for the same reason.

Table :-5 Distribution of the respondents according to their responses on decrease in quality of ground water.

Types of used	Types of quality	Respondents					
		LD		MD		HD	
		No	Percent	No	Percent	No	Percent
Drinking	Taste	43	86	15	30	5	10
	Color	41	82	05	10	6	12
	Odor	42	84	12	24	8	16
Cooking	Taste	48	96	12	24	4	08
	Color	43	86	16	32	3	06

Bathing	Odor	47	94	14	28	6	12
	Taste	39	78	11	22	6	12
	Color	43	86	13	26	4	08
	Odor	44	88	10	20	3	06

*LD= Low Decrease, MD= Moderate Decrease, HD= High Decrease

3. **Yield of crops:-** Due to establishment and their indiscriminate discharges crop yield was found to be decreased (Table 6) as reported by the respondent. Findings shown in Table 6 indicated that all of the respondents (100%) reported about the negative impact of unplanned discharge of industrial wastage on yield of cereal crops and fruits.

Table:-6 Distribution of the respondents according to their responses on decrease in yield of crops.

Types of Crops	Respondents					
	LD		MD		HD	
	No	Percent	No	Percent	No	Percent
Cereals	2	4	12	24	15	30
Pulses	3	6	13	26	13	26
Oil Seeds	2	4	11	22	18	36
Vegetables	3	6	10	20	18	36
Fruits	2	4	10	20	21	42

*LD= Low Decrease, MD= Moderate Decrease, HD= High Decrease

4. **Quality of food crops:-**Qualities of food crops included size and shape,taste, color, etc. that are the determiningfactors of market value. Food qualities alsoincrease the satisfactory consumption of the food items by the growers. Data presented in Table 7 reveal that a mentionable portion of the respondents indicated low change in size, shape and color, respectively of cereals. In terms of taste and odor also noticeable decrease in quality of food crops occur. Almost all of the respondents hinted same type of change in color of pulses and in terms of size and shape. Decrease in tastes was reported by all the respondents. The findings were very alarming in case of vegetables, where almost all the respondents found severe decrease in quality. Similar results were observed in case of oilseeds and fruits. Therefore, it was clear that unplanned discharges of industrial wastes degraded the quality of food crops in the study areas.

Table:-7 Distribution of the respondents according to their responses on decrease in quality of food crops.

Types of Crops	Nature of quality	Respondents					
		LD		MD		HD	
		No	Percent	No	Percent	No	Percent
Cereals	Taste	06	12	04	08	03	06
	Color	04	08	06	12	04	08
	Size & Shape	17	34	05	10	07	14
Pulses	Taste	10	20	09	18	06	12
	Color	22	44	12	24	04	08
	Size & Shape	22	44	16	32	05	10
Oil Seeds	Taste	07	14	14	28	04	08
	Color	04	08	13	26	05	10

	Size & Shape	03	06	16	32	03	06
Vegetables	Taste	02	04	03	06	10	20
	Color	03	06	02	04	09	18
	Size & Shape	04	08	02	04	08	16
Fruits	Taste	13	26	21	42	04	08
	Color	17	34	14	28	06	12
	Size & Shape	09	18	18	36	09	18

*LD= Low Decrease, MD= Moderate Decrease, HD= High Decrease

5. **Effects of industrial discharges on human, animal and aquatic lives:-** Untreated and unplanned industrial discharges deteriorate not only the quality of soil, crop and environment but also directly affect the human, animal and aquatic lives. From the data displayed in Table 8 it is observed that most of the respondents (96%) in the industrial areas faced medium to high levels of dermal diseases and about equal portion of them (86%) have been suffering from respiratory diseases. The other diseases they suffered from Diarrhoea, Dysentery, Gall Bladder Cancer, Kidney problem, Sterility and Abortion of female. In case of domestic animals, all of the respondents directed their opinions that foot & mouth disease, dermal disease occur due to these untreated wastes dumping in the areas. Similarly, all the respondents also pointed out dermal diseases, low growth, and foul odor of aquatic animals after cooking. Thus, human being, domestic animals and aquatic animals are also suffering from bad effects of industrial wastes which are dumped untreated.

Table 8:-Distribution of the respondents according to their responses on effects of industrial discharge on human, animal and aquatic animals' health.

Types of Sufferers	Types of Diseases	Respondents					
		Low		Medium		High	
		No	%	No	%	No	%
Human Beings	Dermal Disease	03	06	11	22	35	70
	Respiratory Disease	06	12	22	44	21	42
	Diarrhoea	14	28	27	54	13	26
	Dysentery	24	48	20	40	04	08
	Kidney Problem						
Domestic Animals	Foot & Mouth Disease	19	38	20	40	14	28
Aquatic Animals	Foul Odor after Cooking	17	34	14	28	23	46

Besides the above findings, during the collection of data, we directly and keenly observed the situations. Some of the respondents informed quick hasty decays of tins of their roofs. Some of them showed their discolored gold ornaments. Some

shows ashes particles on their clothes and other material which one in suitably covered.

Conclusions and Recommendations:-

From the findings and their local interpretation,it can be concluded that in the urban and semi urban areas of Rohtak, the industrialestablishments are increasing rapidly, which

produce huge amount of effluents. Their indiscriminate discharges degrade surface and ground water, soil, crop, insect pest, animal and human lives. Quality of ground water, our major source of drinking water is also deteriorated. So, it is a high time to take special attention to take remedial measures for the industrial effluents.

The existing laws should be strengthened and or applied for treating the untreated industrial effluents and improve our ecosystem in future. There are several ways to solve the environmental problem caused by industrial discharge. Some of the methods are bioremediation, biosorption, phytoremediation, application of

green chemistry and green monitoring. Many studies have been conducted on bioremediation using bacteria, fungi and yeast. Bioremediation is the use of microbial in remediating the contaminant while phytoremediation uses plant. The examples of bioremediation are land farming, composting, bioreactors, bioventing, biofilters,

bioaugmentation, biostimulation, intrinsic bioremediation, pump and treat of groundwater . Brown algae and yeast are examples of the application in biosorption. The examples for phytoremediation could be the use of plant in surface and submerged aquatic plant. Green chemistry and green monitoring are alternative option to prevent and to monitor the contamination of industrial discharge. In this era of chemicals green chemistry is really required to fight with the adverse conditions. Green chemistry is one of the possible sustainable environmental managements. Green chemistry is defined as the design of chemical products and processes that could reduce or eliminate the application and generation of hazardous substances.

There are three important areas in green chemistry:

i. Application of alternative synthetic pathways

ii. Application of alternative reaction conditions

iii. Design for safer chemicals compound that are less toxic or inherently safer with regards to accident potential.

For example, instead of using commercial-activated carbon, research based on inexpensive materials, such as chitosan, zeolites and other adsorbents, which have high adsorption capacity and economical have been conducted .We reported the adsorption of Cu2+ and Cr3+ onto pumice (Pmc) and polyacrylonitrile/Pmc composite . Similarly, we reported the adsorption of lignite to remove copper, lead and nickel from aqueous solutions at the low concentrations. The implementation of green chemistry is essential in order to promote sustainability. Now the collaboration between academia, industry and government are essential to expand and enhance the sustainability through the adoption of green chemistry .

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PREPARATION AND APPLICATIONS OF BINARY DOPANT ($ZnO+ZrO_2$) DOPED POLYANILINE

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Abstract
Preparation of polyaniline (PANI) has been carried out by chemical oxidative polymerization. Chemical doping of ($ZnO+ZrO_2$)is completed in synthesized polyaniline (conducting polymer) by making different concentration of dopant in acidic medium. The synthesized conducting polymer has various potential applications in antistatic materials and they have been incorporated into commercial displays, organic solar cells, printing electronic circuits, organic light-emitting diodes, actuators, electrochromism, supercapacitors, chemical sensors and biosensors, flexible transparent displays, electromagnetic shielding and possibly replacement for the popular transparent conductor indium tin oxide. Another use is for microwave-absorbent coatings, particularly radar-absorptive coatings on stealth aircraft. Doping of binary dopant influence the optical and structural behavior of polyaniline, and this generate the possibility of advanced conducting polymer.
Keywords*: polyaniline, chemical doping, conducting polymer.*

Introduction

An organic polymer that possesses the electrical, electronic,magnetic, and optical properties of a metal while retaining themechanical properties, processibility, etc. commonly associatedwith a conventional polymer, is termed an intrinsicallyconducting polymer (ICP) more commonly known as asynthetic metal. Its properties are intrinsic to a doped form of the polymer. This class of polymer is completelydifferent from conducting polymers which are merely aphysical mixture of a nonconductive polymer with a conductingmaterial such as a metal or carbon powder distributedthroughout the material.The conductive polymers or, more precisely, intrinsically conducting polymers (ICPs) are organic polymers that conductelectricity [1]. Such compounds may have metallic conductivity or can be semiconductors. The biggest advantage of conductive polymers is their processability, mainly by dispersion. Conductive polymers are generally not thermoplastics, *i.e.*, they are not thermoformable. But, like insulating polymers, they are organic materials. They can offer high electrical conductivity but do not show similar mechanical properties to other commercially available polymers. The electrical properties can be fine-tuned using the methods of organic synthesis [2] and by advanced dispersion techniques [3].They are organic conjugated polymers due to extended π-conjugation, and making these materials conducting towards the semi-conducting material range by reacting conjugated polymer with an oxidizing agent, reducing agent or a protonic acid. Conjugated polymers have enormous potential application in various fields such as conducting adhesives, electromagnetic shielding, chemical, biochemical and thermal sensors, OLEDs, and organic solar cells [4]-[5] etc.Alkaline earth's metal doped organic conducting polymers can explore the advanced class of conducting materials for potential applications. Different classes of organic conducting polymers are well studied which includes poly(acetylenes), poly(pyrrole), poly(thiophenes), poly(p-phenylenes sulphide) etc. [6]-[7]. Polyaniline is that conjugated polymer, which has great impression due to its good

environmental stability. M. Husain et al have reported synthesis and characterization of polyaniline prepared with the dopant mixture of (ZrO_2/PbI_2) [8], Vazid et al. have reported the metal salts doped studies on conducting polymers and spectroscopic characterization [9]-[10]. In this paper we report a synthetic pathway for the preparation of polyaniline and chemical doping of binary dopant (ZnO+ZrO_2)in the polyaniline matrix and its application. The synthesis of polyaniline has been carried out by chemical oxidative polymerization by using McDiarmid method [11].

Experimental Details

Chemicals:

Aniline (Spectrochem Pvt. Ltd. Mumbai, India, Potassium dichromate (S.D. Fine Chemicals Ltd. Bombay L.R.Grade), Hydrochloric acid (Qualigens fine chemicals Ltd. Bombay L.R. Grade), Ammonia solution in water 28% (S.D Fine Chemicals Ltd. Bombay L.R.Grade), Tetrahydrofuran (Merck India Ltd. Bombay L.R.Grade), the doping agent (ZnO+ZrO_2)(Hi Media Laboratories Pvt. Ltd.) were used for synthesis and doping in polyaniline.

Synthesis and chemical doping:

Distilled aniline is used to synthesize polyaniline by chemical oxidative polymerization in acidic medium by adopting Mc Diarmid method. Synthesized polyaniline is dried in oven and grinded to achieve polyaniline powder. Polyaniline grinded powder and (binary dopant) (ZnO+ZrO_2)with different concentration such as 1, 2, 3, 4 and 5% (w/w) have been used in 20 ml THF solution for chemical doping with magnetic stirring about 30 minutes in order to swell the doped PANI in the solvent and kept the prepared samples for 40 hours at room temperature 25°C and than further put the samples into oven at 40°C for 24 hours and then temperature raises upto 110°C to achieve moisture free doped polyaniline. The samples were doped with different concentration of dopant such as 1, 2, 3, 4 and 5% (w/w).

Results and discussion

In present research work we can synthesized (binary dopant) (ZnO+ZrO_2)doped polyaniline by using McDiarmid method. The present study was carried out under two steps:

1. Polymerization of polyaniline without doping.
2. Synthesis of doped PANI by (ZnO+ZrO_2)

The polyanilines refer to a very important class of electronic/conducting polymers. They can be considered as being derived from a polymer, the base form of which has the generalized composition and which consists of alternating reduced, and oxidized, repeat units. The terms leucoemeraldine, emeraldine, and pernigraniline refer to the different oxidation states of the polymer either in the base form, for example, emeraldine base, or in the protonated salt form, for example, emeraldine hydrochloride. Generalized composition of polyanilines indicating the reduced and oxidized repeat units, b) completely reduced polymer, c) half-oxidized polyme, d) fully oxidized polymer whole or in part to give the corresponding salts, the degree of protonation of the polymeric base depending on its oxidation state and on the pH of the aqueous acid. Complete protonation of the imine nitrogen atoms in emeraldine base by aqueous HCl, for example, results in the formation of a delocalized polysemiquinone radical cation[12, 13, 14] and is accompanied by an increase in conductivity of about 1010. The partly protonated emeraldine hydrochloride salt can be synthesized easily either by the chemical or electrochemical oxidative polymerization of aniline [15] It can be deprotonated by aqueous ammonium hydroxide to give emeraldine base powder (a semiconductor). Polyaniline attains a special position amongst conductingpolymers in that its most highly conducting doped form can bereached by

two completely different processes, protonic aciddoping and oxidative doping. Protonic acid doping ofemeraldine base units with, for example 1m aqueous HClresults in complete protonation of the imime nitrogen atomsto give the fully protonated emeraldine hydrochloridesalt. The same doped polymer can be obtained by chemicaloxidation (p-doping) of leucoemeraldine base. The linear-backbone 'polymer blacks' (polyacetylene, polypyrrole, and polyaniline) and their copolymers are the main class of conductive polymers. Poly(p-phenylene vinylene) (PPV) and its soluble derivatives have emerged as the prototypical electroluminescent semiconducting polymers. Today, poly (3-alkylthiophenes) is the archetypical materials for solar cells and transistors.The low solubility of most polymers presents challenges. Some researchers have addressed this through the formation of nanostructures and surfactant-stabilized conducting polymer dispersions in water. These include polyaniline nanofibers and PEDOT:PSS. These materials have lower molecular weights than that of some materials previously explored in the literature. However, in some cases, the molecular weight need not be high to achieve the desired properties. They have numerous applications in organic solar cells, printing electronic circuits, organic light-emitting diodes, actuators, electrochromism, supercapacitors, chemical sensors and biosensors, flexible transparent displays, electromagnetic shielding and possibly replacement for the popular transparent conductor indium tin oxide. Another use is for microwave-absorbent coatings, particularly radar-absorptive coatings on stealth aircraft. Conducting polymers are rapidly gaining attraction in new applications with increasingly processable materials with better electrical and physical properties and lower costs. The new nanostructured forms of conducting polymers particularly augment this field with their higher surface area and better dispersability. With the availability of stable and reproducible dispersions, PEDOT and polyaniline have gained some large scale applications. While PEDOT (poly(3,4-ethylenedioxythiophene)) is mainly used in antistatic applications and as a transparent conductive layer in form of PEDOT:PSS dispersions (PSS=polystyrene sulfonic acid), polyaniline is widely used for printed circuit board manufacturing – in the final finish, for protecting copper from corrosion and preventing its solderability.Electroluminescence is light emission stimulated by electrical current. In organic compounds, electroluminescence has been known since the early 1950s, when Bernanose and coworkers first produced electroluminescence in crystalline thin films of acridine orange and quinacrine. In 1960, researchers at Dow Chemical developed AC-driven electroluminescent cells using doping. In some cases, similar light emission is observed when a voltage is applied to a thin layer of a conductive organic polymer film. While electroluminescence was originally mostly of academic interest, the increased conductivity of modern conductive polymers means enough power can be put through the device at low voltages to generate practical amounts of light. This property has led to the development of flat panel displays using organic LEDs, solar panels, and optical amplifiers. So we can say that the doped conducting polymer polyaniline has been synthesized by using Mc Diarmid method and doping may affects the band gap, absorption coefficient and extinction coefficient of the polymer and convert into more conducting polymers or we can say that binary dopant doped in polymer enhance their conductivity.

Conclusions

A conducting polymer polyaniline doped with($ZnO+ZrO_2$)is prepared by chemical oxidation polymerization method.So we can say that dopant is playing a significant role

in the chemical doping in polyaniline matrix affects their structural, optical and conductivity because the electrons are responsible for absorption, in the chemical doping process ofin ($ZnO+ZrO_2$) polyaniline, which exhibits the charge transfer like absorption. It is assumed thatdoped system is behaved as charge transfer complex along with polyaniline chain which can increase the conductivity or helps to fabricate advanced conducting polymers with good conductivity.

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APPLICATION ON SURFACTANT NANO-STRUCTURE IN DRUG DELIVERY

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Abstract
Role of self assembled structures as a vehicle is significant over the years. Their applications have been found for all routes of drug delivery. These micro and nano structures are containers loaded with drugs, ideal for targeted and sustained release of the drug. Drug efficacy depends on the drug loaded into the vehicle, temperature, drug solubility, pH, release characteristics, additives and most significantly, the vehicle morphology. This in turn suggests that the same vehicle cannot be used with high efficiency for all types of drugs and locations where the drug delivery has to take place. The status of various self assembled structures and their applications in drug delivery is reviewed in this communication.
Keywords: *Drug delivery, Self assembled surfactant nano-structure.*

Introduction

There are several important packaged drugs which use micro and nano structures for packaging and as carriers for drug delivery. The reason to do so is that these drugs have specific controlled, sustained and targeted release characteristics. This is especially true in the case of poorly soluble drugs[1], which have poor bioavailability when given orally. In parenteral applications, higher concentrations can readily be achieved with the use of harsh solvents. The surface area in contact affects the performance of the drug delivered at the location. Increased surface area improves the solubility and therefore bioavailability. Nanostructures have many important applications in bioengineering[2] and in particular for healthcare technologies. This paper focuses on the numerous micro and nano structures which are formed when a surfactant is dissolved in various solvents that are already in use as drug vehicles, which could be used as future generation vehicles . We have include the various types of drugs that can be delivered using conventional vehicles as well as new ones. Liquid crystalline structures[3] as well as newer structures are also considered as potential drug delivery vehicles. Structural characteristics of drug vehicles are also discussed in general. An attempt has been mad here to explore the origin, conditions and different sources of lipids which lead to the formation of these newer nano and microstructures viz. ribbon, cochleate, high axial ratio microstructures (HARM), icosahedra, cage like, fiber, ribbon.

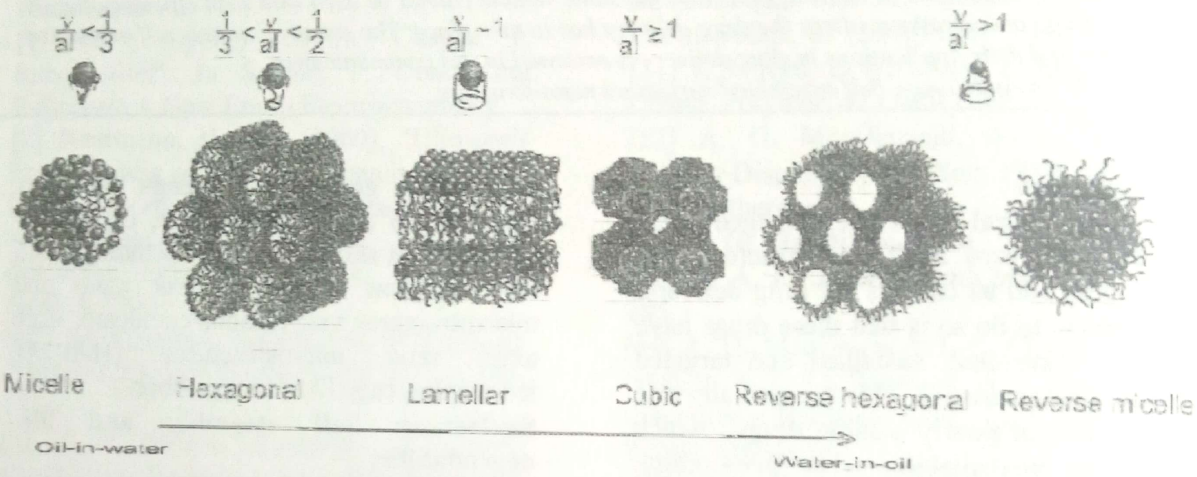
Surfactant: Self assembly and bio-degradability

Amphiphiles are anionic, cationic, zwitterionic depending on the charge accumulated by the head group. In solution, they self assemble to form a variety of structures which are of the order of nano to micro ranges. Self-assembled structures change in size and shape with concentration, *p*H, temperature and pressure. Surfactants self assemble by 'bottom up' approach into various structures governed by critical packing number. The different characterization methods used to determine the structure properties of assembled structure. Surfactants and lipids associate into a variety of structures in water and other solvents. By the strength of the interaction force between the aggregates determine the equilibrium structure in a more concentrated system. Thus the forces that hold amphiphilic molecules together in micelles and bilayers are not strong covalent or ionic

bonds but the weaker van der Waal's forces, hydrophobic(water hating) attractions, hydrogen bonding and screened electrostatic interactions. Surfactants are well known to exert a wide range of biological, pharmacological and toxicological effects on the human body[4], hence nonionic surfactants like Span, Tween series and Cremaphor and zwitterionic lipids are preferred The biodegradability of a surfactant is governed only by the molecular structure of the hydrophobic group[4]. However, the poly (glycol) hydrophilic (water loving) group that is present in ethoxylate nonionic surfactants also influences biodegradability. For a given alkyl chain length, the larger the number of glycol units, the easier the biodegradation. Surfactant vehicles must be resistant to microbial degradation and also suitable for cell growth and propagation[5].

Packing parameter

A general method to predict the type of self assembled structure that will form considers the



Packing parameter[6]of the monomer. A collection of monomers of the amphiphile arranges itself to form the most favoured structures. The packing parameter depends on the optimal area of the head group (a_0), volume of the hydrocarbon chain or chains(v), and the extended hydrocarbon chain length l_0.

$$\text{Packing number} = \frac{v}{a_0 l_0} \quad \ldots (1)$$

Packing number stresses the importance of the surfactant head group in predicting the shape and size of the aggregates, however, the surfactant tail also controls the equilibrium aggregate formation. Although the equilibrium area is directly dependent on the interaction parameter of the head group and not the tail, the tail plays a role in the formation of spherical micelles, rod like micelles and spherical bilayer vesicles. In cylindrical aggregates, the tail does not affect the equilibrium area; its influence can be seen only in sphere-to-rod transitions. A simple technique to control the packing parameter is by changing the tail length or varying the head group with the use of ions. The value of the dimensionless packing number determines whether the aggregates will form spherical micelles, non-spherical micelles, vesicles, bilayers or inverted micelles

Characterization methods

The most fundamental characterization includes structure and surface morphology comprising size, size distribution, shape and three-dimensional structure. For surfactant

structures that are small (below the resolution of an optical microscope), special techniques are needed. Furthermore, such structures are naturally labile and occur within a certain concentration regime, temperature and phase. The mode of characterization of nano and microstructures is broadly classified into direct and indirect techniques.These techniques play a key role and each of them has its constraints depending upon the type of sample and the source from which it is derived i.e. synthetic, biological or polymers.

Optical and confocal microscopy[8] are relatively free from artifacts, handling is convenient, sample preparation is easy, and are therefore preferred for biological samples. Transient structures and dynamic changes in the system can also be studied. However, these techniques are not useful for determining the size, shape and internal morphology of structures in the sub-micron range.

Temperature sensitive that cannot be studied at room temperature can be done using cryo mode by Cryo-TEM and Cryo-SEM [9] In these techniques, a sample is vitrified in the fully hydrated condition, by plunging it into liquid ethane, propane and nitrogen from a temperature-controlled environment. By Cryo -TEM, the structural characteristics of liquid and gel samples are very well evaluated. Indirect methods of characterization based on the scattering of light or X-rays are dynamic light scattering (DLS)[10] , small angle X-ray scattering (SAXS)[11] and its analogue, small angle neutron scattering (SANS), all of which reveal information like particle size distribution and polydispersity through model-dependent interpretations.

Micelles

The self association of an amphiphile occurs in a stepwise manner with one monomer added to the aggregate at a time. For long chain amphiphiles, the association is strongly cooperative and results in large aggregate micelles. Many thermodynamic transport and spectroscopic properties show a distinct change in behaviour at critical micelle concentration (CMC). Micelles have a closely spherical shape in a wide concentration range above CMC, with no marked change in shape until the surfactant solubility reached,where a liquid crystalline phase

generally separates out. The formation of rod like micelles and disk shaped micelles is promoted by increasing the surfactant concentration.

Non-polymeric micelles

Micelles are association polymers that are in dynamic equilibrium with monomers present in solution. This makes their structure tuneable with changes in the surrounding medium. The cooperative self association of an ionic amphiphile like sodium dodecyl sulphate (SDS) into micelles results in accumulation of charge on the aggregate structure. This leads to the binding of counter ions to the micelle by electrostatic attraction. Counter ion repulsion, its influence on hydration and subsequent solubilization has a marked influence on micelle size, shape and further phase transformation.

The combination of an ionic surfactant such as SDS with drugs such as diphenhydramine, tetracaine in aqueous media, has been studied extensively to investigate their sustained release characteristics[11]. A mixture of SDS and positively charged drugs forms similar phases as traditional catanionic mixtures. Drug solubility and stability were studied for camptothecin (CPT) by incorporating it in SDS and then transformed by passing it through an agarose gel preparation. The solubility of CPT in water increased when SDS was added beyond CMC, while the drug's solubility in the micelles increased due to their hydrophobic core.The effect of SDS concentration was also studied for polyquaternium- 4 (PQ-4) which is used in cosmetics and topical drug delivery applications.

Nonionic surfactants like Tween 80 (Polysorbate 80) and Cremophor-EL are used for controlled and targeted delivery . The low solubility of the drug itazigrel was addressed using Tween 80 micelles as vehicle.

Polymeric micelles

The new generation drug delivery micelle consists of biodegradable polymers prepared from diblock copolymers and tri block copolymers. Block copolymers consist of soluble and insoluble segments covalently bonded together. Diblock copolymers have two segments, one soluble and the other insoluble. Block copolymers in suitable solvents self assemble into a wide variety of structures with well -defined morphology, well-defined size, and with high stability to harsh environments. The soluble segment of the block forms the corona and the insoluble segment aggregates into a dense micellar core, as observed for most diblock copolymers. Triblock copolymers which are composed of three polymeric blocks in which one of the polymer block is soluble whereas the remaining two are insoluble or two are soluble and other is insoluble in the solvent. They exhibit a wide variety of nano-andostructures. The structures observed for tri block copolymers include onion like micelles, *p*H sensitive micelles, vesicles, and shell cross linked micelles. Polymeric micelles prepared from block or tri-block polymers mostly consist of PEO or PEG as the hydrophilic part. The other segments of the block are varied based on property like biodegradable and non toxic behaviour for drug delivery. Polyethylene glycol (PEG) and polyethylene oxide (PEO) are polymers having an identical structure except for chain length and end groups, and are the most commercially important polyether.

Polymeric micelles are based on the hydrophobic group or its derivatives with various combinations of hydrophilic groups . The one most commonly used is (PEG) with phosphatidyl ethanolamine (PE), methoxy (PEG)-b-poly (5-benzyloxy –trimethylene[17] for the delivery of anticancer drugs. The amount of protein adsorption on micelles was found to be minimal and insignificant but micelles as a delivery vehicle may be strongly influenced by protein- drug interaction. Various specific targeting ligand molecules can be attached at the surface of the lipid micelles for targeting cells. Copolymers have the ability to assemble into nanoscopic structures in an aqueous environment. This makes them potential candidates for gene transfection. Also there is no cytotoxicity and the transfection efficiency increases three fold in cells.

Copolymers form micelles spontaneously. Significantly, they increase the solubility of poorly water-soluble drugs.

The release of drugs from micelles can be achieved by using a hydrophobic agent. A sink can be developed for the drug, thereby increasing as much as ten times the total amount of drug incorporated into polymeric micelles. For a gastric acid formulation of copolymer micelles, a two fold increase in maximum concentration was achieved, which made it a good candidate for oral drug delivery . Feasibility studies were conducted with copolymers prepared from polyethylene oxide (PEO) and PPO (propylene oxide) as a vehicle: a block of PEO-b-PPO showed pseudo zero-order sustained release for percutaneous administration. A decrease in the apparent permeability and apparent release flux of the drug were observed, With poloxamer and poly (epsilon -caprolactone) vehicles for amphotericin B (AMB), a decrease in the antifungal activity of AMB was observed, but this apparent disadvantage can be simply overcome by usage of higher concentrations of drug or higher doses of formulations owing to reduced toxicity.

Liquid crystalline structures

When the volume fraction of a surfactant in a micellar solution is increased above a certain>??>?? threshold, a series of structures are commonly encountered. As the concentration increases, the number of

micellar aggregates increases. In spite of the repulsive interactions between micelle surfaces, micelles get closer.
Surfactant aggregates change their shape and size as concentration is increased, there by leading to the formation of a series of structures known as mesophases or lyotropic (solvent-induced) liquid crystals.
The main phases associated with two-component surfactant/water systems are hexagonal (normal or inverted), lamellar, several cubic phases and associated structures. The release of a drug from liquid crystalline phases is governed by factors such as drug concentration, diffusion constant, solubility of the drug, structural characteristics, porosity, stability of structure in presence of the drug, and size of the drug molecule entrapped in the structure. Initial discussions focused on the lamellar phase which is generally used for transdermal route.

Lamellar

Lamellar lyotropic liquid crystalline systems are thermodynamically stable, optically isotropic or anisotropic are formed spontaneously. They can be stored for long periods without phase separation. Depending on the concentration of the solvent (generally water or an aqueous solution) and on the polarity of the solvated mesogen, these systems can undergo various phase transitions. Lamellar structures consist of lipophilic bilayers alternately arranged with hydrophilic layers that contain interlamellar water. The formation of a lamellar liquid crystalline phase is dependent on the water content and temperature. A lamellar phase exhibits interesting solubility properties which make it a good choice as a vehicle. Lamellar phases possess one dimensional order with hydrophobic and hydrophilic layers, so it is possible to incorporate water soluble, oil soluble as well as amphiphilic drugs within the structured lamellar layers.
As lamellar liquid -crystalline systems contain a large proportion of incorporated water in the sandwich layers between hydrophilic domains, evaporation of water is less than that from traditional water -in-oil creams. Their moisture content is retained for a long time, so the transepidermal water loss is replaced by long-lasting hydration according to the needs of the skin. New possibilities development of controlled drug delivery systems are inherent in these systems because of their stability and special skin-friendly structure.Skin-compliant lyotropic liquid crystals with relatively low emulsifier concentration were
developed using nonionic surfactants for controlled drug delivery systems.
Cationic and anionic surfactants have been used for drug and gene transfer. However due to the toxicity of anionic surfactants; lower concentrations had to be used than that needed for liquid crystals. Lamellar phase has been used for gene transfer using cationic surfactant and delivery of plasmid DNA by anionic surfactant where a complex between DNA and surfactant clusters were formed which encapsulated the transfer agents within the lamellae of the aggregated multilamellar structures.

Hexagonal phase

The hexagonal phase is composed of an array of closely packed long cylindrical micelles arranged in a hexagonal pattern. The micelles may be either normal in water, (H1) i.e. with the hydrophilic head groups located on the outer surface of the cylinder; or inverted (H2) . Hexagonal and lamellar phases were observed for the system when the surfactant concentration was 50 % w/w. The release of chlorhexidine diacetate from the lamellar liquid crystalline systems was less than thrice that of the hexagonal mesophases. The chlorhexidine diacetate release from hexagonal liquid crystalline preparations was characterized by zero-order release kinetics. The results indicate that drug release kinetics is strongly dependent on the liquid crystalline structure. With an increase in surfactant concentration, a transition occurs from hexagonal to cubic phase. Besides, addition of more than 5% tri

sodium phosphate transforms the cubic phase into a reverse hexagonal phase . The diffusion of sunscreens within liquid crystals was found to be strongly dependent on the structure of the liquid crystal and physicochemical properties of the solute.

Cubic phase

The structure of the cubic phase is unique. It consists of a curved bicontinuous lipid bilayer extending in three dimensions, separating two congruent networks of water channels.The micelles are short prolate ellipsoids arranged in a body-centered, cubic, close-packed array. Denoted V_1 and V_2, they can be normal or reverse structures and are positioned between H_1 and L_{alpha} and between L_{alpha} and H_2 respectively. In addition to the L_1 region, there

are three single-phase liquid crystalline regions: the lamellar liquid crystalline phase, or L_{alpha} and the two bicontinuous cubic liquid crystalline phases: the Pn3m (diamond) and the Ia3d (gyroid).

The concept of functionalization is to control the loading and release properties of the active component by changing the properties of the cubic phase. Functionalization is achieved by incorporating amphiphilic molecules into the liquid crystal; the hydrophobic portion of the amphiphile inserts into the bilayers of the cubic phase and the hydrophilic portions extend into the water channels. As an example, a positively-charged hydrophilic portion is expected to increase the loading of a negatively-charged active.

Newer structures In this section we focus on newer types of Nano and Microstructures like icosahedra,cage-like structures, myelin tubes and High Axial Ratio Microstructures (HARM) including ribbon and cochleate structures. Some of these are already being used as vehicles. Others may play such a role in future.

Icosahedra

A mixture of anionic and cationic surfactants that are made salt free self assemble into hollow aggregates like regular icosahedra shape with pores at the vertices. When the cationic component was present in excess, nano discs were formed by rejection of excess charge towards the edges. When the anionic component was in excess, vesicles were formed at higher temperature. The icosahedral structures can be used for drug or cosmetic delivery. It may be particularly useful for permeation of creams through the skin in such applications. The nano-holes present at vertices of these icosahedra enhance the controlled release of drugs and genes.

Cage like structures

Nanocages were prepared from shell cross linked micelles comprising of various diblock copolymers. Nano cages possessing carbonyl groups on their internal surfaces and acrylic acid residues throughout their structure were prepared and functionalized. This was done either by Schiff-base chemistry i.e. covalently attaching phosphatidylethanolamine-based lipids within the nanocage; or by carbodiamide-mediated coupling, to covalently attach lipids throughout the shell . Schiff base functionalized nanostructures can enhance the *p*H response and increased uptake of hydrophobic guests.

High axial ratio microstructures (HARM)

Double chain amphiphilies self assemble intotubules, twisted ribbons, and helices, which are examples of high axial ratio microstructures (HARM). These result from intrinsic bending of rectangular bilayer lipid sheets due to chiral packing of molecules in the membrane. These HARM structures are potential drug delivery vehicles. They can play a significant role in safe targeted delivery of drugs.

HARM structures were observed in amphiphiles having different head groups like sphingolipids

and peptides, in the presence of glutamic acid dialkyl amides.The method of preparation governs the type of HARM formed, different type of HARM like ribbon, tube, cochleates were observed when NFA-

Galcer in DMF-water was prepared using pyridine evaporation method, thermal cycle and freeze-thaw cycle

Fibers

Fibers are newer generation delivery vehicles for delicate compounds such as proteins which show lower encapsulation efficiency and decreased bioactivity in conventional drug carriers. Fibers are made from complexes of cationic and anionic polyelectrolytes. A chitosan-alginate complex forms fiber like structures that can control the release rate of drugs. When entrapped in chitosan-alginate fibers, the release times of drugs have been fine-tuned. For example, for dexamethasone the release time was 2 hr with an initial burst, and for compounds like bovine serum albumin, platelet derive growth factor (PDGF-bb) and avidin, the release time span was 3 weeks without an initial burst. The release kinetics can also be controlled by using various ratios of cationic to anionic polyelectrolytes, as well as alginate/heparin ratio at constant cationic polyelectrolyte concentration.

Typical fiber fabrication involves the use of high temperature or organic solvents, rendering them unsuitable for protein encapsulation. However, polyelectrolyte complexation as mentioned above does not require harsh solvents. Furthermore, possibilities of protein encapsulation in fibers, or incorporation of growth factors into the fibrous scaffold, can help orchestrate the growth of new tissue, particularly in a spatially defined manner due to the fibrous orientation. Fibers of chitosan-poly (acrylic acid), chitosan-gellan and poly (alpha L-glutamic acid)-(poly (L-lysine) which are used in textiles[33] can also be used as drug carriers. Polyglycolic acid fiber based tubes stabilized by poly (L-lactic acid) (PLLA) and a copolymer of poly (D, L-lactic-co-glycolic acid) (PLGA) has been studied in tissue engineering which resulted in enhanced compression strength . A triblock copolymer of PLGA- PEG-PLGA has been studied for sustained release of insulin.

Concluding summary

A wide range of spontaneous, self assembling surfactant structures in the size range spanning from a few nanometers to tens of micrometers have been reported. Of these, some structures like liposomes, micelles and cubic liquid crystalline structures have conventionally been used for drug delivery. Unusual micro and nanostructures such as high axial ratio microstructures (HARM) . Their supramolecularly organized architecture imparts enhanced stability to an entrapped drug. This safeguards drug molecules from physiologically harsh conditions. Hence, HARM structures are encouraging as drug delivery vehicles, especially for vaccines. The tight packing of aggregates in HARM may prove useful for entrapment of lipophilic drugs and their constant, sustained release via dissolution and clearance. We predict that in the near future other nano-structures such as nanocages, icosahedral structures having holes at the vertices. Lamellar and hexagonal phases have also been used for drug delivery; however their potential has not been well explored. Apart from concentrated surfactant systems, dilute systems will also play a dominant role in drug delivery, such as polymeric micelles which were recently identified as candidates for delivery of anticancer drugs.

Research should focus on the fact that non equilibrium structures that undergo dynamic microstructural transformations while attaining equilibrium subsequent to dissolution from concentrated formulations may prove useful as transient vehicles for drug delivery. It is felt that non-equilibrium structures could be important delivery vehicles of the future.

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OVER VIEW OF NANOMATERIALS

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Abstact

Biological systems often feature natural, functional nanomaterials. The structure of foraminifera and viruses (capsid), the wax crystals covering a lotus or nasturtium leaf, spider and spider-mite silk,[2] the "spatulae" on the bottom of gecko feet, some butterfly wing scales, natural colloids (milk, blood), horny materials (skin, claws, beaks, feathers, horns, hair), paper, cotton, nacre, corals, and even our own bone matrix are all natural organic nanomaterials.Natural inorganic nanomaterials occur through crystal growth in the diverse chemical conditions of the earths crust. For example clays display complex nanostructures due to anisotropy of their underlying crystal structure, and volcanic activity can give rise to opals, which are an instance of a naturally occurring photonic crystals due to their nanoscale structure. Fires represent particularly complex reactions and can produce pigments, cement, fumed silica etc.

Synthetic nanomaterials

The field of nanomaterials is loosely organized, like the traditional field of chemistry, into organic (carbon-based) nanomaterials such as fullerenes, and inorganic nanomaterials based on other elements, such as silicon. See also Nanomaterials in List of nanotechnology topics

Fullerenes

The fullerenes are a class of allotropes of carbon which conceptually are graphene sheets rolled into tubes or spheres. These include the carbon nanotubes (or silicon nanotubes) which are of interest both because of their mechanical strength and also because of their electrical properties.[3] For the past decade, the chemical and physical properties of fullerenes have been a hot topic in the field of research and development, and are likely to continue to be for a long time. In April 2003, fullerenes were under study for potential medicinal use: binding specific antibiotics to the structure of resistant bacteria and even target certain types of cancer cells such as melanoma. The October 2005 issue of Chemistry and Biology contains an article describing the use of fullerenes as light-activated antimicrobial agents. In the field of nanotechnology, heat resistance and superconductivity are among the properties attracting intense research. A common method used to produce fullerenes is to send a large current between two nearby graphite electrodes in an inert atmosphere. The resulting carbonplasma arc between the electrodes cools into sooty residue from which many fullerenes can be isolated. There are many calculations that have been done using ab-initio Quantum Methods applied to fullerenes. By DFT and TDDFT methods one can obtain IR, Raman and UV spectra. Results of such calculations can be compared with experimental results.

Nanoparticles

Inorganic nanomaterials, (e.g. quantum dots, nanowires and nanorods) because of their interesting optical and electrical properties, could be used in optoelectronics.[4] Furthermore, the optical and electronic properties of nanomaterials which depend on their size and shape can be tuned via synthetic techniques. There are the possibilities to use those materials in organic material based optoelectronic devices such as Organic solar cells, OLEDs etc.

The operating principles of such devices are governed by photoinduced processes like electron transfer and energy transfer. The performance of the devices depends on the efficiency of the photoinduced process responsible for their functioning. Therefore, better understanding of those photoinduced processes in organic/inorganic nanomaterial composite systems is necessary in order to use them in organic optoelectronic devices. Nanoparticles or nanocrystals made of metals, semiconductors, or oxides are of particular interest for their mechanical, electrical, magnetic, optical, chemical and other properties. Nanoparticles have been used as quantum dots and as chemical catalysts such as nanomaterial-based catalysts. Nanoparticles are of great scientific interest as they are effectively a bridge between bulk materials and atomic or molecular structures. A bulk material should have constant physical properties regardless of its size, but at the nano-scale this is often not the case. Size-dependent properties are observed such as quantum confinement in semiconductor particles, surface plasmon resonance in some metal particles and superparamagnetism in magnetic materials. Nanoparticles exhibit a number of special properties relative to bulk material. For example, the bending of bulk copper (wire, ribbon, etc.) occurs with movement of copper atoms/clusters at about the 50 nm scale. Copper nanoparticles smaller than 50 nm are considered super hard materials that do not exhibit the same malleability and ductility as bulk copper. The change in properties is not always desirable. Ferroelectric materials smaller than 10 nm can switch their magnetisation direction using room temperature thermal energy, thus making them useless for memory storage. Suspensions of nanoparticles are possible because the interaction of the particle surface with the solvent is strong enough to overcome differences in density, which usually result in a material either sinking or floating in a liquid. Nanoparticles often have unexpected visual properties because they are small enough to confine their electrons and produce quantum effects. For example gold nanoparticles appear deep red to black in solution.

The often very high surface area to volume ratio of nanoparticles provides a tremendous driving force for diffusion, especially at elevated temperatures. Sintering is possible at lower temperatures and over shorter durations than for larger particles. This theoretically does not affect the density of the final product, though flow difficulties and the tendency of nanoparticles to agglomerate do complicate matters. The surface effects of nanoparticles also reduces the incipient melting temperature.

Synthesis

The goal of any synthetic method for nanomaterials is to yield a material that exhibits properties that are a result of their characteristic length scale being in the nanometer range (~1 – 100 nm). Accordingly, the synthetic method should exhibit control of size in this range so that one property or another can be attained. Often the methods are divided into two main types "Bottom Up" and "Top Down."

Bottom up methods

Bottom up methods involve the assembly of atoms or molecules into nanostructured arrays. In these methods the raw material sources can be in the form of gases, liquids or solids. The latter requiring some sort of disassembly prior to their incorporation onto a nanostructure. Bottom methods generally fall into two categories: chaotic and controlled.

Chaotic processes

Chaotic processes involve elevating the constituent atoms or molecules to a

chaotic state and then suddenly changing the conditions so as to make that state unstable. Through the clever manipulation of any number of parameters, products form largely as a result of the insuring kinetics. The collapse from the chaotic state can be difficult or impossible to control and so ensemble statistics often govern the resulting size distribution and average size. Accordingly, control of nanoparticle formation is controlled through manipulation of the end state of the products. Examples of Chaotic Processes are: Laser ablation, Exploding wire, Arc, Flame pyrolysis, Combustion, Precipitation synthesis techniques.

Controlled processes

Controlled Processes involve the controlled delivery of the constituent atoms or molecules to the site(s) of nanoparticle formation such that the nanoparticle can grow to a prescribed sizes in a controlled manner. Generally the state of the constituent atoms or molecules are never far from that needed for nanoparticle formation. Accordingly, nanoparticle formation is controlled through the control of the state of the reactants. Examples of Controlled Processes are, Self-limiting growth solution, Self-limiting chemical vapor precipitation and Shaped pulse femtosecond laser techniques, Molecular beam epitaxy.

Top down methods

Knowledge of processes for bottom-up assembly of structures remain in their infancy in comparison to traditional manufacturing techniques. As a result, the most mature products of nanotechnology (such as modern CPUs) rely heavily on top-down processes to define structures. The traditional example of a top-down technique for fabrication is lithography in which instruments (such as a modern stepper) are used to scale a macroscopic plan to the nanoscale.

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SIMPLE SYNTHESIS AND CHARACTERIZATION OF ZINC FERRITE NANOPARTICLES BY A THERMAL TREATMENT METHOD

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Abstract:
Crystalline, magnetic, zinc ferrite nanoparticles were synthesized from an aqueous solution containing metal nitrates and polyvinyl pyrrolidone (PVP) as a capping agent by a thermal treatment followed by calcination at temperatures 673K. The structural characteristics of the calcined samples were determined by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), and transmission electron microscopy (TEM). Magnetization measurements were obtained at room temperature by using a vibrating sample magnetometer (VSM), which showed that the calcined samples exhibited typical magnetic behaviors.

Introduction:

The spinel ferrite structure with the formula of $ZnFe_2O_4$ can be described as a cubic, closely packed arrangement of oxygen atoms, and M^{2+} and Fe^{3+} ions can occupy either tetrahedral (A) or octahedral (B) sites [1]. Spinel ferrite nanoparticles have attracted much attention because of their electronic, magnetic, and catalytic properties, all of which are different from those of their bulk counterparts. Among spinel ferrites, cobalt ferrite ($ZnFe_2O_4$) has an inverse spinel structure in which, in the ideal state, all Zn^{2+} ions are in B sites, and Fe^{3+} ions are equally distributed between A and B sites. Zinc ferrite has been widely studied due to its high electromagnetic performance, excellent chemical stability, mechanical hardness, high coercivity, and moderate saturation magnetization, which make it a good candidate for the electronic components used in computers, recording devices, and magnetic cards [2–4]. These properties are dependent on chemical composition and microstructural characteristics, which can be controlled in the fabrication and synthesis processes. In order to acquire materials with the desired physical and chemical properties, the preparation of zinc ferrite nanoparticles through different routes has become an important area of research and development. Various methods of synthesizing spinel zinc ferrite nanoparticles have been reported, such as ball milling [5], a ceramic method by firing [5], coprecipitation [5–7], reverse micelles [8], hydrothermal methods [9, 10], a polymeric precursor [11], sol-gel [12], microemulsions [13], laser ablation [14], a polyol method [15], sonochemical approaches [16], and aerosol method [17]. Various precipitation agents have been used to prepare zinc ferrite nanoparticles of a specific size and shape, for example, metal hydroxide in the co-precipitation method, surfactant and ammonia in the reverse micelles and microemulsion methods, and organic matrices in the polymeric precursor, sol-gel, and polyol methods. Most of these methods have achieved nanoparticles of the required sizes and microstructures, but they are difficult to apply on larger scales because of their expensive and complicated procedures, high reaction temperatures, long reaction times, toxic reagents and by-

products, and their potential harm to the environment.

In the present study, zinc ferrite nanoparticles were synthesized from an aqueous solution containing metal nitrates, polyvinyl pyrrolidone, and deionized water using a thermal treatment method followed by crushing and calcination. This method does not require the addition of any other chemicals to the solution, and it has the advantages of simplicity, a low cost, a lack of by-product effluents, and an environmentally friendly operation. The textural and morphological characteristics of the prepared zinc ferrite nanoparticles were studied with various techniques to verify the particle size and distribution as well as to explore other parameters of interest.

Experiment:

Metal nitrate reagents were used as precursors, poly(vinyl pyrrolidone) (PVP) was used as a capping agent to reduce the agglomeration of the particles, and deionized water was used as the solvent. Iron nitrate, $Fe(NO_3)3{\cdot}9\ H_2O$, and cobalt nitrate, $Zn(NO_3)_2{\cdot}6H_2O$, were purchased from Acros Organics with purities exceeding 99%. PVP was purchased from Sigma Aldrich and was used without further purification. An aqueous solution of PVP was prepared by dissolving 3g of polymer in 100ml of deionized water at 343K, before mixing 0.2m mol of iron nitrate and 0.1m mol of zinc nitrate into the polymer solution and constantly stirring for 2h using a magnetic stirrer until a colorless, transparent solution was obtained. The solution had a pH from 1 to 2 measured by means of a glass electrode. No precipitation of materials occurred before the heat treatment. The mixed solution was poured into a glass Petri dish and heated at 353K in an oven for 24h to evaporate the water. The resulting orange solid was crushed for 15min in a mortar to form powder. The calcinations of the powder was conducted at 673K for 3h for the decomposition of the organic compounds and the crystallization of the nanoparticles.

Characterization

The characterization of the prepared zinc ferrite nanoparticles was conducted by using various techniques to verify the particle size and distribution and to explore other parameters of interest. The structure of the ZnFe2O4 nanoparticles was characterized by the XRD technique using a Shimadzu diffractometer (model XRD 6000) using (0.154nm) radiation to generate diffraction patterns from the crystalline powder samples at ambient temperature over the range from 10° to 80°. Infrared spectra (280–4000 cm^{-1}) were recorded using an FT-IR spectrometer (Perkin Elmer model 1650), with the samples pressed onto diamond-coated CsI pellets. Both the XRD and the FT-IR results were used to establish the crystallinity of the prepared zinc ferrite powder at different calcination temperatures. The structural characteristics and particle size of the nanocrystalline powder were determined at room temperature by transmission electron micrograph (TEM) (JEOL 2010F UHR version electron microscope) operating at an accelerating voltage of 200kV. Selected areas were obtained on the TEM images to ascertain both morphology and particle size distribution at different calcination temperatures. Magnetic characterization of the zinc ferrite nanoparticles was performed by using a vibrating sample magnetometer (VSM) (Lake Shore 4700) at room temperature with a maximum magnetic field of 15kOe.

Conclusion:

We have succeeded in synthesizing spinel zinc ferrite ($ZnFe_2O_4$) nanoparticles by a thermal treatment method utilizing only zinc nitrate and iron nitrate as precursors, PVP as an agglomeration capping agent, and deionized water as a solvent. Particle sizes of 11–30nm were obtained with calcination temperatures between 673K, as confirmed by TEM and XRD analyses. The magnetic studies showed that the saturation, magnetization, and remanent magnetization of the zinc ferrite nanoparticles increased as

temperature increased while the coercivity field and remanence ratio increased, until they achieved a maximum value and then decreased. This simple, cost-effective, and environmentally friendly method that produces no by-product effluents can be used to synthesize pure crystalline spinel zinc ferrite nanoparticles. Furthermore, it can be extended to synthesizing other spinel ferrite nanoparticles of interest in nanotechnology.

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RECENT DEVELOPMENT AND APPLICATIONS OF SMART SKIN SENSORS:A REVIEW

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Abstract:

Today, industry and personal medical care both strongly demand accurate, reliable, robust, low-power, and low-cost methods to sense changes in the environment and the condition of the body. This is where the concept of smart skin comes in. Smart skins can monitor changes in environmental parameters, such as temperature, strain, and the presence of ambient gas. The sensing mechanism is based on the novel contact piezoresistive effect. Furthermore, the sensor's resolution, size and shape can be easily tailored to the applications' requirements. This versatility facilitates the use of the sensor in smart applications where tactile information is used to create system intelligence. The smart skin concept can also be extended to that of wearable electronic devices for continuous monitoring and reporting of critical biosignals. Thisarticle presents novel wireless smart skins and its applications. These skins can be applied in both industry and commercial uses.

Introduction:

Smart skin consists of an array of force sensing cells i.e. sensels that can measure the spatial distribution and magnitude of forces perpendicular to the sensing area. Tactile sensors have been the subject of extensive research for use in robotic applications. Their light weight, low cost, outstanding electrical conductivity, and ease of fictionalization targeted for a broad range of chemicals make these carbon materials ideal candidates for the development of a wide spectrum of portable and wearable sensors. These low-profile smart skin prototypes share not only all the aforementioned desired characteristics but also exhibit high levels of accuracy and reliability in a flexible and rugged design. Smart skins can monitor changes in environmental parameters, such as temperature, strain, and the presence of ambient gas, and communicate these parameters' changes wirelessly or wired, as demonstrated in Figure 1.

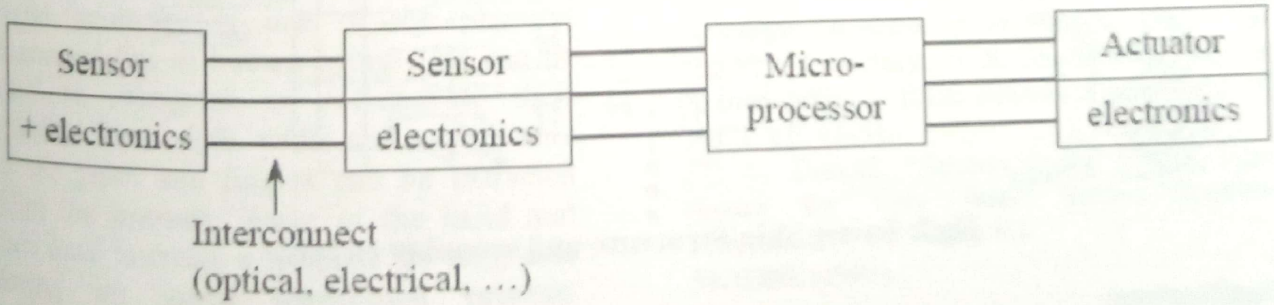

Fig 1: The Smart Skin Module

CONSTRUCTION OF THE SMART SKIN

Discussion of the smart skin can be divided into four parts; the large area substrate, the sensors which will be incorporated into the substrate, the signal processing, which will be incorporated at the sensor location, and the total skin integration.

Substrate

Carbon nanomaterials, such as single-walled carbon nanotubes (SWCNTs), multiwalled CNTs, and graphene, have been considered and investigated as candidates for the quick and precise detection of various chemicals. Because of their large surface area, carbon nanomaterials have the ability to physically and chemically absorb the chemicals on their surface; these carbon nanomaterials then alter their properties, which is the foundation for the chemical sensor applications.

Fabricating smart skin is based on a new process of depositing polycrystalline CdSe (1.75 eV), CdS (2.4 eV), PbS (0.4 eV) [13], PbSe (0.24 eV) and CuS (semiconductor/ metal) films on flexible substrates at temperatures close to room temperature (eV here are electron-volts). Large area surfaces can be covered. Also, ternary and quaternary compounds as well as heterostructures can be deposited. Transparent conductors on flexible substrates (such as CuS), materials for sensors, with possible combination with higher mobility polycrystalline materials (such as laser annealed polycrystalline silicon), amorphous (such as a-Si), polycrystalline (such as CdS or CdSe), and deep submicron crystalline silicon technology (for fast data processing). We will also need sensors with multiple sensing capabilities, learning, once again, from the design of human or animal skin The skin prepared in this work consisted of two 25pm thick.

The skin prepared in this work consisted of two 25pm thick polyester sheets, which were laminated together with adhesive in the non-sensing area (Fig. 1). These sheets carried parallel, thermoplastic, Ag-filled polymer conductive traces covered by a thermoplastic semiconductive ink of resistivity ***p.*** Screen-printing technology was used to deposit all the materials on the sheets. The two sheets were oriented together so that their traces formed a grid, with the semiconductive layers facing each other. Each cross section of the grid formed a contact piezoresistive force sensor.

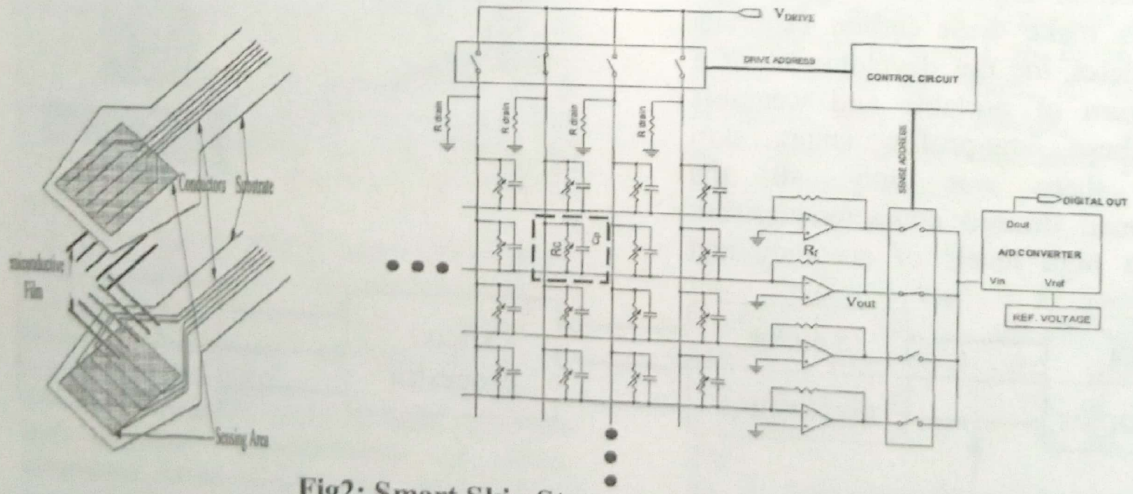

Fig2: Smart Skin Structure and scanning circuit

Applications:

The smart skin sensor system offers a unique solution to the measurement of real-time pressure profiles on flat, curved, rigid or soft surfaces and can be used to improve the quality of industrial processes as well as of commercial products. One of the most demanding applications is the measurement

of static and dynamic tire footprint pressure distribution patterns to set up the suspension of race vehicles, to design tire manufacturing and molding machines or predict roadway surface wear patterns.Also, the tactile sensor can be used ,as a diagnostic tool in the process of chemical mechanical silicon polishing to balance the forces acting on the wafer during polishing. Moreover, a smart skin can be trimmed to the size of a shoe and inserted in the sole to analyze and improve the shoe's comfort or the technical skill of an athlete, diagnose diabetic ulcers or identify potential health problems associated with the use of shoes with high heels.

Identity authentication and seal proof: smart skins of this kind have the ability to authenticate an identity, serve as certificate of authenticity (CoA) and/or proof that a bottle or
envelope is totally sealed

Metallic structural strain detection: fatigue-induced fractures and cracks are the most important problems that metallic bridges and other large structures can experience over
their lifetime and smart skins of this category are designed to accurately detect them

Chemical gas sensing: dangerous industrial-grade gases, such as ammonia and nitrogen dioxide, must be detected early enough and at very low quantities to ensure timely response
and avoid human loss

Biometrics

Hand geometry is one of the physical characteristics of human beings that can be used to recognize or authenticate their identity. The length, width and surface area of the palm and fingers can be extracted from the pressure image of the hand and then used to create a template for each user during an initial registration process. Thereafter, each time the user's hand is placed on the sensor, the above hand geometry variables are recorded and compared to the stored template for identity verification.

Smart Floors

Asmart skin embedded in the floor can be used to identify people by analyzing their footstep force profiles. Moreover, a sensor that covers the whole floor area would be able to locate and track the position of multiple users in a smart home.

Conclusions

The novel force sensing mechanism of contact piezoresistance has been used to create a versatile, flexible, smart skin. The skin construction and the basic interface electronics have been presented. It was shown that the information recorded by tactile sensors can benefit a wide range of applications in the area of medical diagnostics or industrial process control.

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A REVIEW ARTICLE ON ELECTRICAL PROPERTIES OF POLYMER COMPOSITES

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Abstract

In this article we are utilizing natural fibers as reinforcement in polymer composite for making low cost construction materials in recent years. The present paper surveys the research work published in fiber reinforced polymer composite materials with reference to electrical properties such as volume resistivity, dielectric constant, dielectric dissipation factor and dielectric loss factor. Such studies are important because fibrous reinforcements in polymer matrices lead to composite materials with good mechanical properties and electrical properties. The electrical properties such as dielectric constant, dielectric dissipation factor and dielectric loss factor were determined with respect to temperature and frequency. The studies showed that dielectric constant and dielectric dissipation decreased with frequency and increased with temperature, where as the dielectric loss factor decreased with the increase of frequency at fixed temperature and increased with temperature at lower frequencies. It is also observed that the dielectric loss factor decrease with chemical treatment.

Keywords Natural fiber composites, electrical properties.

Introduction

The interest in the natural fiber reinforced polymer composite arises rapidly due to the high performance in mechanical properties, significant processing advantages, low cost and low density. Natural fibers are renewable, cheaper, pose no health hazards and finally provide a solution to environmental pollution by finding new uses for waste materials. Furthermore, natural fiber reinforced polymer composite form a new class of materials which seem to have good potential in future as a substitute for scarce wood and wood based materials in structural applications. Many plant fibers have found applications as a resource for industrial materials. In addition to cellulose, plant fibers contain different natural substances. The most important of these is lignin. The different cells of hard plant fibers are bonded together by lignin, acting as cementing materials. The lignin content of the plant fibers influences its structure, properties and morphology. The composites mainly consist of cellulose fibrils embedded in lognin matrix. These fiber exhibits high electrical resistance. It can be expected that when these fibers are incorporated into low modulus polymer matrix, they would yield materials with better properties suitable for various applications. The properties of natural fiber composites were influenced by fiber loading, dispersion and fiber to matrix adhesion. The uses of composites as dielectric are becoming more popular, therefore the electrical properties of natural fiber reinforced polymer composites are very important. The electrical properties such as volume resistivity, dielectric strength of some natural fibers and composites have been studied. Fiber reinforced plastics materials not only act as effective insulators, but also provide mechanical support for field carrying conductors. Phenol formaldehyde resin was well known for its electrical insulator characteristics. The incorporation of fiber in polymer matrices is suitable for electrical applications. The composite materials have been used as terminals, connectors, industrials and house hold plugs, switches, printed circuit boards etc. The electrical applications of composite materials have been determined in terms

of dielectric constant, volume resistivity and loss factor. The dielectric studies of minerals filled epoxy composite indicate that the electric constant increased with addition of the filler. The study of dielectric constant and dielectric loss as a function of temperature and frequency is one of the most convenient and sensitive methods of studying polymeric structure. The electric properties of sisal fiber reinforced composite showed that the composite has electric anisotropic behaviour . The electric properties of sisal fiber reinforced low density polyethylene composite have been compared with that of carbon black and glass fiber filled low density polyethylene composite. They considered the effect of frequency, fiber content and fiber length. The dielectric constant increased steadily with increasing fiber content for all frequencies in the range of 1to 107 Hz. They also noted that dielectric constant decreased with increase of fiber length and frequency. The composite with 1 mm fibers and 30 % fiber content had the highest value of dielectric constant at all frequencies. They also noted the effect of surface treatment on the electric properties of low density polyethylene composite reinforced with short sisal fibers. It have been observed that with alkali, steric acid, peroxide, acetylation and permanganate treatment the dielectric strength of composite materials decreased due to decrease in hydrophilicity of the composite. It has been reported that sisal/ low density polyethylene composites containing 5 % carbon black can be used in antistatic applications to dissipate static charge. The relationship between water absorption and dielectric behaviour on polyester matrix composite of glass and jute fiber showed that dielectric constant of jute fiber composite is higher than that of glass fiber because of higher water uptake on jute fibers than glass fibers . The electric properties of banana fiber reinforced phenol formaldehyde composite have been studied with respect to fiber loading, fiber treatment and hybridization with glass fibers . The dielectric constant decreased with frequency and fiber loading. Treatment with silane, NaOH, latex, heat and acetylation have decreased the dielectric constant value. In hybrid composites the dielectric constant decreased with increase in glass fiber concentration. The volume resistivity of composite decreased with frequency and fiber loading. The physical structure of polymer composites in the solid or viscoelectric state is of great importance in determining the dielectric behaviour . The dielectric properties of polymer composite materials have been studied with a view to modify the properties of polymer system for practical applications. The inorganic insulators and dielectrics have been largely replaced by polymers on account of their unique ability for specific needs. Epoxides and polyesters have been used in electronics as insulators, dielectrics substrates, potting compounds, embedding materials and conformal coating . Fiber reinforced composite materials have wide range of applications in aircraft automobile, chemical, medical and electrical industries. In the electrical or electronics industry, these composite materials are used for making panel, switches, and insulators.

Electrical property determination

The capacitance, resistance, dissipation factor and dielectric loss factor have been measured directly by using LCR meter by varying frequencies at room temperature. The square samples of thickness 3mm, length 10 mm and breadth 10 mm have been used for study. The test samples were fixed between two electrodes.

The volume resistivity (ρ) :

It can be calculated from the resistance using following equation,

$$\rho = RA/t$$

where,R - resistance
A - area of cross-section of the sample
t - thickness of the sample.

The dielectric constant (ε) :

It can be calculated from the capacitance using equation

$$\varepsilon = ct/\varepsilon_0 A$$

where,ε_0 - permittivity of air (8.85 × 10–12 Fm–1)
c - capacitance with dielectric
A - area of cross-section of the sample
t - thickness of the sample.

The dielectric dissipation factor (tan δ)

It can be determined as follow

$$\tan(\delta) = \varepsilon''/\varepsilon'$$

where,ε'' - the dielectric loss.

The dielectric loss factor (ε'') :

It can be determined as follow

$$\varepsilon'' = C/C_0\omega$$

where,C_0 - capacitance without dielectric
ω - angular frequency

Conclusion

The electric properties of natural fiber reinforced composites were reviewed. The electrical properties of natural fiber reinforced polymer composites are very important. Due to their unique the inorganic insulators and dielectrics have been replaced by polymers for specific needs. Epoxides and polyesters have been used in electronics as insulators, dielectrics substrates, potting compounds, embedding materials and conformal coating. The moisture content in fibers increases conductivity of the composites. . It has been found that heat treatment increased the resistivity of the composites as heat treated fiber reinforced composites. The increase of dielectric constant with temperature is due to greater freedom of movement of dipole molecular chain at high temperature. It has been observed that dielectric dissipation factor increased with temperature and decreased with frequency. It has been further observed that dielectric loss decreased with the increase of frequency at fixed temperature. It can be concluded that with systematic and persistent research there will be good scope and better future for polymer reinforced composites for suitable electrical applications such as terminals, connectors, switches, circuit boards etc.

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ISO L.P.P AND SOLUTION OF GAME

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ABSTRACT : The two person zero-some game can also be solved by Linear programming method. However Iso L.pp preposed by us , provides a quicker and alternate solutions

INTRODUCTION : The two person zero-some game can be solved by linear programming [1] ; consider such game for two persons A and B with following pay-off matrix

Player A p1
p2
P3

	*a*1	*a*2	*a*3	*an*
	*a*11	*a*12	*a*13	*a*1*n*
	*a*21	*a*22	*a*23	*a*2*n*
Player B	*am*1	*am*2	*am*3	*amn*

The expected game to A (is *ai*1*pi* *ai*2*pi*..... *ainpi* with different strategies with probabilities p1,p2 .....pn ; *pi* 1 and B plays with different probabilities qi ; *pi* 1 where the expected gain to B (row wise)

*a*1*iqi*, *a*2*iqi*,..... *amiqi*

We write L.P.P for A as

Min $Z_{B=}$ x1+x2+x3

Where xi = pi / V , i=1,2,3 V= value of game.

S.t

$a_{11x1}+a_{12x2}+a_{13X3} <=1$

$a_{21x1}+a_{22x2}+a_{23x3} <=1$

$a_{31x1}+a_{32x2}+a_{33x3} <=1$

xi>=0 , i=1,2,3

Further some matrix element of pay-off matrix of be -ve , then we chose most negative values of its elements and add to modulus of most -ve pay-off matrix .Say -1 then

Add -1 Mod 1 + 1 = 2 value of all pay-off matrix to get revised pay-off matrix

Consider a game

		Player B		
		B1	B2	B3
Player A	A1	1	-1	-1
	A2	-1	-1	3
	A3	-1	2	-1

This gives revised pay-off matrix

		Player B		
		B1	B2	B3
Player A	A1	3	1	1
	A2	1	1	5
	A3	1	4	1

This L.P.P for B is $Z_{B\ (MIN)}$ = x1+x2+x3

S.t

3x1+x2+x3 <= 1

x1+x2+5x3<=1

x1+4x2+x3<=1

x1,x2,x3>=0

L.P.P with respect to A is , taking column element

$Z_{A(max)}$ = x1+x2+x3

S.t 3x1+x2+x3 >= 1

X1+x2+4x3>=1

X1+5x2+x3>=1 x1,x2,x3>=0

The solution of this problem is

For Z_B x1=6/25 , x2 = 4/25 , x3 = 3/25

Z_B = 13/25=1/V ; V=1/Z_B =25/13

The probability q1 = vx1 = 6/13 q2 = 4/13 q3 = 3/13
And value of original game V = 25/13 -2 = 1/13 For B
Similarly solution for A are p1 = 6/13 p2 = 3/13 p3 = 4/13
Thus A(6/13,3/13,4/13) ;
B(6/13,4/13,3/13)
And V=-1/13 For player B and V=1/13 for player A
Now we work out three Iso L.P.P Say for B
The constant equation is

3	1	1	x1	1
1	1	5	x2	1
1	4	3	x3	1

We get three ISO L.P.P as
ISO L.P.P. I : Z^B (max) = x1+x2+x3
S.t

3	1	1	x1	1
1	0	2	x2	0
2	3	0	x3	0

ISO L.P.P II : Z^B (max) = x1+x2+x3
S.t

1	0	2	x1	0
1	1	5	x2	1
0	3	4	x3	0

ISO L.P.P III : Z^B (max) = x1+x2+x3
S.t

2	3	2	x1	0
0	3	2	x2	0
1	4	3	x3	1

The solution of game for B has same value for Iso L.P.P as derived for L.P.P earlier
Player A , we have

$$Z_{A(MIN)} = x1+x2+x3$$

S.t

$$3x1+x2+x3 >=1$$
$$x1+x2+4x3>=1$$
$$x1+5x2+x3>=1$$

x1,x2,x3>=0 . We solved it by writing its dual

$$Z_{A(MAX)} = y1+y2+y3$$

S.t

$$3y1+y2+y3<=1$$
$$y1+y2+5y3<=1$$
$$y1+4y2+y3<=1$$

y1,y2,y3>+0
The solution of this is y1=6/25 , y2=4/25 , y3=3/25

$$Z_{A(MAX)} =13/25$$

Thus for player A and B , we have same answer (value of game and probabiltiy for both L.P.P and Iso L.P.P
Conclusion: We have solved two person zero-some game by proposing Iso L.P.P and answer is identical in both cases L.P.P and Iso L.PP
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A REVIEW ON GROUP THEORY

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Abstract

In mathematics, a ***group*** *is an algebraic structure consisting of a set of elements together with an operation that combines any two elements to form a third element. The operation satisfies four conditions called the group axioms, namely closure, associativity, identity and invertibility. One of the most familiar examples of a group is the set of integers together with the addition operation; the addition of any two integers forms another integer. The abstract formalization of the group axioms, detached as it is from the concrete nature of any particular group and its operation, allows entities with highly diverse mathematical origins in abstract algebra and beyond to be handled in a flexible way, while retaining their essential structural aspects. The ubiquity of groups in numerous areas within and outside mathematics makes them a central organizing principle of contemporary mathematics. Groups share a fundamental kinship with the notion of symmetry. For example, a symmetry group encodes symmetry features of a geometrical object: the group consists of the set of transformations that leave the object unchanged and the operation of combining two such transformations by performing one after the other. Groups, have various notions to break groups into smaller, better-understandable pieces, such as subgroups, quotient groups and simple groups. In addition to their abstract properties, group theorists also study the different ways in which a group can be expressed concretely (its group representations), both from a theoretical and a computational point of view.*

Definition and illustration

First example: the integers

One of the most familiar groups is the set of integers Z which consists of the numbers

..., −4, −3, −2, −1, 0, 1, 2, 3, 4, ...,

together with addition.

The following properties of integer addition serve as a model for the abstract group axioms given in the definition below.

1. For any two integers a and b, the sum $a + b$ is also an integer. Thus, adding two integers never yields some other type of number, such as a fraction. This property is known as *closure* under addition.
2. For all integers a, b and c, $(a + b) + c = a + (b + c)$. Expressed in words, adding a to b first, and then adding the result to c gives the same final result as adding a to the sum of b and c, a property known as *associativity*.
3. If a is any integer, then $0 + a = a + 0 = a$. Zero is called the *identity element* of addition because adding it to any integer returns the same integer.
4. For every integer a, there is an integer b such that $a + b = b + a = 0$. The integer b is called the *inverse element* of the integer a and is denoted $-a$..

Definition

A group is a set, G, together with an operation • (called the *group law* of G) that combines any two elements a and b to form another element, denoted $a \cdot b$ or ab. To qualify as a group, the set and operation, $(G, \cdot)$, must satisfy four requirements known as the *group axioms*:

Closure

For all a, b in G, the result of the operation, a • b, is also in G.

Associativity

For all a, b and c in G, (a • b) • c = a • (b • c).

Identity element

There exists an element e in G, such that for every element a in G, the equation e • a = a • e = a holds. Such an element is unique

Inverse element

For each a in G, there exists an element b in G such that a • b = b • a = e, where e is the identity element.

The result of an operation may depend on the order of the operands. In other words, the result of combining element a with element b need not yield the same result as combining element b with element a; the equation

$$a \cdot b = b \cdot a$$

may not always be true. This equation always holds in the group of integers under addition, because a + b = b + a for any two integers (commutativity of addition). Groups for which the commutativity equation a • b = b • a always holds are called abelian groups. The symmetry group described in the following section is an example of a group that is not abelian.

The identity element of a group G is often written as 1 or 1G, a notation inherited from the multiplicative identity. The identity element may also be written as 0, especially if the group operation is denoted by +, in which case the group is called an additive group. The identity element can also be written as id.

The set G is called the underlying set of the group (G, •). Often the group's underlying set G is used as a short name for the group (G, •). Along the same lines, shorthand expressions such as "a subset of the group G" or "an element of group G" are used when what is actually meant is "a subset of the underlying set G of the group (G, •)" or "an element of the underlying set G of the group (G, •)". Usually, it is clear from the context whether a symbol like G refers to a group or to an underlying set.

Uniqueness of identity element and inverses

Two important consequences of the group axioms are the uniqueness of the identity element and the uniqueness of inverse elements. There can be only one identity element in a group, and each element in a group has exactly one inverse element. Thus, it is customary to speak of the identity, and the inverse of an element.

To prove the uniqueness of an inverse element of a, suppose that a has two inverses, denoted b and c, in a group (G, •). Then

b = b • e	as e is the identity element
= b • (a • c)	because c is an inverse of a, so e = a • c
= (b • a) • c	by associativity, which allows to rearrange the parentheses
= e • c	since b is an inverse of a, i.e. b • a = e
= c	for e is the identity element

The two extremal terms b and c are equal, since they are connected by a chain of equalities. In other words there is only one inverse element of a. Similarly, to prove that the identity element of a group is unique, assume G is a group with two identity elements e and f. Then e = e • f = f, hence e and f are equal.

Division

In groups, it is possible to perform division: given elements a and b of the group G, there is exactly one solution x

in G to the equation x • a = b. In fact, right multiplication of the equation by a−1 gives the solution x = x • a • a−1 = b • a−1. Similarly there is exactly one solution y in G to the equation a • y = b, namely y = a−1 • b. In general, x and y need not agree.

A consequence of this is that multiplying by a group element g is a bijection. Specifically, if g is an element of the group G, there is a bijection from G to itself called left translation by g sending h ∈ G to g • h. Similarly, right translation by g is a bijection from G to itself sending h to h • g. If G is abelian, left and right translation by a group element are the same.

Group homomorphisms

A function a: G → H between two groups (G, •) and (H, ∗) is called a homomorphism if the equation

a(g • k) = a(g) ∗ a(k)

holds for all elements g, k in G. In other words, the result is the same when performing the group operation after or before applying the map a. This requirement ensures that a(1G) = 1H, and also a(g)−1 = a(g−1) for all g in G. Thus a group homomorphism respects all the structure of G provided by the group axioms.

Two groups G and H are called isomorphic if there exist group homomorphisms a: G → H and b: H → G, such that applying the two functions one after another in each of the two possible orders gives the identity functions of G and H. That is, a(b(h)) = h and b(a(g)) = g for any g in G and h in H. From an abstract point of view, isomorphic groups carry the same information. For example, proving that g • g = 1G for some element g of G is equivalent to proving that a(g) ∗ a(g) = 1H, because applying a to the first equality yields the second, and applying b to the second gives back the first.

Subgroups

given a group G under a binary operation ∗, a subset H of G is called a subgroup of G if H also forms a group under the operation ∗. More precisely, H is a subgroup of G if the restriction of ∗ to H × H is a group operation on H. This is usually denoted H ≤ G, read as "H is a subgroup of G".

A proper subgroup of a group G is a subgroup H which is a proper subset of G (i.e. H ≠ G). This is usually represented notationally by H < G, read as "H is a proper subgroup of G".

The trivial subgroup of any group is the subgroup {e} consisting of just the identity element.

If H is a subgroup of G, then G is sometimes called an overgroup of H.

Cosets

A subgroup H defines left and right cosets, which can be thought of as translations of H by arbitrary group elements g. In symbolic terms, the left and right cosets of H containing g are gH = {g • h : h ∈ H} and Hg = {h • g : h ∈ H}, respectively.

The cosets of any subgroup H form a partition of G; that is, the union of all left cosets is equal to G and two left cosets are either equal or have an emptyintersection. The first case g1H = g2H happens precisely when g1−1 • g2 ∈ H, i.e. if the two elements differ by an element of H. Similar considerations apply to the right cosets of H. The left and right cosets of H may or may not be equal. If they are, i.e. for all g in G, gH = Hg, then H is said to be a normal subgroup.

Quotient groups

Let N be a normal subgroup of a group G. We define the set G/N to be the set of all left cosets of N in G, i.e., G/N = { aN : a ∈ G }. Define an operation on G/N as follows. For each aN and bN in G/N, the product of aN and bN is (aN)(bN). This defines an operation on G/N, because we have the following equalities of subsets of G:
(aN)(bN) = a(Nb)N = a(bN)N = (ab)NN = (ab)N.
Here we have used in an important way that N is a normal subgroup. One checks that this operation on G/N is associative, has identity element N, and the inverse of an element aN of G/N is a−1N. Therefore, the set G/N together with the operation defined above forms a group; this is known as the quotient group of G by N.
Because of the normality of N, the left cosets and right cosets of N in G are equal, and so we could have instead defined G/N to be the set of right cosets of N in G.

Cyclic groups

A group G is called cyclic if there exists an element g in G such that G = ⟨g⟩ = { gn | n is an integer }. Since any group generated by an element in a group is a subgroup of that group, showing that the only subgroup of a group G that contains g is G itself suffices to show that G is cyclic.
For example, if G = { g0, g1, g2, g3, g4, g5 } is a group, then g6 = g0, and G is cyclic. In fact, G is essentially the same as (that is, isomorphic to) the set { 0, 1, 2, 3, 4, 5 } with addition modulo 6. For example, 1 + 2 ≡ 3 (mod 6) corresponds to g1 · g2 = g3, and 2 + 5 ≡ 1 (mod 6) corresponds to g2 · g5 = g7 = g1, and so on. One can use the isomorphism χ defined by χ(gi) = i.
The name "cyclic" may be misleading: it is possible to generate infinitely many elements and not form any literal cycles; that is, every gn is distinct. (It can be thought of as having one infinitely long cycle.) A group generated in this way is called an infinite cyclic group, and is isomorphic to the additive group of the integers, (Z, +).

Finite group

a finite group is a mathematical group with a finite number of elements. A group is a set of elements together with an operation which associates, to each ordered pair of elements, an element of the set. With a finite group, the set is finite.

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NANOTECHNOLOGY: FUNDAMENTALS AND APPLICATIONS IN YIELD ENHANCEMENT

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Nanotechnology is science of manipulating materials at nano-scale. Among the latest technological advancements, nanotechnology occupies a central position. It has many applications in all stages of production, processing, storing, packaging and transport of agricultural products. The reduced use of herbicides, pesticides and fertilizers with increased efficiency, controlled release and targeted delivery will lead to precision farming (Ali et.al., 2014). ETC Group (2004) presented a reported on nanotech research initiative in Thailand that aims to atomically modify the characteristics of local rice varieties. In a three-year project at Chiang Mai University Nuclear Physics Laboratory, researchers "drilled" a hole through the membrane of a rice cell in order to insert a nitrogen atom that would stimulate the rearrangement of the rice DNA to alter the colour of a local rice variety from purple to green. Patlolla et.al. (2012) reported the use of Vicia faba root-tip meristem to investigate the genotoxicity of Silver nanoparticles [AgNPs] under modified GENE-TOX test conditions. The root tip cells of V. faba were treated with four different concentrations of engineered AgNPs dispersion to study toxicological endpoints such as mitotic index (MI), chromosomal aberrations (CA) and micronucleus induction (MN). Nanomaterials especially Nanosilver [NS], are regularly being used as an antimicrobial agent in medical and environmental fields. Mahna et. al. (2013) studied the efficiency of NS in sterilizing plant seeds and fragile tissues, such as leaf and cotyledon, two important model plants, Arabidopsis and tomato, as well as potato as an important cultivated crop, were used as explants in this study. Results showed that at lower concentrations, NS could function as an antimicrobial agent with no side effect on the explants viability, and consequently, all decontaminated seeds germinated, and leaf and cotyledon explants survived.

Torney et. al. (2007) showed the use of Surface-functionalized silica nanoparticles in plants and told that's it is limited because of cell wall present in plant cells. They showed a honeycomb mesoporous silica nanoparticle (MSN) system with 3-nm pores that could transport DNA and chemicals into isolated plant cells and intact leaves. They loaded the MSN with the gene and its chemical inducer and capped the ends with gold nanoparticles to prevent the molecules from leaching out. Uncapping the gold nanoparticles released the chemicals and triggered gene expression in the plants under controlled-release conditions. Semiconducting nanoparticles have been successfully applied in live mammalian cell cultures, as alternative biological labels for multicolour imaging, by verifying known physiological processes.

Ravindran. et.al (2005) reported the application of semiconducting nanoparticles to live plant cells in culture. Utilizing this technique, they have very clearly explained and showed the position of plant pollen tube adhesion protein along with stigma/stylar cysteine-rich adhesin (SCA) region. This has potential to trace out self incompability barrier in crop plants by explaining the precise region of self incompability in a specific case. This has practically being demonstrated that nano particle perform better as compared to conventional immunolocalization methods using fluorescently labeled antibodies.

Nanotechnology, though, has positive impact on crop improvement by use of various techniques, yet some negative reports are also available. One of the examples has been reported by Tan et.al. (2009), in rice. They found toxic effect of multi-walled carbon nanotubes (MWCNTs) on plant cells and observed increased of reactive oxygen species (ROS) and decreased of cell viability, however when a primary antioxidant, ascorbic acid was added to the rice cell suspension, it showed a positive effect by decreasing reactive oxygen species (ROS) and increase cell viability.

In conclusion it can be very safely stated that the appropriate and timely use of nanotechnology has vast opportunities in the area of crop improvement, But at the same time application of nano-materials in agro-food sector has to be evaluated for public acceptance so it does not come across a scenario as faced by GMOs in past.

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STUDIES ON SEED BORNE DISEASES AND THEIR DIAGNOSTIC TECHNIQUES

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Abstract

Seed technology emerging more advances to escape seedborne pathogens, still pathogens continue to be problematic and diseases caused by these pathogens are responsible for serious losses in crop yield worldwide. The use and expectations of seed treatments are greater today due to the impact of environmental regulations that have either banned or restricted the use of older fungicides and the development of biological and chemical control agents that offer the potential to control bacteria, viruses, and fungi and provide plant protection well into the growing season. Number of common pathogens, causes these diseases including virus, fungi and bacteria. Pathogen may penetrate to seed during harvesting, threshing and processing and Infectivity or contamination of the seed may occur and carry the pathogen with the seeds by this means. Infested seeds are responsible for the re-emergence of diseases of the past, movement of pathogens across international borders, or the introduction of diseases into new areas. Considerable attention have been paid to improving the sensitivity and selectivity of seed health assays by using techniques such as bioassay and the polymerase chain reaction. This paper presents seed borne diseases, uses of seed treatment methods and application of serology and PCR for diagnostic assay.

Keywords: *Virus; bacteria; fungi; Seed; Seedborne; Disease*

Introduction

The risk of seed-borne disease infection varies widely by crop, disease, and location. Many diseases will only become a problem if grown in a region or environment conducive to the disease. Commonly diseases present on seed may be soil-borne or air-borne and the ultimate fate of the crop may be as dependent on the variety resistance and crop management practices as on the presence of seed-borne inoculums. There are additionally many microorganisms present on seeds that have no known negative effects and some feel may hold potential positive effects, although there is no current research documentation. It is still important to start with high-quality, clean seed. In some instances, the spread of specific pathogens from seed may introduce the disease to the system with devastating effects.

Disease and injuries to seeds due to viruses, bacteria, fungi and nematodes are responsible for some of the most severe crop production losses in the world today. Seed production technology has made tremendous advances in recent years but losses still occurs, particularly in developing and under-developed tropical countries. Seeds are known to be attacked by various types of fungi, many of which are plant pathogens such as *Aspergilus* spp., *Botryodiplodia theobromae*, *Cladosporium* spp., *Fusarium* spp., *Penicillium* spp. which cause vast loss in many crops (Neergaard, 1977; Richardson, 1979; Lillehoj et al., 1980; Raveesha et al, 1985; Rao et al., 1985, Kumar and Shetty, 1986).

Quantifying of plant diseases losses due to pathogens and their effect on agricultural production is of primary importance not only because of taking into consideration rational control measures, but also for the better allocation of resources. Crop loss information is also crucial, however, much attention has not been paid to collect reliable information on loses caused by crop parasites particularly in developing countries. Crop losses caused by seed-borne pathogens are even more complicated. Often there is insufficient knowledge of their biology, epidemiology, and the many factors

involved in soil pathogenesis. Potato offer one of the best examples of the yield-depressing effect of seed borne pathogens (Chiarappa and Gambogi, 1986; Wiersema, 1980 and FAO, 1982). A very brief description of pathogens can be summarised as follow:

Fungi: Fungi mostly grow as small threads and spread between plants often as small "seeds" called spores. These can blow in the wind. The diseases they cause are often dry, distinct, spots or marks on leaves, stems and fruit. Many plant disease fungi are small but sometimes can be seen by looking very carefully.

Bacteria:These are very small and are often square or round which can't be seen with naked eyes, but can be observe with powerful microscope. Mostly they cause soft squashy rots in plants or cause plants to wilt. They normally spread between plants in water or soil or in sap of plants through planting material or when plants rub together.

Viruses:These are very, very small and only observed with an electron microscope. They can only live inside plants and can't blow around in the wind or stay in the soil. Virus diseases are often spread by plants rubbing together, or through the planting material. The diseases they cause mostly look like indistinct yellow colours on leaves, or twisted leaves and other plant parts.

Among the seed-borne organisms, fungi cause maximum seed damage such as seed abortion, shrunken seeds, seed rot, sclerotisation, seed necrosis, seed discoloration and reduced germination and vigour. Many seed borne pathogens in cereale and legumes cause seed rot (Shetty, 1988). Viral interactions with plant species result 10% transmission through seeds. Rates of viral transmission through plant seeds range from <0.1 to 100%; however, transmission rates in economic crop species rarely exceeds 50%, facilitating selections of mother plants and nuclear-seed sources (crop cultivars, breeding lines, germplasm, etc.) that are free of seed-borne virus (Albrechtsen and Hampton, 1988). Information pertaining to even extensive host ranges, *in vitro* stability and gross morphology of seed borne pathogens is not necessarily adequate for an accurate identification. The economical importance of seed-borne pathogens must be hassled in the technological development of agriculture as well as in countries by using advanced technologies. Adequate information on seed-borne pathogens and seed testing methods is necessary to implement protection and control measures in order to reduce losses and to acquire self-sufficiency in food productions. It is important to know, in advance, the kinds of pathogens present in seeds (infection) or with the seeds (infestation) in order to make comments on transmission, quality of seed lot, and on the nature of seed treatment (Anselme, 1988). For example crop seed contamination with seed-borne viruses must be viewed from both direct and indirect perspectives. 1. Direct viral damage to crop plantings due to seed-borne infection. 2. Field spread of seed-borne virus by vectors, after the planting of infecting seeds. 3. Seeds lots rendered as remarkable because of the recognised disease potential from seed-borne virus.

Routine laboratory techniques are more or less limited to certain groups of fungi in detection of seed borne pathogens (Neergaard, 1965) however, specific antisera were often essential for the necessary confidence. In addition, serological or nucleic base detection offers obvious advantages, if suitably adapted for seed health testing pertaining to pathogens. Seed health testing involves detection and identification of seed-borne pathogens that cannot be achieved without a fair knowledge of seed and plant production.

Test for pathogen detection

Dry examination

A visual inspection of dry seed prior to incubation can occasionally reveal some

morphological abnormalities associated with pathogen infection "Seed borne diseases" (Baker, 1972).

Biological tests

Seeds grown for tests as such or in combination with some infectivity tests to check the seed health are most useful tools in spite of having some limitations. If suitable facilities consisting of a fair control on environmental conditions, especially light and temperature, biological tests may serve as sufficient tools for detection of some seed pathogens. In order to reveal symptomless infections and to increase the reliability of the growing-on tests, especially for quarantine work, infectivity tests are appropriate. Detached-leaf tests in germinated seeds are classical example of how mass-testing is possible under controlled conditions (Phatak, 1980).

Biochemical tests

Colorimetric, histochemical and serological tests are routinely used for pathogen detection. Undoubtedly, serological tests are the most outstanding among all tests for possible routine diagnosis of seed borne pathogens, which is highly specific and rapid. A distinct reaction with known antiserum leads to a reasonably reliable diagnosis.

Biophysical tests

Electron microscopy is the only approach that used for seed testing work by this approach. An electron microscope is, no doubt, useful in conjunction with growing-on tests for several seed-borne viruses.

Serology

Enzyme-linked immunosorbent assays are solid-phase assays in which each successive reactant is immobilized on a plastic surface and the reaction is detected by means of enzyme labelled antibodies. The principle of amplification of the reaction between viral antigens and their antibodies by utilizing an enzyme and its substrate was described by Avrameas (1969). The microplate method currently being used widely for virus detection and the term ELISA was introduced by Voller *et al.* (1976). There are many different forms of ELISA (Ball and Reeves, 1992). Three of the main types are the direct (Double antibody sandwich (DAS-ELISA) method, the indirect method and the competitive assay (Lange, 1986). The direct method is most often used in seed health assays (Lange, 1986). Serological tests for plant pathogenic bacteria have been known since 1918 (Schaad, 1979). The methods are based on the immunological principle that foreign molecules (i.e. immunizing agents or antigens) injected into the bloodstream of mammals stimulate the immune system of those mammals to produce specific antibodies which will recognise and bind to the antigens (Schaad, 1979). Immunoassays utilizing antisera produced against purified pathogens or extracts of pathogens have been effective in the detection of viruses (Torrance, 1992) but have had a more limited value for the detection of bacteria and particularly fungi. There are monoclonal antibody technique now which can be used to detect seedborne fungi of spruce seeds (Mitchell, 1988) and certain other seedborne fungi (Dewey, 1992) and bacteria (Alvarez et al., 1993) from seed. Lange (1986) examined serological and nucleic acid techniques for the detection of seedborne viruses.

Pathogen detection using probes

Nucleic acid probes have been applied widely and quickly in research programmes in plant pathology but they have not been developed yet for use in routine seed testing due to some pros and cons. The potential for the use of probes in seed testing is considerable. One of the major technological disadvnatges, i.e. the radioisotope labelling of probes (Lange, 1986; Schaad et al., 1989; Ball and Reeves, 1992) has been overcome by the introduction of non-radioactive labelling methods (Reeves, 1995). However, before probes can be applied, organisms have to be extracted from seeds, and in many cases, they have to be purified. Probes are extremely fast and accurate means ofidentification using pure colonies of pathogens but where seed extracts are probed

directly, contaminating DNA may cause problems in the accurate detection of organisms.

Pathogen detection by PCR

Molecular approaches have revolutionized the detection, identification, and quantification of phytopathogenic microbes in past decade. The polymerase chain reaction (PCR) assay allows detection of extremely small quantities (10 fg) of specific DNA in complex environments. The utility of PCR as a specific and sensitive assay for identification of plant pathogens is well-documented (Henson and French, 1993). The PCR is highly sensitive and reproducible for amplification of diagnostic molecular markers, and could be used easily for identification and detection if species-specific primers are available. Although molecular methods have been widely used for detection, identification, and phylogenetic study of the various phytopathogenic fungi, attempts to use molecular approaches for detecting seed infection have gained attention only recently (Doohan et al., 1998; Huff et al., 1994; Parry and Nicholson, 1996; Reeves, 1995). Multiplex PCR assays also have been employed for detection of a number of pathogens (Glick *et al.*, 2002; Hiroyuki and Tsuda, 2005).

Conclusion

The use of molecular diagnostics as a tool in plant disease management is to improve plant disease diagnosis. There is increasing economic and environmental pressure to reduce the use of agrochemicals to control crop diseases. Disease management systems are now being developed that aim to reduce agrochemical use by more efficient targeting of sprays, for example by optimising the timing and dose of sprays applied. For many crop diseases control measures need only be taken when disease levels exceed some economically damaging threshold. Conventionally, disease pressure in crops is estimated by assessing visual symptoms. Molecular diagnostics offer alternative, more accurate, methods for determining disease or pathogen inoculum thresholds. The nucleic acid based detection of plant pathogens has emerged as a supplement to overcome the quick detection bottlenecks. The recent advancement in the area of PCR based approaches further extended its versatility. Assays like real-time PCR, multiplex PCR, nested PCR, Bio-PCR, repetitive PCR, LAMP are among the detection options that provides rapid data analysis with specificity. Molecular diagnostics are already making a considerable impact on research in Plant Pathology. In time they will become increasingly important in the management and control of plant disease.

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EMPLOYEE ENGAGEMENTS – AN OVERVIEW

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Employee engagement is associated with many desirable outcomes, such as job satisfaction, intention to stay and job performance. Companies with a greater number of engaged employees typically have lower operating costs, higher customer satisfaction and higher profits. There is a tangible monetary benefit to companies investing time and resources in fostering higher engagement within their employees. The task of precisely defining employee engagement is still ongoing, but it is most often defined in terms of behaviours exhibited in the workplace.

Engaged employees are prepared to go the extra mile in pursuit of workplace excellence. They are ambassadors for their organisations, who will speak highly of the company and its people, even when they are not in a work setting. An engaged employee is identifiable by workplace behaviours such as losing track of time as they are so absorbed in the task at hand. This is distinct from excessive overtime in order to give the impression of "Hard work".

Both look the same, but one is productiv e for the employer- employee relationship and one is not! Academics would say that not enough is understood about what drives employee engagement as most research in the area has tended to focus on business outcomes without investigating underlying causes. As the impact of engagement on business has been positive and has been linked with higher profitability, practice has raced ahead of the underpinning research in pursuit of creating a more engaged and hence profitable workforce.

I undertook research to aid understanding of the area by investigating the relationship between employee engagement and the retention level. At the same time I looked at the interplay between individual differences and engagement levels of the organization. I hope to discover best practices of the organizations and the individual's expectations from such strategies.

Success today requires a good bit more than good attendance. Yet, multiple studies indifferent countries and across industries show that employees who are passionate about their jobs and the organizations in which they work are in the minority. Some of the Survey conducted by few organizations revealed that approximately 19% of the employees are highly engaged The Corporate Executive Board, looking at levels of engagement across 50,000 employees around the world, placed only 11 percent in what they dubbed "true believer"category. Towers Perrin's recent "Talent Report" is slightly more optimistic, finding just 17 percent of the 35,000 employees surveyed to be highly engaged. 40 to 70 percent of employees can be classified as neutral, middle of the road, or agnostic. Worse yet, an alarming 10 to 20 percent of employees are actively "disengaged"—just putting in their time or, worse yet, undermining or badmouthing their organizations and

bosses. The economic impact of low engagement can be staggering.

The global survey shows that 34 per cent of the employees in India are fully engaged and 13 per cent disengaged. As many as 29 per cent are 'almost engaged'.

What makes these numbers especially discouraging is that, supposedly, we have evolved from the dark ages of "personnel management." On one hand, for the past two decades we have been trying to realize the benefits of empowerment, teamwork, recognition, people development, performance management, and new leadership styles. Evidently, there is a big difference between putting in place initiatives that have the overall goal of increasing employee engagement and truly seeing the payoffs. And, on the other hand, one might easily attribute low engagement to persistent downsizing, which leads to an erosion of loyalty and commitment.

seeing the payoffs. And, on the other hand, one might easily attribute low engagement to persistent downsizing, which leads to an erosion of loyalty and commitment.

Executives today recognize that employee engagement is an important contributor to business performance. Beyond that, however, they often find themselves with more questions than answers: Why are some employees devoted, giving everything they have, while others are checked out, barely doing the minimum? Why do some parts of the business report high scores while others show indifference or decline from year to year? How can we move the needle in the right direction? Accenture research reveals the key drivers of engagement, and how companies can not only create it in their organizations, but more important, sustain high levels of engagement over time.

Employee engagement can be defined as an employee putting forth extra discretionary effort, as well as the likelihood of the employee being loyal and remaining with the organization over the long haul. Research shows that engaged employees: perform better, put in extra efforts to help get the job done, show a strong level of commitment to the organization, and are more motivated and optimistic about their work goals. Employers with engaged employees tend to experience low employee turnover and more impressive business outcomes.

Employee engagement is more than just the current HR 'buzzword'; it is essential. In order for organizations to meet and surpass organizational objectives, employees must be engaged. Research has proven that wholly engaged employees exhibit,

Higher self-motivation.

Confidence to express new ideas.

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has proven that wholly engaged employees exhibit,

Higher self-motivation.
Confidence to express new ideas.
Higher productivity.
Higher levels of customer approval and service quality.
Reliability.
Organizational loyalty; less employee turnover.
Lower absenteeism.

The CEO of a global bank scratched his head as he reviewed the latest employee engagement scores for the company's two largest business units. In the wealth management segment, employees had never been more engaged. In fact, 80 percent of wealth management's employees were highly engaged—the best score ever. But the story was entirely different in capital markets. Engagement scores in capital markets had plummeted—disengage-ment was rampant and several of the segment's high-potentials and senior leaders had fled to competitors.

What accounted for the difference? Why were some employees engaged, the chief executive asked himself, and others not?

Like the bank's CEO, executives today know that employee engagement can make the difference between outstanding business performance and mediocrity. Consider: Companies with engaged workforces outperform peers with low engagement by a margin of 12 percentage points in return on assets and 11 percentage points in profitability. And countless studies have shown that engaged employees are more productive, more sharply focused on customers and more likely to stay with their organization than their disengaged counterparts.

Every CEO cares deeply about these kinds of results, so it's not surprising that the practice of measuring work-force engagement levels has become widespread. But those efforts point to the bigger challenges: fostering and sustaining engagement within an organization. Solving the employee engagement puzzle isn't easy.

To get the business results described by studies on the link between engagement and organiza- tional performance, executives must deepen their understanding of what really drives engagement as well as what sustains it.

The general principles of employee engagement have been around for decades. During the past five years, though, there has been a surge in the popularity of employee engagement.

There are four primary drivers.

1. People have become the primary source of competitive advantage.

The Brookings Institute (2003) examined the primary source of market value in today's organizations and how it has changed over time. In 1982, 62 percent of an organization's market value came from tangible assets and 38 percent from intangible assets. Tangible assets include things like machinery, products, facilities, etc. Intangible assets, on the other hand, include factors such as brand, intellectual property, and, most important, the quality of the workforce. By 2002, 20years later, the source of value had almost totally flipped.

Almost 80 percent of market value today comes from the intangible with a scant

20 percent coming from tangible assets. As we all have heard before, products can easily be copied, a technological edge can prove fleeting, and more facilities can be built, but the quality of an organization's talent, its passion and commitment, is nearly impossible to replicate. Engagement is the fuel that drives the value of intangible assets.

2. Retention and the war for talent.

The landmark 1998 McKinsey study, *The War for Talent,* was among the first to talk about the potential for workforce shortages due to the aging population. The study's authors called upon organizations to take more seriously their efforts to attract and retain talent, to assure that they would be able to survive and thrive in the future.

In the late 1990s and early 2000s, the slump in the global economy quickly took the spotlight off of the anticipated talent shortage. And some predict that a portion of today's aging workers will delay their retirements out of necessity, attenuating the expected talent shortage. Since 2003 the picture is once again changing, albeit not as quickly as expected.

For example, the Society for Human Resources Management reported that 48 percent of the employees it polled are actively seeking new jobs. Additionally, the workforce is getting older, with many of the baby boomers hitting 60 in 2006 and ready to retire. Over and above the workforce cost of increased retirements, companies are beginning to take heed of the enormous financial costs of turnover and increasingly viewing employee engagement as an imperative for keeping their key employees— and attracting new ones—as the war for talent heats up once again.

3. Popular appeal.

Remember the reengineering wave? Even those who used it as more than just a guise for massive layoffs found it painful. Six Sigma implementations are invaluable to business performance, but most companies are finding them too complex to implement well. Engagement is a different matter altogether. While it still takes patience to implement, engagement gets to the "hard stuff" by focusing on the "softer stuff". As one manager said: "It's about appealing to the head and the heart."

Engagement is about creating passion, it's about focusing on what people do well, and it's about development and recognition. Some have called employee engagement a form of positive psychology which, on the whole, is an easy pill for organizations and their employees to swallow.

4. Overwhelming impact.

The human resources function has been under pressure for decades to prove that it makes a difference. While CEOs may espouse the importance of their workforces in their annual reports, when times get tough, HR is among the first to get the budget axe. Why? A lack of convincing evidence on the value of HR initiatives.

HR professionals are scrambling, according to a recent Conference Board

report, to prove that their activities and investments are both efficient and positively influential to business strategy. The positive relationship between engagement and performance (documented in hundreds of studies, with the evidence mounting everyday) provides a way for HR to prove its contribution. It's a fact: The higher the level of engagement, the higher the performance of the business. The research is not inconclusive, not limited to one country or industry, and not contained to a few hundred people—it's overwhelming.

How to Make Employees Engage

Growth and development - An exciting position, with plenty of opportunity for growth, learning and advancement for employees is always helpful in retaining employees.

Support and recognition - Giving those rewards and recognition.

In many instances, employee retention starts just as soon as an employee is hired. If a company sees an unusual amount of potential in a new hire, management could make them feel appreciated right off the bat. In a way, this practice can be considered a combination of recruitment and retention tools.

Employee Participation in decision making is also a very effective engagement activity in the organization.

Aligning effort with strategy —Engagement begins with employee's clear understanding of what they should be doing on the job. Each employee needs a solid job description and a clear set of performance expectations.

Empowerment — Empowerment is a feeling of job ownership and commitment brought about through the ability to make decisions, be responsible, be measured by results; and be recognized as a thoughtful, contributing human being rather than a pair of hands doing what others say.

Teamwork and Collaboration – In the context of engagement, teamwork and collaboration requires a good relationship both within the work group and across work groups. Many organizations have strong teams with members who work well with each other.

The power of employee engagement is that it is closely connected to business results. When employees work in an environment in which they can focus their attention on their work and have a drive to do their best, organizations experience higher levels of productivity and profitability. Engaged employees look for better ways to do their work, spend less time on wasted activities, and make effective use of resources. In the end, companies deliver better products or services and have more resources left to invest in further improvements. Although it is an important consideration, high financial compensation is not the only driver of increased employee retention.

As addressed previously, employees decide to stay

withorganizations for other reasons, such as growth and development opportunities, strongleadership, and meaningful work. Turnover costs organizations millions of dollars each year, and engagement has a proven relationship to employee retention. No one likes going into a store where the sales clerks are sullen, absent, or uncooperative. It's easy to see why customers notice engaged employees and are more satisfied and willing to purchase again.

For example, Tom Labadie, director of training and development at Comp USA states,"Whenyou walk into a store with high engagement scores, you can sense the positive tone.Employees whistle and smile, they approach customers, and the store gives off that elusive approachable feeling that customers appreciate."

Organizations with engaged employees have more satisfied customers, but it's not just because employees have better interactions with customers.

Engaged employees are more likely to improve other critical factors affectingcustomer satisfaction, such as responsiveness, product quality, thought leadership, innovation, etc. Finally, higher engagement translates into higher and faster revenue growth.

Engaged employees are more innovative and place more emphasis on meeting customer needs. The "what can I do better or differently" attitude of engaged employees versus the "it's not in my job description" attitude of the unengaged simply leads to better financial performance.

PHARMACEUTICAL CHEMISTRY PRACTICAL: ESSENTIAL OR WASTAGE OF CHEMICALS, TIME, ENERGY AND OTHER RESOURCES?

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Abstract: *Pharmaceutical Chemistry Practical is full of life. It is comprised of bright colors, pleasant fragrances, hot or cold chemical reactions with full of energy (exothermic/endothermic). The chemicals used in Pharmaceutical Chemistry Practical are also full of taste – sweet, sour, bitter or sometimes tasteless. Tons and tons of chemicals are already consumed in Pharmaceutical Chemistry Practical in undergraduate courses. Our earth is having limited resources; same applies for pharmaceutical chemicals too. Time has now arrived, when we should start thinking in terms of saving the wastage of all resources including various Laboratory grade and Analytical grade pharmaceutical chemicals. For demonstration of Pharmaceutical Chemistry Practical, we can use simulation techniques like computer aided software, CDs, clips, films etc.*

Introduction: Pharmaceutical Chemistry Practical is full of life. It plays a vital role in our day to day life. It covers things or events, surrounding us and inside our body. We cannot imagine our life without Pharmaceutical Chemistry Practical. Just take any of our body part or anything surrounding us, Pharmaceutical Chemistry Practical helps in understanding the chemical composition of this part or thing. This chemical understanding helps in explaining various functions or role that part or thing is playing or can perform.

Positive side of Pharmaceutical Chemistry Practical:

Pharmaceutical Chemistry Practical utilizes various chemicals. These chemicals are of different colors, like 'VIBGYOR'- Violet, Indigo, Blue, Green, Yellow, Orange and Red. Mostly these chemicals also have different odor – pleasant fragrances or bad smell. Sometimes they may be odourless. Many times these chemicals have certain taste like – sweet, sour, bitter or somet6imes they may be tasteless. These chemicals, when react with each other, may release some energy or absorb some energy. When heat energy is produced, the chemical reaction is termed as exothermic. Here the temperature is increased. In case of endothermic reaction, temperature is lowered.

So, Pharmaceutical Chemistry Practicals are full of life, energy, vibrant colors, sweet fragrances and helps in understanding various life processes and other events occurring in our surrounding environment.

This is one side of a coin. Let us see the other side of coin.

Negative side of Pharmaceutical Chemistry Practical:

The other side of Pharmaceutical Chemistry Practical is similar to a horror story and depicts a shabby, horrible, filthy, stingy picture. This is not so encouraging side of picture of Pharmaceutical Chemistry Practical.

As life is made up of joys and sorrows, flowers and thorns, similarly Pharmaceutical Chemistry Practical also has strong acids and bases, which are corrosive and can burn and harm our body. The chemicals of Pharmaceutical Chemistry Practical has many times strong, pungent odour and can cause nausea and vomiting. Many chemicals are

very bitter or may be tasteless. During chemical reactions, various harmful gases may be formed. These gases cause burning sensation to eyes/ skin or cause coughing. Sometimes the temperature of the reaction goes up so high that fire may broke out. Some chemicals are light sensitive, so extra care is to be taken that they should be stored in amber colored glass containers. Some chemicals stain the clothes, skin. These stains are permanent and are hard to remove.

To avoid all these mishappenings, we have to be extra careful and follow following precautions while doing various Pharmaceutical Chemistry Practicals.

Precautions to be observed while doing Pharmaceutical Chemistry Practicals:

1. Always wear proper size; full length laboratory coat. This coat will prevent any damage to skin, clothes from acids, bases, stains etc.
2. Always cover hands with gloves while dealing with acids or bases.
3. Do not keep any book, item/ bag on slab. Some chemicals may be spilled over lab slab, which may harm the book or any other item / bag placed on slab.
4. Always wear glasses to protect the eyes.
5. Always wear shoes/rubber sleepers to prevent any damage to feet due to broken glass pieces/ spilled chemical spread on the floor.
6. Always use duster/ clothes to lift hot objects.
7. Plenty of water should be available in the lab.
8. Proper exhaust fans should be functional.
9. In case of gases produced in any reaction that should be performed in the gas fume hood area, which should be properly covered and ventilated.
10. Do not clean the sink with naked hands as there may be glass pieces in the sink, which may harm/cut the hands.
11. The lab should be neat and clean.
12. The fire extinguishers should be functional.
13. In case of injury, wash the affected part with simple water and take the person for necessary medical attention/care.
14. Proper Standard Operating Procedures should be placed near the various instruments in the lab and they should be strictly followed.

Wastage of chemicals in Pharmaceutical Chemistry Practicals:

Tons and tons of chemicals are already consumed in Pharmaceutical Chemistry Practical in undergraduate courses. These practicals are done to strengthen or prove the theoretical knowledge of students. They are not doing any research work. They are doing practicals involving simple chemical reactions, volumetric titrations and synthesis of simple compounds. There may be limit tests and assays of chemicals. Sometimes they do the quantitative analysis of various chemicals which involve modern instruments like UV, NMR, Mass Spectroscopy, HPLC etc. They are simply practicing. Most of these students never required this chemical testing experience as not all of them will join Quality Control/Analysis department of a Pharmaceutical company. Not many of them will do further research in Pharmaceutical Chemistry for development of a new molecule.

Very few students genuinely require this Pharmaceutical Chemistry Practical. These very few students are those, who will continue their higher studies in Pharmaceutical Chemistry or will join Quality Control/Analysis department of a Pharmaceutical company. For rest of

students, it is shear wastage of chemicals, time, energy and resources.

Moreover, our earth has limited natural resources like sunlight, drinking water, plants, animals, minerals, gases etc. Utmost care should be taken to ensure proper usage of these limited natural resources. Tons and tons of chemicals are already consumed or we can say wasted in performing Pharmaceutical Chemistry Practical in undergraduate courses. Now the time has come when we should ponder on this issue of wastage and take some stringent measures to stop this wastage of chemicals in Pharmaceutical Chemistry labs.

Measures to prevent Wastage of chemicals in Pharmaceutical Chemistry Practicals:

1. These practicals should be optional. Those students who are interested in higher studies/ research in Pharmaceutical Chemistry or willing to join Quality Control/Analysis department of a Pharmaceutical company should opt for these practicals.
2. Various simulation techniques can be incorporated in Pharmaceutical Chemistry Practical. Computer software can be developed. CDs, films, power point presentations can be made. These inputs can be made available to each and every college, where Pharmaceutical Chemistry Practicals are performed.
3. For research purpose also, the help of CADD (Computer Aided Drug Designing) can be taken. In research work, the very first step is mostly development of new derivatives from existing drug molecule. The formation or development of these derivatives consumed lot of time. Then biological activity is performed on animals. This again consume more time. Here comes the helping hand of Computer Aided Drug Designing (CADD). The CADD has helped in reducing or cutting short the time needed in this step. The CADD helps in shortlisting the promising derivatives. For example, instead of 100 derivatives, CADD will shortlist only 10 most promising derivatives. Many of these may have biological activity also. Previously, many times it happens that not a single derivative comes out with any biological activity.

Advantages of stopping the wastage of chemicals in Pharmaceutical Chemistry Practicals:

1. This digitalization of the Pharmaceutical Chemistry Practical will reduce the amount of chemicals required/used for performing same experiments, repeatedly.
2. Lot of precious time of students and teachers will be saved.
3. Lot of injuries/ accidents commonly occurring in Pharmaceutical Chemistry Practical Lab will be avoided.
4. Those interested in doing these Pharmaceutical Chemistry Practical will be get ample opportunities of performing the Pharmaceutical Chemistry Practicals.
5. More job opportunities will be there for the interested candidates as not all the students will qualify and entitled for the jobs.

Conclusion: Now the time has come when we should come forward to take some really strong steps to stop this wastage of chemicals in Pharmaceutical Chemistry Practical. This will definitely improve the grim situation of short supply of quality, purified, high grade chemicals. As it is rightly said that 'Money saved is Money earned', similarly 'Chemicals saved ensures better availability of chemicals by wise usage of chemicals at right place and right time'.

PROFIT ANALYSIS OF A TWO-UNIT CENTRIFUGE SYSTEM CONSIDERING FAULTS OCCURS DUE TO DELAY

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ABSTRACT

The present paper deals with a two unit centrifuge system with major and minor faults. It is assumed that system leads to partial failure state on occurrence of a minor fault whereas on occurrence of a major fault it leads to complete failure. On occurrence of a failure in the system, either the repairman carry out the repair of the components involved or the unit wait for repair if the repairman is busy. While sometimes a fault may also occur during the repair. Various measures of system effectiveness are obtained by using Markov processes and regenerative point technique. The analysis of the system is carried out on the basis of the graphical studies.

Keywords: Centrifuge System, MTSF, Expected Uptime, Markov Process, Regenerative Point Technique, Profit.

INTRODUCTION

Many researchers in the field of reliability modeling including Gupta and Kumar (1983), Gopalan and Murlidhar (1991), Tuteja et al (2001), Taneja et al (2004), Taneja and Parashar (2007), Gupta et al (2008), Kumar et al (2010), etc. analyzed a large number of one unit/ two unit systems. Kumar and Bhatia (2011, 2012, 2013) discussed the behaviour of the single unit centrifuge system considering the concepts of inspections, degradation, minor/major faults, neglected faults, online/offline maintenances, repairs of the faults etc.

In reliability modeling, none of the researchers have analyzed such a centrifuge system considering various faults. To fill up this gap, the present paper analyses a two unit centrifuge system considering minor and major faults. Whereas faults such as leakage of seal, motor overheating, alignment etc. are considered as minor faults and faults such as motor burnt, gear damage, bearing fault etc. are considered as major faults. It is assumed that minor fault leads to down state while major fault leads to complete failure of the system. On a failure of the system, the single repairman reaches to the system in negligible time and carries out the repair of the components involved. Various measures of system effectiveness such as mean sojourn time, MTSF, expected up time, expected down time of the system and busy period of the repairman are obtained using Markov processes and regenerative point technique. The conclusions regarding reliability of the system are given on the basis of graphical studies.

SYSTEM DESCRIPTION AND OTHER ASSUMPTIONS OF THE MODEL

1. The system consist two identical units.
2. There are three modes for each unit of the system i.e. Operative, Partially failed and Failed.
3. Operation to the system starts initially from zero (0^{th}) state

where both the units are in the operative mode.

4. Faults are self- announcing on occurring in the system.
5. Single repairman facility is available to repair of the fault of the system.
6. The system behaves like a new system after completion of each repair.
7. During online repair/waiting for repair there may be occurrence of major fault.
8. All the time distributions are in general while failure time distributions are in exponential.
9. The variables which occur randomly are mutually independent.

To find out the measures of system effectiveness for the system, the models are analysed with the help of application of Markov Processes and regenerative point technique. Which are as follows:

At each transition of the state of the system define state transition probabilities.

Evaluate Mean Sojourn times for each different state.

The system Performance (Reliability) and Means times for failure to the system (MTSF).

During (0, t), calculate point wise Availability for the system and also for steady state.

During (0, t), calculate Estimated work-time for the system with full capacity and also for steady state.

During (0, t), calculate Estimated work-time for the system with reduced capacity and also for steady state.

During (0, t), calculate the Repairman's Busy Period (Inspection Time only) and also for steady state.

During (0, t), calculate the Repairman's Busy Period (Repair Time only) and also for steady state.

TRANSITION PROBABILITIES AND MEAN SOJOURN TIMES

A state-transition diagram in fig. 1 shows various states of transition of the system. The epochs of entry into states 0, 1, 2 and 3 are regeneration points and thus these are regenerative states. The state 4 is failed state.

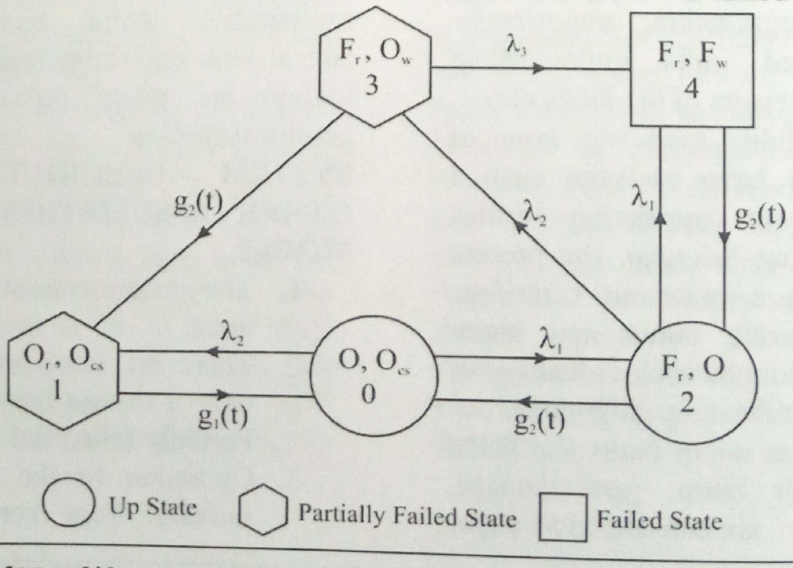


Fig.-1 State Transition Diagram

The transition probabilities are given by

$$dQ_{01}(t) = {}_2e^{-(\lambda_1+\lambda_2)t}dt$$

$$dQ_{02}(t) = {}_1e^{-(\lambda_1+\lambda_2)t}dt$$

$$dQ_{10}(t) = g_1(t)\,dt$$

$$dQ_{20}(t) = e^{-(\lambda_1+\lambda_2)t}g_2(t)\,dt$$

$$dQ_{23}(t) = {}_2e^{-(\lambda_1+\lambda_2)t}\overline{G_2}(t)\,dt$$

$$dQ_{24}(t) = {}_1e^{-(\lambda_1+\lambda_2)t}\overline{G_2}(t)\,dt$$

$$dQ^{4}_{22}(t) = {}_1e^{-(\lambda_1+\lambda_2)t}(1*g_2)(t)\,dt$$

$$dQ_{31}(t) = g_2(t)\,e^{-\lambda_3 t}dt$$

$$dQ_{34}(t) = {}_3e^{-\lambda_3 t}\overline{G_2}(t)\,dt$$

Taking L.S.T $Q_{ij}(s)$ and $p_{ij} = \lim_{s\to 0} Q_{ij}(s)$, the non-zero elements p_{ij}, are obtained as under:

$$p_{01} = \frac{\lambda_2}{\lambda_1+\lambda_2}$$

$$p_{02} = \frac{\lambda_1}{\lambda_1+\lambda_2}$$

$$p_{10} = g_1^*(0)$$

$$p_{20} = g_2^*(\lambda_1+\lambda_2)$$

$$p_{23} = \frac{\lambda_2[1-g_2^*(\lambda_1+\lambda_2)]}{\lambda_1+\lambda_2}$$

$$p_{31} = g_2^*(\lambda_3)$$

$$p_{24} = \frac{\lambda_1[1-g_2^*(\lambda_1+\lambda_2)]}{\lambda_1+\lambda_2}$$

$$p^{4}_{22} = \frac{\lambda_1[1-g_2^*(\lambda_1+\lambda_2)]}{\lambda_1+\lambda_2}$$

$$p_{34} = 1-g_2^*(\lambda_3)$$

By these transition probabilities, it can be verified that

$$p_{01}+p_{02}=1,$$

$$p_{20}+p_{23}+p_{24}=1,$$

$$p_{20}+p_{23}+p^{4}_{22}=1,$$

$$p_{31}+p_{34}=1,$$

$$p_{10}=p_{42}=1$$

The unconditional mean time taken by the system to transit for any regenerative state j, when it is counted from epoch of entrance into that state i, is mathematically stated as-

$$m_{ij} = \int_0 t\,dQ_{ij}(t) = -q_{ij}^*(0),$$

Thus-

$$m_{01}+m_{02}=\mu_0$$

$$m_{10}=\mu_1$$

$$m_{20}+m_{23}+m_{24}=\mu_2$$

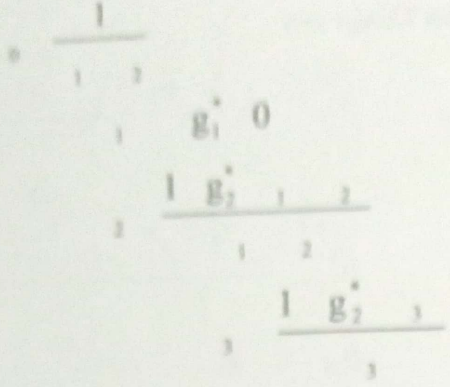
$$m_{20}+m_{23}+m^{4}_{22}=k_1$$

$$m_{31}+m_{34}=\mu_3$$

Where

$$k_1 = -g_2^*(0)$$

The mean sojourn time in the regenerative state i(μ_i) is defined as the time of stay in that state before transition to any other state then we have



MEASURES OF THE SYSTEM EFFECTIVENESS

Various measures of the system effectiveness obtained in steady state using the arguments of the theory of regenerative process are as under:

The Mean Time to System Failure (MTSF) = N/D

Expected Up-Time of the System with Full Capacity (AF_0) = N_1/D_1

Expected Up-Time of the System with Reduced Capacity (AR_0) = N_2/D_1

Busy Period of Repair Man (Repair Time Only) = N_3/D_1

where

N $_0$ + $_1$ P_{01} $P_{02}P_{23}P_{31}$ +P_{02} $_2$ $P_{20}P_{23}$ $_3$

D 1 P_{01} P_{02} P_{20} $P_{23}P_{31}$

$N_1=\mu_0$ $1-p_{22}^4$ $+p_{02}\mu_2$

$D_1=\mu_0+p_{01}\mu_1+p_{02}k_1+p_{02}p_{23}$ $\mu_1+\mu_3$ $-p_{22}^4$ $1+p_{01}\mu_1$

$N_2=p_{01}$ $1-p_{22}^4$ $\mu_1+p_{02}p_{23}p_{31}\mu_1+p_{02}p_{23}\mu_3$

$N_3=p_{02}\mu_2$

PROFIT ANALYSIS

The expected profit incurred of the system is-

$$P = C_0AF_0 + C_1AR_0 \quad C_2B_7 \quad C_3$$

where

C_0 = Revenue per unit uptime of the system with full capacity.

C_1 = Revenue per unit uptime of the system with reduced capacity.

C_2 = Cost per unit repair of the failed unit

C_3 = Cost of installation

GRAPHICAL INTERPRETATION AND CONCLUSION

For graphical analysis following particular cases are considered-

$g_1(t)$ $_1e$ ^{1t}

$g_2(t)$ $_2e$ ^{2t}

Therefore, we have

p_{01} $\frac{2}{1\quad 2}$

p_{02} $\frac{1}{1\quad 2}$

p_{10} 1

p_{20} $\frac{2}{1\quad 2\quad 2}$

p_{23} $\frac{2}{1\quad 2\quad 2}$

p_{22}^4 $\frac{1}{1\quad 2\quad 2}$ p_{24}

$$p_{31} \quad \frac{\beta_2}{\beta_2+\lambda_3}$$

$$p_{34} \quad \frac{\lambda_3}{\beta_2+\lambda_3}$$

$$\frac{1}{1 \quad 2}$$

$$\mu_1 = \frac{1}{\beta_1}$$

$$\frac{1}{1 \quad 2 \quad 2}$$

$$\mu_3 = \frac{1}{\beta_2+\lambda_3}$$

Various graphs are plotted for MTSF, Expected up time and Expected down time and Profit of the system by taking different values of failure rates (λ_1 & λ_2), and repair rates (β_1 & β_2).

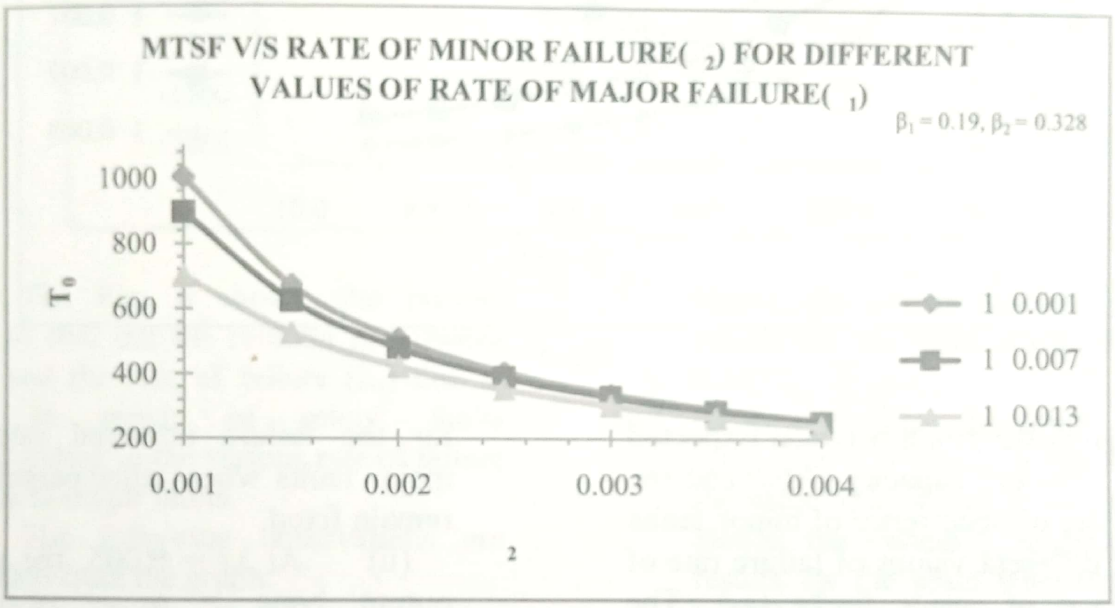


Fig.2

Fig.2 gives the graph between MTSF (T_0) and the failure rate (λ_2) due to minor faults for different values of failure rate (λ_1) due to major faults. The graph reveals that the MTSF decreases with increase in the values of the failure rates.

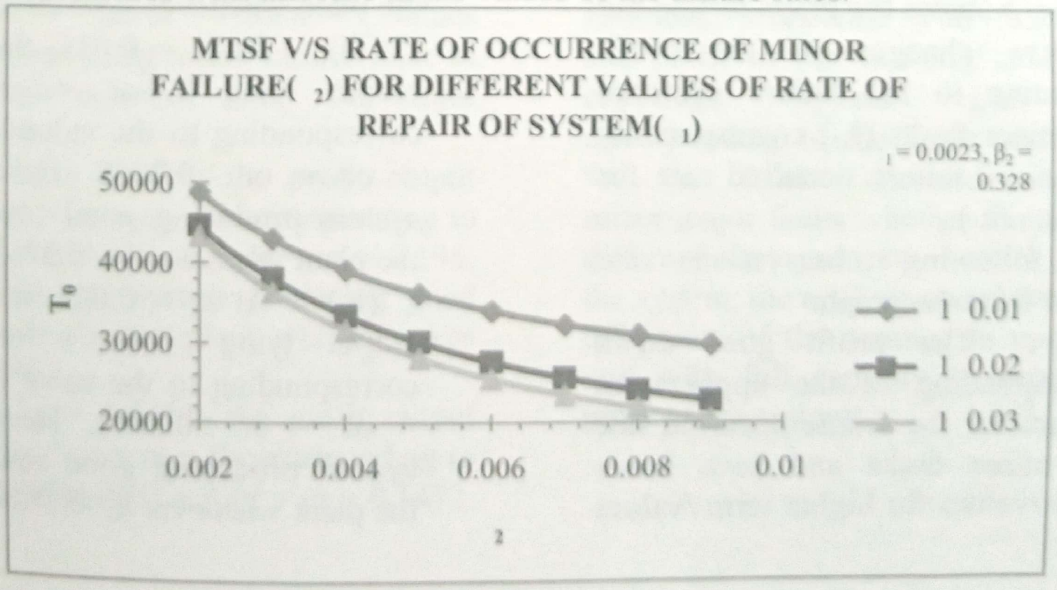


Fig.3

Fig.3 gives the graph between MTSF (T_0) and rate of occurrence of minor failure ($_2$) for different values of rate of repair of the system ($_1$). The graph reveals that the MTSF decreases with increase in the values of the failure rate as well as repair rate.

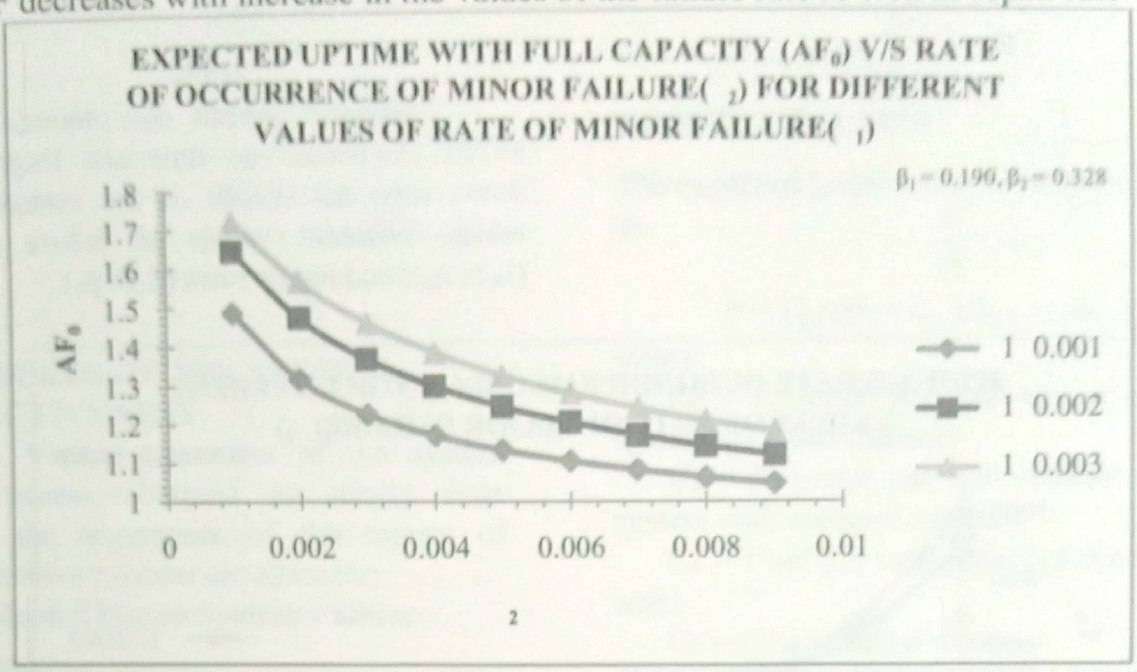


Fig.4

Fig. 4 gives the graph between Expected uptime with full capacity (AF_0) and the failure rate of occurrence of minor faults (λ_2) for different values of failure rate of occurrence of major faults (λ_1). The graph reveals that the Expected uptime with full capacity decreases with increase in the values of the failure rates.

Fig. 5 shows the graph to find out the relative changes of the profit corresponding to the failure occurred rate for minor faults (λ_2) corresponding to the various failure occurred rate for major faults (λ_1).

The following observations are concluded from the graph:

(i) The profit goes down corresponding to the upper term /values for the failure occurred rate for minor faults and have lower term /values for higher term /values for the failure occurred rate for major faults when other parameters remain fixed.

(ii) At $\lambda_1 = 0.005$, the profit output lying > or = or < 0 corresponding to the value of λ_2 is < or = or >0.2913. Hence, the system producing good results for the plant whenever λ_2<0.2913.

(iii) At $\lambda_1 = 0.015$, the profit output lying > or = or < 0 corresponding to the value of λ_2 is < or = or >0.2765. Hence, the system producing good results for the plant whenever λ_2<0.2765.

(iv) At $\lambda_1 = 0.025$, the profit output lying > or = or < 0 corresponding to the value of λ_2 is < or = or >0.2614. Hence, the system producing good results for the plant whenever λ_2<0.2614.

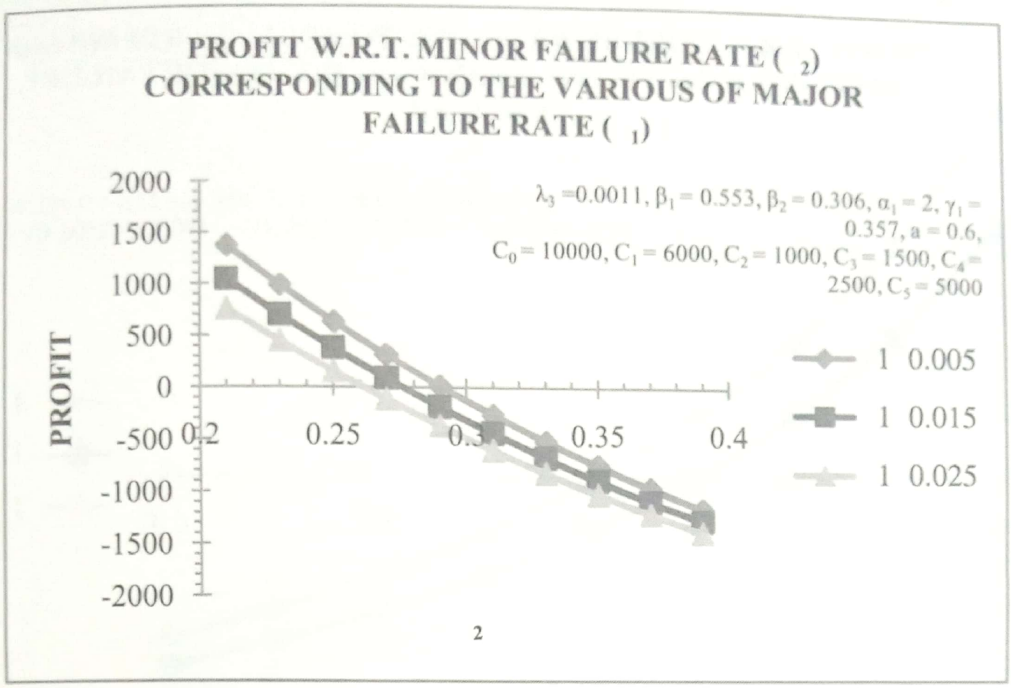


Fig. 6

The Fig. 6 shows, the present graph to find out the relation in between profit and the rate of failure (λ_3) due to delay in repair of minor faults corresponding to the various rate of failure (λ_1) due to major faults.

The following observations are concluded from the graph:

(i) The profit goes down corresponding to the upper term /values of failure occurred rate for failure due to delay in repair of minor faults which gave lower term /values corresponding to the various hike in failure occurred rate for major faults.

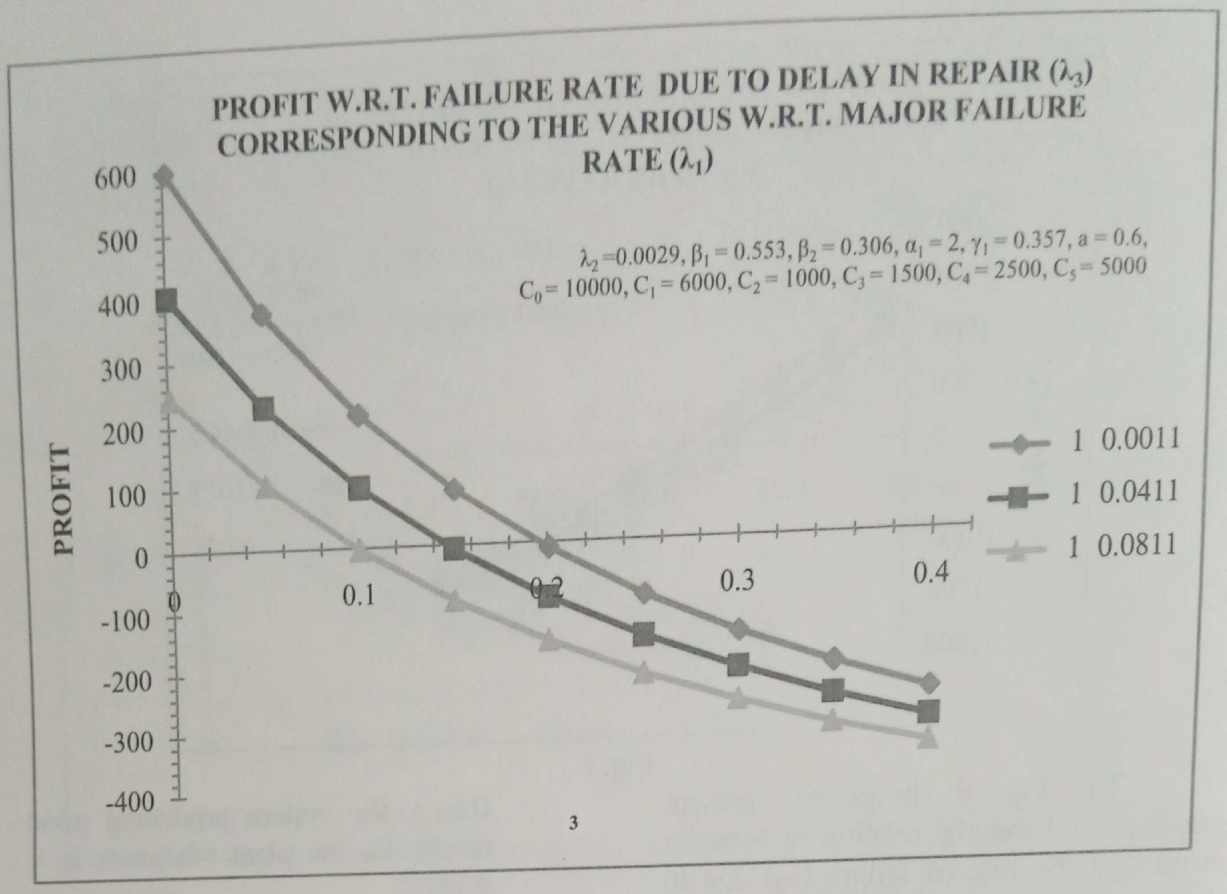
(ii) At $\lambda_1 = 0.0011$, the profit output lying > or = or < 0 corresponding to the value of λ_3 is < or = or > 0.195. Hence, the system producing good results for the plant whenever $\lambda_3 <$ 0.195.

(iii) At $\lambda_1 = 0.0411$, the profit output lying > or = or < 0 corresponding to the value of λ_3 is < or = or > 0.1472. Hence, the system producing good results for the plant whenever $\lambda_3 <$ 0.1472.

(iv) At $\lambda_1 = 0.0811$, the profit output lying > or = or < 0 corresponding to the value of λ_3 is < or = or > 0.0993. Hence, the system producing good results for the plant whenever $\lambda_3 <$ 0.0993.

CONCLUSION

As per the analysis discussed above, the means times to system failure, Estimated work-time with full capacity and profit of the two-unit cold standby centrifuge system goes down corresponding to the upper term /values for the failure occurred rate for minor/major faults whether the results are different for repair rate. For the profit of the system, the analysis stated various cut-off points of the revenue in up-time per unit with full capacity to enhance the profit of the system.



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