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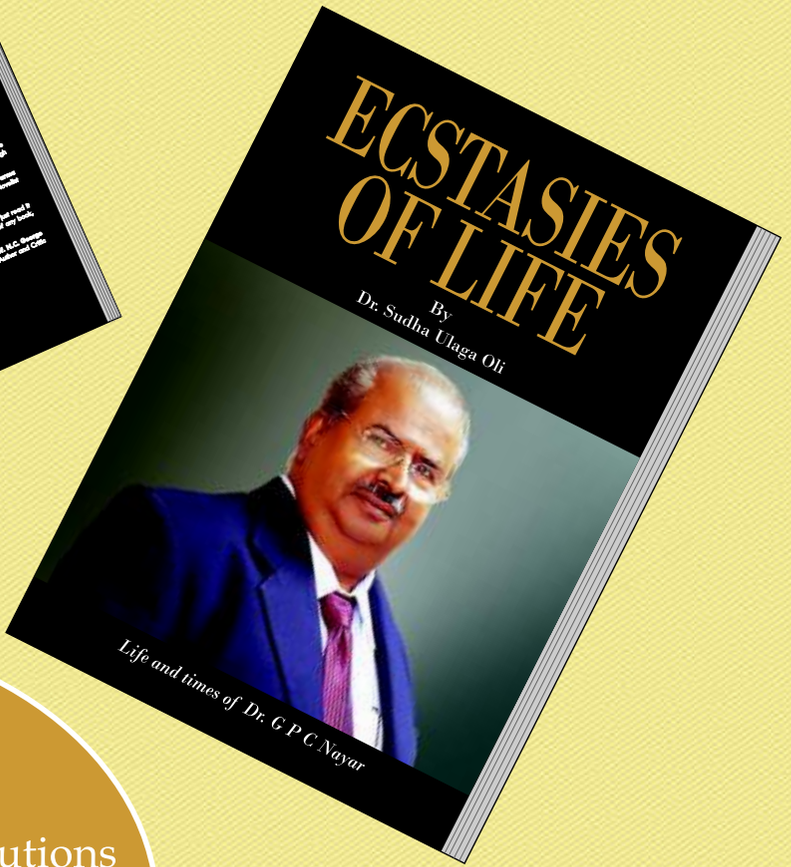
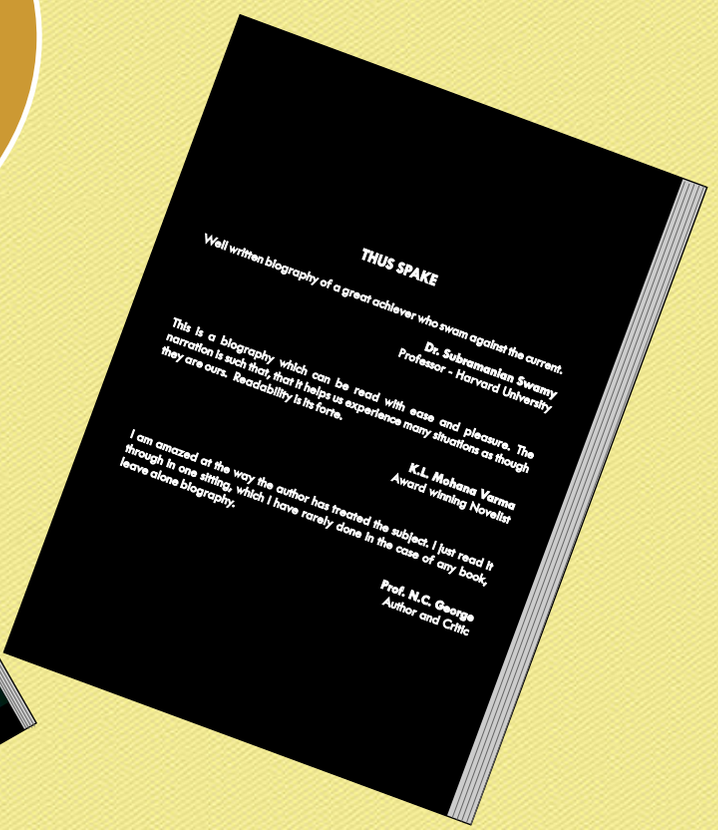
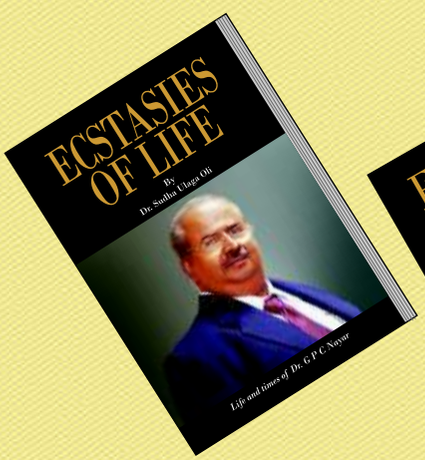
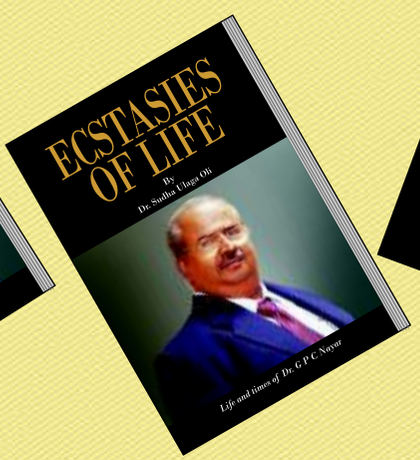


Here's an entrepreneur
who has created
some excellent academic institutions
in an unfriendly environment.
It is a saga of trials and tribulations
in an extremely readable manner
by a consummate
writer in English.







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Articles

Chairman's Overview

Doing business in India has become a priority for MNCs as the investment climate in the country seems to be improving. More MNCs have raised stakes in their Indian units this year, seeking greater control of their businesses in world's third largest economy.

For many of them developing a robust strategy for the Indian market needs to be on top of their growth agenda. The diversity and dynamism unique to India defy any one-size-fits-all approach. In order to succeed in India companies will have to do things differently from their practices in the parent country. As markets become global, the ethical and transparency standards of companies must become higher and more universally applied.

In a bid to get a larger share of the profit, some of the MNCs are resorting to questionable tactics. There are several examples of poor corporate governance practices such as issues on parent company holdings, royalty paid to the parent, minority shareholder interests, poor disclosures, and so on.

Taking these into consideration, we bring to you the lead article in this issue, a study on the impact of foreign ownership on the corporate governance and disclosure policies.

An effective supplier selection process is so important to the success of any manufacturing company. In most industries, the cost of raw materials and components represents the largest percentage of the total product cost. So, choosing the right supplier becomes a major opportunity to reduce costs across the entire supply chain. Our second lead article is on vendor evaluation system.

There are various ways in which researchers have attempted to measure the size of barriers to trade, and determinants of barriers to trade. Our third lead article is a study to understand the implication of the Gravity Model on India's trade.

In addition, the issue carries a number of learned articles on a variety of topics such as performance of oscillators, gold price and NIFTY, stress and job performance, competency mapping, emotional intelligence, et al.

I am confident that this issue will be truly informative and educative to our readers.

Dr. G. P. C. NAYAR

Chairman, SCMS Group of Educational Institutions.

SCMS Journal of Indian Management

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Editorial

Entrepreneurship and Education

It is possible to stimulate people to think entrepreneurially. It is possible to stimulate people to engage themselves in entrepreneurial activities. Entrepreneurship is attracting the interest of Indian policy makers and the national entrepreneurial potential has become an important educational and research topic. It is interesting to note why are Indian policy makers interested in entrepreneurship? The answer is: In the present environment characterized by rapid economic change and intensified competition internally and externally, firms all over the world are under constant pressure to attain and sustain the competitive advantage. The strengthening of Indian competitiveness is our common challenge particularly as competitive pressure is coming from China and other developing countries. In this context, a well-defined strategy is inevitable. Developing entrepreneurship is a key instrument of this strategy to rejuvenate Indian innovation and competitiveness. Entrepreneurship is a driving force of economic restructuring. It moves away from the production of old products and services with low value added, obsolete technology, and obsolete organizational capabilities. It is the vehicle for the transformation of the existing enterprises and the development of new ones. It is a driving force of innovation, competitiveness, and growth. As such it also drives a nation towards the achievement of high quality of life and social prosperity.

Building up competitive advantage and maintaining sustainable high growth will depend on how much national intellectual energy and physical resources a country will be able to allocate to the creation of high quality enterprises whose competitive advantage will be based on up-to-date technological, organizational, and managerial knowledge. The challenge is the development of a consultative relationship between universities, research institutions, and industry. This means co-operation between education and training institutions on one hand, and engineers and production managers on the other, leading to an increase in the stock of entrepreneurial knowledge. Our stereotyped education system with conventional universities and affiliated technological institutions shall be transformed into new educational hubs where entrepreneurship shall be wedded to education empowering the youth to survive risks of entrepreneurship in the process.

Dr. D. Radhakrishnan Nair

MNC Subsidiaries vs Domestic Firms

Pankaj M. Madhani

Abstract

This research examines the impact of foreign-ownership on the corporate governance and disclosure policies of firms. MNCs operate across different countries with different corporate governance regimes, which will often deviate from corporate governance practices in the home country of MNCs. Thus MNCs have to manage multiple economic, legal, political and cultural environments. This paper aims to analyze difference in corporate governance and disclosure practices among firms owned by foreign owner (MNC subsidiaries) and local owner (domestic firms). These research findings suggest that subsidiaries of MNCs are no better in disclosure practices than domestic Indian firms.

Key Words : *Corporate governance, Disclosure, Clause 49, MNC subsidiaries, Globalization, Domestic firms*

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Firms having multinational presence such as subsid - iaries of Multinational Corporations (MNCs) have their parent firm in other country, have operations in more than one country and may also be listed in the host country. Such subsidiaries of MNCs are influenced by the parent firm in home country to a great extent. As such, host country has domestic firms originated and listed in the host country as well as MNC subsidiaries, operated and listed in the same legal institutional environment. As the regulatory environment in the host country is the same for both groups i.e. domestic firms and subsidiaries of MNCs, it is possible that subsidiaries of MNCs internalise some aspects of disclosure practices of their parent company.

MNCs subsidiaries operate across different countries with different corporate governance regimes, which will often deviate from corporate governance practices in the MNC home country. MNCs have to thus manage multiple economic, legal, political and cultural environments externally as well as complex networks of knowledge and

resource flows internally (Volkmar, 2003). The question is whether firms with foreign ownerships have better behavior in their disclosure policies compared to domestic firms. Hence, this research intends to investigate empirically whether MNC subsidiaries have better corporate governance and disclosure policies compared to domestic firms listed in India.Using firms across different sectors listed in Bombay Stock Exchange (BSE), this research study aims to analyze difference in corporate governance and disclosure practices among firms owned by foreign owner (MNC subsidiaries) and local owner (domestic firms). The findings can shed light on the governance and disclosure practices of MNC subsidiaries and domestic firms, in legal institutional environment of India.

Corporate Transparency and Disclosure: **Key Drivers**

Good practices of corporate governance are now documented in most country codes. These codes commonly stress the need for transparency in financial and non-financial disclosures, due board processes and information systems, compliance with legal and regulatory requirements, accountability to various stakeholders, among others (Baxi, 2005). Corporate transparency plays crucial role in reducing the information asymmetry between firms and their stakeholders (Durnev *et al.*, 2009). It also allows stakeholders to monitor performance and contractual commitment of firms (Bushman and Smith, 2001). Hence, market regulators enact numerous rules and codes to ensure timely and accurate disclosure of information by listed firms. As such corporate transparency refers to the disclosure of firm specific information to outside constituents of the firm and is an integral part of corporate governance practices.

Disclosure may be considered the foundation of any system of corporate governance (Cadbury, 1999). Prior research has shown specific benefits that encourage voluntary disclosure of information through better corporate governance. These benefits translate into a reduction of the information asymmetry problems as a result of the separation of ownership and control of firms (Lev, 1992). Also, firms that opt to disclose information beyond the standard requirements reap benefits such as reductions in capital and debt costs, greater analysts' cover or an increase in the liquidity of company securities (Glosten and Milgrom, 1985).

Disclosure of timely, accurate, and relevant information, thus, enables shareholder to evaluate the management's performance by observing, how efficiently the management is utilizing the firm's resources in the interest of the principal.

Corporate governance is not just about the process but it is also about the way firms are held accountable mainly via "financial reporting." Corporate governance have significantly focused on the relationship between the management of firm and the Board of Directors particularly on separating these two functions for effective professional management and hence may lead to greater transparency. The Board members usually may not get enough time and the management of the firm has to manage the day-to-day affairs. So the role of corporate governance becomes even more pertinent. The Cadbury Report (1992) recommends the Board of Directors to pay a great attention to the highest level of disclosure. As shown in model of Figure 1, lack of accountability of the Board of Directors and inadequate or minimal information flow to the shareholders result in weak controls.

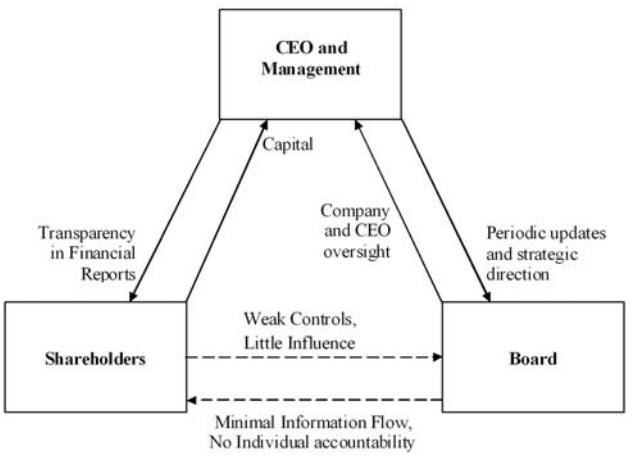

Figure 1: Corporate Governance System

(Source: Model developed by author based on *Montgomery and* Kaufman, 2003)

On the one hand, financial reporting constitutes an important element of the corporate governance system. In fact, some failures of corporate governance may be reduced by an adequate financial reporting system. On the other hand, some problems of the financial reporting system find their origin in deficiencies of the system of corporate governance (Whittington, 1993).

The effective financial reporting may play a key role improving the soundness of the corporate governance system. One of the key functions of the financial reporting system is to limit top management's discretion, and hence constraining top management to act in the shareholders'

interest (Jensen and Meckling, 1976; Watts and Zimmerman, 1978), or, broadly speaking in a wider perspective, in the interest of all the strategic corporate stakeholders. However, it should also be noted that the quality of information produced by the financial reporting system is fundamental for a corporate governance system to be effective. Disclosure is one of the fundamental goals of the financial reporting system. Transparency is the timely and adequate disclosure of the performance of the company and its corporate governance practices related to its ownership, board, management structure, and processes. A system of corporate governance needs a good level of disclosure and an adequate information to eliminate (or at least reduce) information asymmetries between all parties, making corporate insiders accountable for their actions.

According to Baek *et al.* (2009) "all the relevant information should be made available to the users in a cost-effective and timely way." Annual reports are published by firms as a medium for communicating both quantitative and qualitative corporate information to shareholders, potential shareholders (investors) and other users (Whittington, 1993). Although, such publication of an annual report is a statutory requirement, firms normally voluntarily disclose information in excess of the mandatory requirements. Hence, annual reports are important documents for assessing and analyzing the company performance in regard to corporate governance and disclosure standard/standards as well as compliance. Communication of corporate disclosure via annual reports is a very important aspect of corporate governance in the sense that meaningful and adequate disclosure enhances good corporate governance (Bhasin and Reddy, 2011).

Literature Review

Corporate governance is defined as an institutional arrangement that not only addresses the agency problem between shareholders and managers of the firm, but also provides the context for the decisions taken by the top management of the firm. In this context, the fundamental objective of a corporate governance framework is to identify a basis for strategic co-operation between shareholders and managers of the firm such that the agency problem is reduced and a basis for decisions that promote the competitiveness of the firm is provided (Sinha, 2006). As La Porta *et al.*(1998) argue, good corporate governance is needed for better access to external financing at lower cost. Good corporate governance is a key driver of sustainable corporate growth and long-term competitive advantage (Madhani, 2007). Firms, across the globe, recognize that there are economic benefits to be gained from a well-managed disclosure policy. This shows that firms in need of a good deal of external financing, such as rapidly growing firms, have an incentive to improve their disclosure and corporate governance.

A detailed and structured system of disclosure enables investors to understand, and obtain accurate and reliable information of companies in order to make better investment decisions (Ho *et al.*, 2008). Some research studies have shown that with increased corporate disclosure, firms experience a reduction in cost of equity capital (Botosan and Plumlee, 2002), as well as, the cost of debt (Sengupta, 1998). Similarly, Healy *et al.* (1999) found a beneficial increase in the firm's stock liquidity and performance. Moreover, information disclosure in itself is a strategic tool, which enhances a company's ability to raise capital at the lowest possible cost (Lev, 1992).

Several studies examine Indian corporate governance generally. Khanna (2008) reviews the development of corporate governance norms in India beginning from independence era. World Bank (2005), Sarkar and Sarkar (2000), and Mohanty (2003) examine how firm-level governance influences the behaviour of institutional investors, or vice-versa. Mohanty (2003) finds that institutional investors own a higher percentage of the shares of better-governed Indian firms. This is consistent with research in other countries (Aggarwal *et al.*, 2005; Ferreira and Matos, 2008). Bhattacharyya and Rao (2004) examine whether adoption of Clause 49 (an important set of governance reforms in India) predicts lower volatility and returns for large Indian firms. Black and Khanna (2007) conduct an event study of the adoption of Clause 49 and report positive returns to a treatment group of large firms (who were required to comply quickly) relative to small firms (for whom compliance was delayed). Implementation of Clause 49 in India was done in staggered manner, with large firms (included in "Group A" on the BSE) required to comply first, followed by medium-sized firms and then small firms.

Prior to the adoption of Clause 49, India was considered a laggard in corporate governance practices. From 1947 (independence) through 1991, the Indian government pursued socialist policies. The government nationalized most banks, and became the principal provider of both debt and

equity capital for private firms. The performance of the government agencies who provided capital to private firms was measured, based on the amount of capital disbursed rather than return on capital investment. This policy created little incentive for managers of private firms to voluntarily adopt good governance practices. Hence, during this period (1947-1991), corporate governance practices in India, which were considered to be comparable to that of British firms at independence, considerably deteriorated. In the year 1992, the Securities and Exchange Board of India (SEBI) - India's securities market regulator was formed. By the mid-1990s, the Indian economy was growing steadily, and Indian firms began to seek capital from variety of sources to finance expansion into the global market spaces created by liberalization and the growth of outsourcing (Black and Khanna, 2007).

The need for capital by Indian firms, amongst other things, led to corporate governance reforms. The first major step in this area was setting up of the Confederations of Indian Industry (CII) Code for Desirable Corporate Governance in 1998 (Sanan, 2011). The code published in April 1998 comprised seventeen recommendations. A year later, in May 1999, SEBI announced the formation of the Kumar Mangalam Birla committee, which was tasked with proposing corporate governance reforms. These reforms became 'Clause 49' so named because they were implemented through a new Clause 49, which was added to stock exchange listing requirements. Clause 49 has both mandatory as well as voluntary provisions. Mandatory provisions relate to board composition, audit committees, board procedures, management discussion and analysis in the annual reports, certification of financial statements and internal controls, and corporate governance reporting. The adoption of Clause 49 was viewed as a turning point in Indian corporate governance (Black and Khanna, 2007). Dharmapala and Khanna (2013) report that small Indian firms which are subject to Clause 49 react positively to plans by SEBI to enforce the Clause 49, relative to similar firms not subject to Clause 49.

There is an expanding literature that examines whether a country's legal and judicial institutions affect disclosures practices across countries (Jaggiand Low, 2000). Bushman *et al.*(2004) studied corporate transparency across 45 countries and found substantial differences in corporate disclosure practices that arose from a country's legal as well as judicial regime. Researchers such as Hope (2003b), and Francis *et al.*(2005) also found that country-level institutional factors matter in explaining disclosure levels. Khanna *et al.*(2004) pointed out that customers require financial information to evaluate a foreign firm's long-term viability, and suppliers use financial statements in evaluating a foreign firm's creditworthiness. Likewise, employees or prospective employees can use disclosures in assessing employment opportunities with a foreign firm. These arguments are supported by Bowen *et al.*(1995) who argue that implicit contracts can affect a firm's accounting practices. Given the unfamiliarity of firms when they enter foreign labour, product or capital markets first time, MNCs have incentives to provide additional information in order to establish and maintain a reputation. This can reduce costs associated with these relational contracts in the long-run.

MNCs are seen as amongst the world's most powerful types of organizations as they account for a large share of intellectual property rights (IPRs), are big employers and contribute to the economic development of the foreign countries where they operate (Williams, 2009). Despite some research interest among scholars in the corporate governance and disclosure practices of MNCs (Strange and Jackson, 2008), comparisons between MNCs subsidiaries and domestic firms on corporate governance and disclosure practices have received very little attention. A MNC subsidiary is defined as a local affiliate of a MNC located in a foreign country of which the parent company holds majority ownership in promoters' holding. (Bouquet and Birkinshaw, 2008).

MNCs subsidiaries face additional complexities and challenges in corporate governance and disclosure practices due to the diversity of corporate governance rules, regulations and stakeholder expectations in the various host countries in which they operate (Luo, 2005). Some studies have examined the differences in corporate disclosure practices between MNC corporate headquarters and domestic firms (Krigger, 1988; Lekseland Lindgren, 1982). However, very few studies have examined the differences between MNC subsidiaries and domestic firms in their corporate governance and disclosure practices in a host country (Cahan *et al.*,2005; Duru and Reeb, 2002).

Pattnaik and Gray (2012) found that subsidiaries of MNCs were more transparent and disclose more than domestic listed Indian firms. Their time frame of the study was before implementation of Clause 49. However, no study was conducted in India regarding corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed in India after implementation of Clause 49. Hence, this

research fills this gap and compares corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed in BSE for the sample firms across various sectors in year 2011-2012.

Development of Hypothesis

MNCs Subsidiaries and Domestic Firms

Subsidiaries of MNCs operating in developing countries are expected to have higher standard of corporate governance and disclose more information and observe better reporting practices for the various reasons explained below:

1) As they have to comply with the regulations of not only their host country but also those of the parent country or home country, where accounting practices and standards of reporting are substantially higher.

2) Usually, these firms are equipped with more advanced accounting software tools and packages, efficient audit staff, competent and efficient accounting and support staff, and better management practices. The variety of information collected by the parent firms i.e. MNCs, along with their better reporting systems can result in the increase of voluntary disclosures. Hence, they have the potential to disclose more information without any incremental processing costs on disclosures (Choi and Mueller, 1996).

3) These firms are under closer scrutiny of various political and pressure groups within the host country, as they view them as sources of economic exploitation and agents of imperialist power (Kamran and Nicholls, 1994). Hence, such firms have an incentive to disclose more information in order to avert any pressure for excessive control for exploitation (Srinivasan, 2008).

4) International agencies like the Organization for Economic Cooperation and Development (OECD) and others frequently monitor and evaluate the MNCs because of their importance in the global trade. Subsidiaries of MNCs have been frequently accused of tax evasion and other practices like transfer pricing which may end up paying high political costs.

5) MNCs have two related levels of corporate governance structures – one at headquarters and other at subsidiary levels. In the case of MNCs with subsidiaries listed on local stock exchanges in different host countries, those subsidiaries need to simultaneously conform to the host country's legal requirements as well governance practices of the MNC in home country (Kiel *et al.*, 2006). Therefore, MNC subsidiaries face dual pressures, from the demand of the host country environment where they are operated and also from corporate headquarters of parent MNC in home country (Rosenzweig and Singh, 1991).

In recent years, there has been a greater interest in applying institutional theory to the study of MNCs (Westney, 2005), especially to identify and study factors influencing MNC subsidiary practices in different host country institutional environments (Kostova and Roth, 2002; Tempel *et al.*, 2006). Prior empirical research has found that institutional pressures created by legal environment develop an institutional context within which firms make decisions regarding what to disclose and how (Crawford and Williams, 2010).

Institutional theory can also be linked to legitimacy theory, as their combined view could provide a better explanation of disclosure practices of MNC subsidiaries. The application of legitimacy theory to MNCs has been studied in detail by many researchers (Dacin *et al.*, 2008; Kostova and Zaheer, 1999). They assert that a MNC subsidiary has to gain dual legitimacy and as such is in a state of institutional duality.

MNCs as a parent firm pressurize their subsidiaries internally to adopt their organizational practices which are transferred to it from their parent firm in home country. Externally the host country institutional environment pressurizes MNC subsidiaries to adopt local organizational practices. Hence, MNCs subsidiary has to decide which institutional pressures are more important; internal pressures that would enable it to become legitimate within the working environment of MNCs or the external pressures that would enable it to gain external legitimacy within the legal environment of the host country. In contrast, domestic firms need to confirm only to the demands of their domestic rules, regulations and stakeholder expectations (Alpay *et al.*, 2005).

To study the extent of disclosure by MNC subsidiaries in comparison to their parent firms would require a separate study. Major emphasis of such study will be to analyse

levels of disclosure by MNC subsidiaries in the host country and compare it with disclosure practices of their parent firm or MNCs in their home country. However, such investigation is beyond the scope of this research. Hence, this study focuses on corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed only in India to understand such difference in their practices.

Testable Hypothesis

This research study seeks to examine how MNC subsidiaries and domestic firms differ in corporate governance and disclosure practices. As MNCs conduct their global business in multiple institutional environments that require different disclosure rules, they may maintain higher disclosure standards and disclose more information than domestic firms. Thus, based on this argument, following null hypothesis is proposed:

H01: *There are no differences in corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed only in India.*

Corporate Transparency and Disclosure by Firms:An Indirect Measurement Approach

Equity analysts play role of intermediaries between firms and the financial market and serve as transparency enhancing mechanism in market. Analyst forecasts are more accurate and less dispersed for firms with more open disclosure policies (Lang and Lundholm, 1996). Equity analysts collect information about a firm, evaluate its current performance and make future forecasts about the firm. Forecast error captures analysts' forecast accuracy and is calculated as the absolute value of the difference between actual earnings per share (EPS) and the median analyst forecast of EPS. Forecast dispersion among group of analysts can be calculated as the standard deviation of analysts' forecast of EPS.

The accuracy and dispersion of analysts' forecast depend on, and reflect the extent to which firms disclose information in the markets (Healy and Palepu, 2001). Prior research have demonstrated that corporate disclosure is positively linked to analysts' forecast accuracy and negatively to the dispersion among analysts covering a given firm in their forecasts (Bhat *et al.*,2006). Ashbaugh and Pincus (2001) find that analysts' forecast accuracy is higher after firms adopt *International Accounting Standards* (IAS), and Hope (2003a) finds that analysts' forecast accuracy improves when firm-level disclosure increases. Leuz and Verrecchia (2000) find that German firms switching to US Generally Accepted Accounting Principles (US GAAP) reporting have lower information asymmetry than firms that continue to report under German GAAP, which is a lower disclosure-reporting regime.

Pattnaik and Gray (2012) used the measure of corporate transparency based on the characteristics of equity analysts' forecast behaviour and conclude that voluntary disclosure is negatively related to analyst forecast errors. Analyst forecast error and forecast dispersion were used by researchers as proxies for corporate disclosure and transparency. However, it is subjective measure of corporate disclosure practices as analysts' subjective opinions could be influenced by firm performance. Hence, this research study uses an alternate approach of direct method of calculating corporate governance and disclosure practices of firms as described below in research design and methodology section.

Research Design and Methodology

Objective of the Study

1. To measure overall corporate governance and disclosure practices of MNC subsidiaries and domestic firms with the help of an appropriate instrument as an evaluation tool.
2. To know that to what extent subsidiaries of MNCs and domestic firms disclosed through their annual reports by measuring Corporate Governance and Disclosure (CGD) scores of sample firms.

Scope of the Study

This study will help us to understand that whether MNC subsidiaries have better corporate governance and disclosure practices compared to domestic firms in Indian context. As it is perceived that MNC subsidiaries have more incentives to disclose information compared to domestic firms.

Sources of Data

For the purpose of study, data of the sample firms collected from the annual reports of the same for the financial year 2011-12 (for the period ending March 2012 or December 2012 based on the firms' financial year) have been downloaded from the CMIE PROWESS database (Version 4.14).

Sampling Technique Applied

Stratified sampling was used for obtaining data of firms listed in Bombay Stock Exchange (BSE) and is constituent of S&P BSE sectoral indices.

Sampling and Data Collection

The sample for the study was collected from the firms listed in BSE in the form of S&P BSE sector indices. Sectoral indices at BSE aim to represent minimum of 90% of the free-float market capitalization for sectoral firms from the universe of S&P BSE 500 index. This sector index consists of the firms classified in that particular sector of the BSE 500 index. From these sectors, banking sector (Bankex) was eliminated as the disclosure requirements for these firms are specialized and regulated by other regulatory authorities. Likewise, realty sector was also not considered because of specific issues of governance. Hence, remaining all nine sectors from S&P BSE sectoral indices were studied for this research. In each of these sectors, top six firms as per market capitalization are selected for sample. Out of sample size of 54 firms, the sample consists of nine public sector firms (16.67%), 13 MNC subsidiaries (24%) and others with dominant Indian ownership (59.25%). Hence, sample represents 41 domestic firms and 13 MNC subsidiaries.

The sample firms represent different sectors viz.: Auto (11.1%), Metal (11.1%), Oil & Gas (11.1%), Consumer Durables (11.1%), Capital Goods (11.1%), FMCG (11.1%), Health Care (11.1%), IT (11.1%), and Power (11.1%). As shown below in Table 1, these 54 firms selected from 9 different sectors represent 91% of overall sectoral index weight. Hence, these samples of 54 firms truly represent selected 9 sectors.

Table 1: Weight of Sample Firms in their respective Sectoral Indices

Sr. No.	S&P BSE Sectoral Indices	No. of Firms Studied	Weight in Index (Per Cent)
1	S&P BSE Auto	6	89
2	S&P BSE Capital Goods	6	94
3	S&P BSE Consumer Durables	6	90
4	S&P BSE Healthcare	6	88
5	S&P BSE IT	6	95
6	S&P BSE Metal	6	82
7	S&P BSE Oil & Gas	6	94
8	S&P BSE Power	6	97
9	S&P BSE FMCG	6	91
Total Sample Size		54	91

(Source: Calculated by Author form BSE Web Site)

The Research Instrument: Direct Measurement of Corporate Governance Disclosure Score

A review of the existing literature is undertaken to explore the methodology used for measuring corporate governance and disclosure practices of firms. Prior research studies on disclosure have been broadly classified as those on disclosure indices, event studies and specific disclosure analysis. Researchers have used various methods of computing disclosure score for determining the level of disclosures. The disclosure index provides a reasonable method for measuring the overall disclosure quality of a firm.

Prior research in this area has made extensive use of such index methodology as a research tool (Marston and Shrives, 1991). Index method involves the development of an extensive list of disclosure items, which are expected to be relevant to the users of information. The methodology adopted for computing the disclosure score can be of two types; use of the externally developed disclosure index used in relevant prior research or to have a self-constructed disclosure index for the specific research.

Most prior international studies have used the transparency and disclosure index developed by Standard & Poor (S&P) or the Center for International Financial Analysis and

Research (CIFAR) scores. Many cross-country studies used externally developed measures of total disclosures, e.g., Hope (2003b) used CIFAR ratings and Khanna *et al.* (2004) used S&P's transparency and disclosure scores. Such externally developed indexes have the advantage of being objective and comprehensive; however, they also have disadvantages (Bushee, 2004; Francis *et al.,* 2008). These externally developed indexes capture total disclosures that include both mandatory and voluntary disclosures. Further, externally developed indexes offer lower construct validity since they were not exclusively developed with a specific research context in mind, and they can restrict the researcher to non representative samples that may be motivated by commercial interests of the organization that prepared the index.

Bushee (2004) notes that the bigger payoffs for future researchers will probably come to those who construct their own index and also use hand-collected data. This research study uses a voluntary disclosure index based on Subramanian and Reddy (2012) and hand-collect governance and disclosure data for sample of 54 firms. The instrument developed by Subramanian and Reddy (2012) is given at Annexure - I. They developed a new instrument to measure corporate governance and disclosure practices of firms, considering only voluntary disclosures in the Indian context. Although, this instrument is based on S&P methodology, it overcomes the limitations of the S&P instrument regarding non segregation of voluntary and mandatory disclosures.

This approach allows us to isolate voluntary disclosures and provides more powerful tests of firm-specific corporate governance and disclosure incentives and hence, complements prior studies that use broad-based, externally developed disclosure indexes. According to Clause 49 of listing agreement of Indian stock exchanges, firms have to mandatory disclose, corporate governance practices as per the guidelines stipulated in Clause 49. It is now binding for the Indian listed firms to file with SEBI the corporate governance compliance report along with the financial statements. Hence, there was need to develop a methodology for measuring voluntary corporate governance disclosure practices as mandatory disclosure is already taken care of by Clause 49 of listing agreement.

Subramanian and Reddy (2012) focused also on the quality of practices and not just the disclosure of certain practices by firms. On the basis of the S&P instrument, the instrument also classifies corporate governance-related disclosures under two categories: ownership structure and investor relations (*ownership*), and board and management structure and process (*board*). The final instrument had 67 items: 19 questions in the *ownership* disclosure category and 48 in the *board* disclosure category. In the latter, the questions in the instrument were not just about the disclosure of board practices, but also about the quality of board practices. For example, the S&P instrument just quizzes whether or not the attendance details of board members are disclosed, whereas this instrument checks whether an attendance at board meetings of at least 60% is maintained. Thus, the scores of board practices (maximum score: 48) from this instrument indicate not just the disclosure of board practices, but also the level of adoption of best board practices by firms.

Disclosures to the market participants can be made by firms through annual reports, quarterly reports and continuous disclosures to the stock exchanges. In this study, content analysis was used and only the annual report information is used for calculating CGD score of firms. The annual reports of the selected 54 sample firms were carefully examined for the financial year 2011-12. Hence, to arrive at the overall disclosure score for each category, i.e. *ownership* and *board*, annual reports of each firm under study was scrutinized for the presence of specific items under the above mentioned categories. One point is awarded when information on an item is disclosed and zero otherwise. All items in the instrument were given equal weight, and the scores thus arrived at (for each category), with a higher score indicating greater disclosure. Final corporate governance and disclosure score (Maximum: 67) for each firm was calculated by adding overall score received in *ownership* (Maximum: 19) as well as *board* category (Maximum: 48).

Data Analysis and Interpretation

For the purpose of this study, the firms have been taken from nine different sectors for making meaningful comparison of MNC subsidiaries and domestic firms. The reason behind this classification is to find out the extent of disclosure in MNC subsidiaries and domestic firms. The CGD score of firms was calculated by thoroughly scrutinizing annual report of sample of firms with the help of instrument developed by Subramanian and Reddy (2012).Out of sample of 54 firms, 13 firms are MNC subsidiaries;while remaining 41 firms are domestic firms. Out of pool of domestic firms, 15 firms are cross-listed, some on

more than one non-Indian exchange.Similarly, out of pool of MNC subsidiaries, three firms are cross-listed. All these cross-listed firms are excluded from our sample. Hence, in the research sample of 36 firms listed only in India finally we have sample of 10 MNC subsidiaries and 26 domestic firms(Table 2).

Table 2: MNC subsidiaries and Domestic firms Listed only India according to Sectors

Sr. No.	Sector	MNC Subsidiaries	Domestic Firms
1	Power	-	4
2	Oil & Gas	1	4
3	Metal	-	3
4	Health Care	1	2
5	FMCG	3	1
6	IT	1	3
7	Consumer Durables	-	5
8	Capital Goods	2	2
9	Auto	2	2
Total		10	26

(Source: Calculated by author from Annual Report of Firms)

Table 3, below shows sector and CGD score for MNC Subsidiaries.

Table 3 : MNC SubsidiariesListed in India and Overseas: Sector and Listing Details

Sr. No.	Company	Sector	Overseas Listing	CGD Score	Mean CGD Score
1	Oracle Financial Services Software	IT	-	20	20
2	ABB	Capital Goods	-	22	25
3	Siemens	Capital Goods	-	28	
4	Sterlite Industries (India)	Metal	US	30	30
5	Maruti Suzuki	Auto	-	19	16
6	Cummins India	Auto	-	13	
7	Cairn India	Oil & Gas	-	30	30
8	Hindustan Unilever	FMCG	-	33	21.33
9	Colgate-Palmolive (India)	FMCG	-	15	
10	Nestle India	FMCG	-	16	
11	GlaxoSmithKline Pharmaceuticals	Health Care	-	20	18.67
12	Ranbaxy	Health Care	Europe	22	
13	Cipla	Health Care	Europe	14	
Overall Sector CGD Score					23

(Source: Computed by author from company annual reports by applying Research Instrument)

Table 4, below shows key statisticsof CGD score for MNC subsidiaries.

Table 4 : MNC Subsidiaries:Key Sector and Statistics

Sr. No.	Sector	No. of Firms	CGD Score			Mean CGD Score	Std. Deviation	CV* (%)
			Min.	Max.	Range			
1	Capital Goods	2	22	28	6	25	4.24	16.97
2	Auto	2	13	19	6	16	4.24	26.52
3	FMCG	3	15	33	18	21.33	10.12	47.42
4	Health Care	3	14	22	8	18.67	4.16	22.30
5	Oil & Gas	1	30	30	0	30	-	-
6	Metal	1	30	30	0	30	-	-
7	IT	1	20	20	0	20	-	-
Overall		13	13	33	20	21.69	6.65	30.66

*CV = Coefficient of Variation (Source: Calculated by author)

As MNC subsidiaries such as Sterlite, Ranbaxy and Cipla are cross-listed (Table 3),they are excluded from our study.

Table 5, below shows key statisticsof CGD score for MNC subsidiaries listed only in India.

Table 5: MNC Subsidiaries Listed only in India: Key Sector and Statistics

Sr. No.	Sector	No. of Firms	CGD Score			Mean CGD score	Std. Deviation	CV* (%)
			Min.	Max.	Range			
1	IT	1	20	20	0	20	-	-
2	Oil & Gas	1	30	30	0	30	-	-
3	Auto	2	13	19	6	16	4.24	26.51
4	Capital Goods	2	22	28	6	25	4.24	16.97
5	FMCG	3	15	33	18	21.33	10.11	47.41
6	Health Care	1	20	20	0	20	-	-
Overall		10	13	33	20	22.06	6.69	30.96

*CV = Coefficient of Variation (Source: Calculated by author)

Table 6 below shows sector and CGD score for domestic firms listed in India and overseas. As 15 domestic firms are cross-listed they are excluded from our study. Hence, out of 41 domestic firms we have now 26 domestic firms listed only in India.

Table 6: Domestic Firms Listed in India and Overseas: Sector and Listing Details

Sr. No.	Company	Sector	Listing	CGD score	Mean CGD Score
1	Infosys	IT	US	37	42
2	Wipro	IT	US	47	
3	Dr. Reddy	Health Care	US	40	40
4	Reliance Industries	Oil & Gas	Europe	34	34
5	ITC	FMCG	Europe	41	32.5
6	United Spirits	FMCG	Europe	24	
7	Mahindra & Mahindra	Auto	Europe	30	32
8	Tata Motors	Auto	US & Europe	34	
9	Reliance Infrastructure	Power	Europe	30	29.5
10	Tata Power	Power	Europe	29	
11	L & T	Capital Goods	Europe	31	27
12	Crompton Greaves	Capital Goods	Europe	23	
13	Hindalco	Metal	Europe	20	26
14	Tata Steel	Metal	Europe	32	
15	Videocon	Consumer Durables	Europe	18	18
Overall					31.33

(Source: Computed by author from company annual reports by applying Research Instrument)

Table 7, below shows sector and CGD score for domestic firms listed only in India.

Table 7: Domestic Firms Listed only in India: Key Sector and CGD Score

Sr. No.	Company	Sector	CGD score	Mean CGD score
1	HCL	IT	34	29.33
2	TCS	IT	33	
3	Mahindra Satyam	IT	21	
4	Bajaj Auto	Auto	24	23
5	Hero Moto Corp	Auto	22	
6	Pipavav Defence	Capital Goods	21	22.5
7	BHEL	Capital Goods	24	
8	ONGC	Oil & Gas	31	25.75
9	IOC	Oil & Gas	28	
10	GAIL	Oil & Gas	20	
11	Bharat Petroleum	Oil & Gas	24	
12	NTPC	Power	28	27.25
13	Reliance Power	Power	27	
14	NHPC	Power	29	
15	Power Grid	Power	25	
16	Lupin	Health Care	24	23.5
17	Glenmark	Health Care	23	

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18	Coal India	Metal	24	25.33
19	Jindal Steel & Power	Metal	17	
20	JSW Steel	Metal	35	
21	Godrej	FMCG	36	36
22	Titan	Consumer Durables	26	20
23	TTK Prestige	Consumer Durables	15	
24	Gitanjali Gems	Consumer Durables	24	
25	Rajesh Exports	Consumer Durables	15	
26	Bluestar	Consumer Durables	20	
Overall Sector CGD Score				25.85

Source: Computed by author from company annual reports by applying Research Instrument)

Table 8, below shows key statistics of CGD score for domestic firms listed only in India.

Table 8: Domestic Firms Listed only in India: Key Statistics

Sr. No.	Sector	No. of Firms	CGD Score			Mean CGD score	Std. Deviation	CV* (%)
			Min.	Max.	Range			
1	IT	3	21	34	13	29.33	7.23	24.66
2	Power	4	25	29	4	27.25	1.71	6.27
3	Oil & Gas	4	20	31	11	25.75	4.79	18.59
4	Auto	2	22	24	2	23	1.41	6.15
5	Capital Goods	2	21	24	3	22.50	2.12	9.43
6	Metal	3	17	35	18	25.33	9.07	35.82
7	FMCG	1	36	36	0	36	-	-
8	Consumer Durables	5	15	26	11	20	5.05	25.25
9	Health Care	2	23	24	1	23.50	0.71	3.01
Overall		26	15	36	21	25	5.68	22.71

*CV = Coefficient of Variation (Source: Calculated by author)

Table 9, below shows key statistics of CGD score for MNC subsidiaries and domestic firms according to listing status, i.e. listed only in India or cross-listed.

Table 9: MNC Subsidiaries and Domestic Firms Listing: Key Statistics

Sr. No.	Listing Status	No. of Firms	CGD Score			Mean CGD score	Std. Deviation	CV* (%)
			Min.	Max.	Range			
1	MNC Subsidiaries	13	13	33	20	21.69	6.65	30.66
(a)	India & Overseas (Cross-listed)	3	14	16	6	22	8	38.36
(b)	India only	10	13	33	20	21.60	6.69	30.96
2	Domestic Firms	41	15	47	32	27.32	7.22	26.44
(a)	India & Overseas (Cross-listed)	15	18	47	29	31.33	8.01	25.58
(b)	India only	26	15	36	21	25	5.68	22.71
Overall		54	13	47	34	25.96	7.44	28.64

*CV = Coefficient of Variation (Source: Calculated by author)

Research Procedures for Testing Hypothesis

This research conducted an inferential statistical analysis for testing the hypothesis. In order to test the significant differences in the CGD scores of MNC subsidiaries and domestic firms, parametric *t*-test was used.

Summary of Findings and Empirical Results

A detailed analysis of the CGD score for sample firms is presented in Table 10. Values of minimum, maximum, mean and standard deviation of CGD score for MNC subsidiaries and domestic firms have also been reflected. Results show that there is a difference between mean and standard deviation of CGD score for MNC subsidiaries and domestic firms. Analysis of the result shown in Table 10 indicates that mean of CGD score is higher for domestic firms at 25. Also, the standard deviation of CGD score is higher at 6.68 for MNC subsidiaries when compared to domestic firms in the sample.

Table 10: Descriptive Statistics of Dependent Variable – CGD Score

	No. of Firms	Minimum CGD Score	Maximum CGD Score	Mean CGD Score	Std. Deviation
All Firms Listed only in India	36	13	36	24.05	6.07
MNC Subsidiaries	10	13	33	21.6	6.68
Domestic Firms	26	15	36	25	5.67
Source: Computed by author from company annual reports by applying Research Instrument					

The hypotheses have been tested using the univariate *t*-test. Group statistics and independent sample test output is given in Table 11 and Table 12 respectively.

Table 11: Group Statistics for MNC Subsidiaries and Domestic Firms Listed Only in India

Group Statistics					
Firms Listed in India		No. of Firms	Mean	Std. Deviation	Std. Error Mean
CGD Score	MNC Subsidiaries	10	21.6000	6.68664	2.11450
	Domestic Firms	26	25.0000	5.67803	1.11355

Table 12: Independent Samples Test

CGD Score	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.505	.482	-1.533	34	.135	-3.40000	2.21835	-7.90823	1.10823
Equal variances not assumed			-1.423	14.289	.176	-3.40000	2.38979	-8.51590	1.71590

Table 13, shows result of univariate test.

Table 13: Results of Univariate Test

Null Hypothesis	*t* - Value	Significance Level
No significant difference between corporate governance and disclosure scores of MNC subsidiaries and domestic firms listed only in India	1.533	.135

Results of parametric test, as indicated in Table 13, show that significance value *p* is greater than 0.05, therefore at 5% level of significance; null hypothesis of equality of means fails to be rejected. Thus, there exists no significant difference between the CGD scores of MNC subsidiaries and domestic firms. As such there is no statistical significant difference between corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed only in India.

Analysis and Findings

Global presence of MNC and its subsidiaries create a demand for voluntary disclosure by such firms because MNC subsidiaries are likely to have greater information asymmetry as a result of their greater scope and complexity. Such effect will be larger for firms based in countries with weak legal environments than for firms based in countries with strong legal institutional environments. Hence, it is expected that

the subsidiaries of MNCs will provide more disclosures as a result of weak legal environment at host country. Accordingly, MNC subsidiaries are expected to have higher disclosure level compared to domestic firms in India.

Pattnaik and Gray (2012) found evidence for such hypothesis and empirically proved that subsidiaries of MNCs were more transparent and disclosed more information than domestic listed Indian firms. They used data of Indian firms listed in BSE from 1995 to 2003 and used indirect method of disclosure measurement. During period of their research study (1995-2003), host country legal environment in India was not strong, as during this period corporate governance and disclosure rules were weak in comparison to developed countries. As their study period ends in 2003, after which the Clause 49 of listing agreement was made mandatory by SEBI, their study period reflects weak period of corporate governance in India. After 2003, corporate governance and disclosure practices of Indian firms improved to great extent as Clause 49 of listing agreement was announced in October 2004 with its implementation in staggered manner by 2005. After adoption of Clause 49 and its enforcement by SEBI, corporate governance and disclosure practices of domestic firms enhanced considerably. This research found support for this and empirically proved that there is no statistical significant difference between corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed in India.

In conclusion this study contributes to several areas of research:

1. This research studies whether the interaction between globalization and the legal environment of the country affects voluntary disclosure practices of MNC subsidiaries.
2. This research adds to the emerging literature that uses country-level institutional features, such as legal origin to explain cross-country differences in governance and disclosure practices.
3. This research examines how practices of MNC subsidiaries' disclosures are affected by the legal environment of host country where it's listed when compared to domestic firms.
4. This research contributes to the growing literature on globalization, MNCs as well as India specific research.

Limitations of Study

The focus of corporate governance and disclosure study in this research has been on corporate annual reports which are only a part of the information set. However, as mentioned earlier the use of annual reports is widely accepted in prior research. Key consideration of content analysis with hand-collected disclosure data is that because the process is time intensive, sample sizes are often small. For example, Botosan (1997) uses hand-collected data for a sample of 122 manufacturing firms, and Guo *et al.*(2004) use hand-collected data for a sample of 49 biotech firms.Although sample size for this research is not too big, it fairly represents sectoral indices of BSE. Lastly as this study analyses data of sample firms for the financial year 2011-12 only, future study may be conducted with multiple year panel data.

Conclusions

In this research study, the corporate governance and disclosure practices of subsidiaries of MNCs as well as domestic firms listed in BSE were measured by doing content analysis of annual report of sample firms. Prior research suggested that domestic firms were disclosing less information compared to MNC subsidiaries in India. However, this research finding suggests that in Indian context, subsidiaries of MNCs are no more transparent than domestic firms. This research also indicates that corporate governance and disclosure practices of subsidiaries of MNCs and domestic firms have converged as there is no statistical significant difference in corporate governance and disclosure practices of MNC subsidiaries and domestic firms listed in India. It is because of improvement in overall corporate governance norms and enforcement by regulatory bodies. SEBI has formulated comprehensive corporate governance rules and regulations. Clause 49 of listing agreement announced by SEBI has considerably enhanced corporate governance and disclosure practices of Indian firms.This research concludes that institutional, legal and regulatory environment of a country has a major role in shaping corporate governance and disclosure practices of MNC subsidiaries as well as domestic firms.

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ANNEXURE – I

Instrument for Measuring GCD Score of Sample Firms

Component 1:	Board and Management Structure and Process	
	Sr. No.	*Disclosure of:*
	1	Details about current employment/position of directors provided?
	2	Details about previous employment/positions provided?
	3	When each of the directors joined the board?
	4	Details about whether the chairman is executive or non-executive?
	5	Detail about the chairman (other than name and executive status)?
	6	Details about the role of the board of directors in the company?
	7	Are the dates of board meetings disclosed?
	8	Is the aggregate board attendance disclosed for each meeting?
	9	Are directors attending over 60 per cent of the board meetings?
	10	Are attendance details of individual directors at board meetings disclosed?
	11	Do independent directors constitute at least 1/3 of the board?
	12	Do independent directors constitute more than 1/2 of the board?
	13	Do independent directors constitute more than 2/3 of the board?
	14	A list of matters reserved for the board?
	15	Is the list of audit committee (AC) members disclosed?
	16	Is the majority of AC independent?
	17	Is the chairman of the AC independent?
	18	Is disclosure made of the basis of selection of AC members?
	19	Is the aggregate attendance of AC meetings disclosed?
	20	Is the attendance of individual directors at AC meeting disclosed?
	21	Does the company have a remuneration committee?
	22	Is the list of remuneration committee members?
	23	Is the majority of RC independent?
	24	Is the remuneration committee chaired by an independent director?
	25	Is the frequency of RC meetings disclosed?
Component 2:	Board and Management Structure and Process	
	Sr. No.	*Disclosure of:*
	26	Is the aggregate RC meeting attendance disclosed?
	27	Is disclosure made of individual members' attendance in RC meetings?
	28	Does the company have a nominating committee?
	29	Is the list of members of the nominating committee disclosed?
	30	Is the majority of nominating committee independent?
	31	Is the frequency of NC meetings disclosed?
	32	The existence of a strategy/investment/finance committee?

	30	Is the majority of nominating committee independent?
	31	Is the frequency of NC meetings disclosed?
	32	The existence of a strategy/investment/finance committee?
	33	The number of shares in the company held by directors?
	34	A review of the last board meeting disclosed (for example, minutes)?
	35	Whether they provide director training?
	36	The decision-making process of directors' pay?
	37	The specifics on performance-related pay for directors?
	38	Is individual performance of board members evaluated?
	39	Is appraisal of board performance conducted?
	40	The decision making of managers' (not Board) pay?
	41	The specifics of managers' (not on Board) pay (for example, salary levels and so on)?
	42	The forms of managers' (not on Board) pay?
	43	The specifics on performance-related pay for managers?
	44	The list of the senior managers (not on the Board of Directors)?
	45	The backgrounds of senior managers disclosed?
	46	The details of the CEO's contract disclosed?
	47	The number of shares held by the senior managers disclosed?
	48	The number of shares held in other affiliated companies by managers?
Component 3:	Ownership Structure and Investor Relations	
	Sr. No.	*Does the annual report contain?*
	1	Top 1 shareholder?
	2	Top 3 shareholders?
	3	Top 5 shareholders?
	4	Top 10 shareholders?
	5	Description of share classes provided?
	6	Review of shareholders by type?
	7	Number and identity of shareholders holding more than 3 per cent?
	8	Number and identity of shareholders holding more than 5 per cent?
	9	Number and identity of shareholders holding more than 10 per cent?
Component 3:	Ownership Structure and Investor Relations	
	Sr. No.	*Does the annual report contain?*
	10	Percentage of cross-ownership?
	11	Existence of a Corporate Governance Charter or Code of Best Practice?
	12	Corporate Governance Charter/Code of Best Practice itself?
	13	Details about its Articles of Association (for example, changes)?
	14	Voting rights for each voting or non-voting share?
	15	Way the shareholders nominate directors to board?
	16	Way shareholders convene an Extraordinary General Meeting (EGM)?
	17	Procedure for putting enquiry rights to the board?
	18	Procedure for putting proposals at shareholders meetings?
	19	Review of last shareholders meeting (for example, minutes)?

(Source: Subramanian and Reddy, 2012)

Factor Rating Method: Vendor Evaluation System

Mahendra Singh

Abstract

Vendor selection and evaluation is gradually seen as a strategic issue in SCM. Today emerging trend is to select vendors where long-term relationship is desired. Present paper is study of factor rating method in vendor evaluation system (VES). Study has been done by analysis of secondary literature available and data collected from selected companies. VES was studied to find out supplier's credentials and capabilities in supplying. Study finds efficient application of factor rating methods in VES with respect to its objectivity, methods by assigning objective weightages to these factors. The study comes up with critical evaluation on select cases.

Key Words : *Purchasing, Factor rating, Vendor evaluation system, India.*

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In the global business scenario competition is no longer between organizations, but among supply chains (SC). Efficient Supply Chain Management (SCM) has therefore become a potentially valuable way of securing a competitive advantage and improving organizational performance (S. Li et al., 2006). In effective Supply Chain Management, correct vendor evaluation plays the most important role in formulating sub-contracting strategies. Correct vendor evaluation helps an organization, directly and indirectly, to improve product quality, and reduce production costs and lead times for new product introductions (Pal 2010). Supplier evaluation and selection turn out to be one of the key issues that affect the product's competitiveness (G. Vanteddu et al., 2011). The understanding of the why and how Vendor Evaluation System (VES) affects SCM performance, which areas are especially important and which are the important moderator effects, is still incomplete. The application of Numerical methods in managerial decision making is quite inherent and so are supply chains. As important function of SCM,

VES has capabilities of affecting overall efficiency. Factor rating finds its application for finding out supplier's credentials and capabilities in supplying specific goods/ services to the customer organization. VES helps to evaluate vendors in objective manner specially- how this assists in fact-based decision making, gives basic criterion for running supplier reward programme, and provides a supplier data set within various components, functional and technological information and provides a unified procedure for all VES in organisations (Sharath, K. et al., 2012). A correct relevant business decision based on bundles of very large volumes of both internal and external data is possible with relevant mathematical method only (Sahay, B.S and J. Ranjan, 2008). The selection of appropriate vendors has long been one of the most important functions of any company's purchasing department. The vendor evaluation problem is an unstructured, complicated, and multi- criteria decision problem which is being solved with the help of data analysis (Jiann L., et al., 2008). Detailed analysis shows five major and critical factors influence supplier selection in manufacturing; principal requirements, strategic importance, capacity and capability, partnership approach and regulatory adherence. The evaluation attributes are diverse in nature and careful attention is required by the evaluation committee when conducting vendor evaluation (Mohanty, M.K. and G. Padmavati, 2011). The analysis of criteria for selecting suppliers and measuring the performance of suppliers, has been the focus of many academics and purchasing practitioners since the 1960's. From the purchasing literature, 50 distinct factors (characteristics of vendor performance) have been highlighted as being meaningful in a vendor selection decision (Ellram, L., 1990 and G. Dickson, 1996). The study carried out by Pal and Kumar (2010) outlined a "trait based approach" for vendor selection and evaluation for expensive procurements in large businesses through a simple and easy-to-use mathematical model using safety, quality, delivery and cost criteria. They have used 16 traits including safety (S), quality (Q), delivery (D) and cost (C) areas for evaluating the performance of a vendor on a 10 point linear scale. Starting with an evaluation of each "supplier-supply item" combination, gross averages were computed for each of the SQDC areas to develop an "Overall Performance Index" for each supplier-supply item combination. There are primarily four drivers of cost in a supply chain, namely, infrastructure, inventories, transportation and information (Chopra and Meindl,2004). These indices form a decision making "Vendor Performance Dashboard." In view of simplicity in vendor evaluation decision making factor rating methods finds a good place. But the effective application and proper weight assigning for different factors is still a big question for decision makers.In this present paper the methods in use for vendor evaluation have been studied in the selected Indian manufacturing companies and their inter-relationships are analyzed for knowing how factor rating assists in fact-based decision making, gives basic data for running vendor appraisal and reward programme, and gives a vendor data set for various elements.

2. Literature review

Prior works done in area of supply chain management and vendor selection and evaluation system provides enough back ground for studying application of factor rating in VES. Several research papers on vendor performance evaluation which include mathematical and heuristic modeling have already been published but few have been applied successfully. In effective Supply Chain Management, correct vendor evaluation plays the most important role in formulating sub-contracting strategies. Supplier evaluation is one of the most interesting and most talked about subjects in the area of organizational strategic planning among senior executives and entrepreneurs around the globe. Today's high-technology market poses an even greater challenge to both customers and vendors as buyers are frequently affected by "mass confusion" and "customer bewilderment" while at the same time vendor choice becomes increasingly challenging (Dickson, G.,1996). Kraljic (1983) proposes a four-stage approach as a framework for developing supply strategies for single products or product groups. In the first stage, a company classifies all its purchased products in terms of profit impact and supply risk. Subsequently, the company weighs the bargaining power of its suppliers against its own power. Then, the company positions the products that were identified in the first stage as strategic (high profit impact and high supply risk) in a portfolio matrix. Finally, it develops purchasing strategies and action plans for these strategic products, depending on its own strength and the strength of the supply market. Three general purchasing strategies are recommended: exploitation (in case of buyer dominance), balance (in case of a balanced relationship), and diversification (in case of supplier dominance). While partner selection takes place with large manufacturing firms, the following factors are to be considered when choosing a partner; in addition to quality,

total cost and cycle time performance (Weber, C. et al., 1991). Researchers used the 23 factors identified in Dickson's study (1996) as the basis of their study. Review of the literature since Dickson's study with the aim of providing a comprehensive view of the criteria that academics and purchasing practitioners considered important in the supplier evaluation.Various mathematical tools have been prominently used for factor rating in VES. Literature review shows that methods like Regression analysis is also used to establish the relationship between the overall supplier evaluation factors with the identified dimensions, factor analysis, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy tests whether the partial correlations among the variables are small (Hair, F., et al., 1998). Again simple statistical tools like measures of central tendency are also in use for vendor evaluation in industries.

2.1. Role of vendor evaluation system in managing supply chains

Suppliers are part of integrated supply chain management today. According to Newman (1989) while offering some excellent opportunities for achieving economies and control of purchase, single sourcing clearly generates some potential problems. These include erosion of the supplier base for the buyer; and for the supplier, loss of technological thrust, excess control, and loss of supplier identity. Although Newman's findings may be alarming, loyalty in buyer-supplier relationships can help overcome some of these problems (Youssef et al., 1996). Vendor selection is the process by which vendors are reviewed, evaluated and chosen to become part of the company's supply chain. Shin et al. (2000) argue that several important factors have caused the current shift to single sourcing or a reduced vendor base. First, multiple sourcing prevents vendors from achieving the economies of scale based on order volume and learning curve effect. Second, multiple vendor system can be more expensive than a reduced vendor base.

Treating suppliers as partners, not as adversaries, is a necessary condition for minimizing, if not eliminating, these fears. Procurement deals with multi sourcing and vendor development activities. The existing vendors are needed to be re-assessed for continuation of their approval. There are quite a large number of vendors in some of the organizations.With limited resources, it becomes difficult to organize re-assessment in time. For want of any transparent system, the cases have to be dealt uniformly and visits are being organized. The vendor rating system can provide a transparent system, using which decision can be taken to dispense with field visits for re-assessment. The rating system can be utilized as other decision making tools also.

The quality of product/services depends upon the quality of the inputs, processes, etc. It is, therefore, essential that the inputs are procured only from those vendors who have demonstrated their capability to supply the inputs of desired quality at an acceptable cost and within the agreed time schedule. It is, therefore, essential to rate or classify the vendors on a scientific basis. This standard aims at providing the necessary objective and step-wise guidance for Vendor Rating. Vendor rating is a process of assessing the performance of a vendor in comparison with other vendors with a view to drawing up a comparative scale. This involves processing of huge amount of data into manageable information which in turn provides objective criterion for (Shin et al., 2000).

a) Vendor selection for issue of enquiries,
b) Acceptance of tender/distribution of quantities where more than one tenderer qualifies to get order,
c) To give feed back to the vendors on their performance and to guide them for improvement of their performance, and
d) Decision on continuation/suspension of dealings with vendors.

Efficient Supply Chain Management (SCM) requires efficient vendor selection. Strategic management decisions impact all areas of a firm. Once such decisions are made, the criteria for making subsequent operational decisions must be re-examined. New strategic directions may require new criteria and a re-emphasis of the existing criteria used in making the operational decisions necessary to implement them. An important area of operational decision making is purchasing. One major aspect of the purchasing function is vendor selection. In today's competitive operating environment, it is impossible to successfully achieve low cost, high quality products without having satisfactory vendors. Thus, one of the most important purchasing decisions is the selection and maintenance of a competent group of vendors (Farzipoor Saen, 2009).

3. Research methodology

Indepth analysis of literature provides enough scope for research in areas of SCM. Shuttleworth (2009) describes a literature review as a critical, in-depth evaluation of previous research. Thus, a literature review is both a summary and an

explanation of the complete and current state of knowledge on a topic. Present study is done on basis of literature review and case studies are followed by assessment methodology. Case study methodology is considered suitable for such systems. Furthermore, case study approaches cover study on specificity and particularity; behavioral study on selected cases; cover contextual condition that is important to the occurrence under study. Here different cases are assessed for studying factor rating specifically its application, methodology and results in VES.

4. Study of vendor evaluation systems

Organisations had used some approaches for vendor selection in the past. Table 1 lists the reviewed papers based on applied techniques. However, all the references in Table 1 rely on the assumption of complete homogeneity of vendors and do not consider the slightly non-homogeneous vendors, for determining the relative efficiency of slightly non-homogeneous vendors (Farzipoor Saen, 2009). Farzipoor Saen developed an algorithm that is based on AHP and chance-constrained data envelopment analysis (CCDEA). However, the proposed algorithm has five steps and it is computational burden. To the best of author's knowledge, there is not even one reference that discusses the problem of slightly non-homogeneous vendor selection in a straightforward manner.

Table 1
Vendor selection techniques

Technique Name	References
Cost Based Model	Youssef et al. (1996)
Expert systems	Vokurka et al. (1996), Kwong et al. (2002)
Data envelopment analysis (DEA)	Weber (1996), Braglia and Petroni (2000), Weber et al. (2000), Liu et al. (2000), Forker and Mendez (2001), Ross and Droge (2002), Talluri et al. (2006)
Analytic hierarchy process (AHP)	Bhutta and Huq (2002), Kahraman et al. (2003), Cebi and Bayraktar (2003), Wang et al. (2004), Liu and Hai (2005), Xia and Wu (2007)
Integer programming	Dahel (2003), Ghodsypour and O'Brien (2001), Talluri and Baker (2002), Ip et al. (2004)
Dual-matrix approach	Chandra et al. (2005)
Goal programming	Karpak et al. (2001), Talluri and Narasimhan (2003), Kumar et al. (2004), Hajidimitriou and Georgiou (2002)
Genetic algorithms	Sha and Che (2006)
Artificial neural Networks	Choy et al. (2002)
Factor analysis	Lasch and Janker (2005)
Fuzzy mathematical Programming	Ohdar and Ray (2004), Chang et al. (2006),

The evaluation of vendors is a complicated decision problem, because of the following reasons (Mohanty, R. P. and S. G. Deshmukh, 2001).

a. The complexity comes from two main areas. The first is the relative difficulty to conceptualize and structure numerous components of the evaluation problem into an analytical framework. The second is the nature of components in this process, some are quantitative whereas others are subjective.

b. As the competition in the marketplace increases, there exists a large search space for decision makers.

c. There are multitudes of factors/attributes involved in a selection process which are often conflicting and sometimes complementary. Many times, such factors are non-expressible and they might reflect psychological aspects such as qualitative considerations.

Beside these, it is all dependent on organisation and vendors that what technique will be used for VES. The literature review gives following methods which are practised worldwide by most of the manufacturing organisations. Yahya and Kingsman (1989) have discussed different methods of vendor rating such as:

a. Categorical method,
b. Simple linear weighted average method,
c. Cost –ratio method, and
d. Analytical Hierarchy Process (AHP)

AHP has been applied successfully for VES (Mohanty, R.P. and S.G. Deshmukh, 2001, and Wedley, W.C. 1990). In addition simplicity, ease of use and flexibility, its ability to handle ill-structured problems has led AHPs power and popularity as a decision making tool (Wedley, W.C., 1990 and Vergas L.G., 1990).

5. VES in Indian industry

Indian industry advanced in most areas, where organizations are applying factor rating method in VES. Firmest important reason for application of method is ease of application. In this section, empirical examples of vendor evaluation system are used to demonstrate that how factor rating method is more appropriate and applied than the traditional method.

5.1. Case 1:

5.1.1. Case description: An example of Public sector organisation engaged in Research, Design and Standardization of product, services, and procedures for their parent organisation has been taken. Organisation follows IS: 12040-2001 which provides the broad guidelines for development of Vendor Rating System. The standard stipulates Quality, Price, Delivery, Service and System as five key factors to work out rating system. As organisation maintains vendor list basically on quality consideration, for our purpose, price may not be a very significant factor. The information on price aspect will not be readily available and data base will be very vast, comprising number of tenders from number of purchasing units. The standard also stipulates that need for development of vendor rating system should be decided keeping cost of vendor rating system vs anticipated returns and other factors in view. Accordingly, the rating system based on four key factors viz.quality, delivery, service and system will be good enough to meet the requirement at organisation.

5.1.2. VES Method: The Vendor Rating is done Based on three criteria:

1. Quality performance of vendor: based on quality of products produced during period under consideration,

2. Delivery Performance of Vendor: based on supply performance of vendor against orders within delivery period,

3. Service and System performance of vendor: based on general performance such as reassessment, updating infrastructure etc. and maintenance of quality control systems. Specific method has been defined by organization that for majority of items for which vendor list is maintained, the quality shall be treated as critical and delivery as sub-critical path. For this classification, the standard lays down following weightages (Table 2):

Table 2: weightage and factors

Factor	Weightage (%)
Quality	35%
Delivery	20%
Price	10%
Service	5%
System	30%

Here quality has been given highest weightage of 35%, delivery is rated 20%,system rated 30%, whereas price is having weightage of 10% only. Lowest weightage has been given to service, of 5 %.The service and system performance are having common indicators for case organisation approved sources, accordingly these are considered to be included in one group. Following weightage is considered appropriate:

Table 3: weightage

Factor	Weightage (%)
Quality performance	**50%**
Delivery performance	**35%**
Service & system performance	**15%**

Final weightage for vendors is assigned on the above three criteria. The above table shows that highest weighted factor was quality performance (50%). Delivery performance and service and system performance contribute the other half part. The overall vendor rating will be weighted average of three parameters indicated above. Accordingly, overall vendor rating (VR) is to be determined based on following formula:

$$VR = (50 \times QR + 35 \times DR + 15 \times SR) \div 100$$

Where QR= Quality Rating
DR= Delivery Rating
SR= Service & System Rating

Determination of Quality Rating:

The quality of product supplied is adjudged based on rejection during product inspection, performance of samples in consignee end testing (wherever applicable) and field complaints from consignee. As consignee end testing is not done for all products and this exercise is similar to consignee complaints, the quality rating is proposed to have two components as under:

a. Quality Rating based on *Product inspection* results: Weightage: 60%

b. Quality Rating based on *Consignee end results* and/ or field complaints:weightage: 40%

c. The overall quality rating (QR) is to be worked out based on following formula:

$$QR = 0.60 \times QR1 + 0.40 \times QR2$$

Where QR1= Quality Rating in Purchase Inspection of Product

QR2= Quality Rating Based on Samples testing from Consignee End and/ or Field Complaints

Determination of Quality Rating in purchase Inspection (QR1):

$$QR1 = Q1 \div Q \times 100$$

Where Q1= Total Quantity Accepted during product during period under consideration.

Q=Total Quantity offered during product inspection during period under consideration

Determination of Quality Rating Based on Consignee End sample testing and field complaints (QR2):

This value consists of two components:

a) Determination of Quality Rating based on Result of consignee end checks: (QR2A)

The values to be given based on testing results as under:

$QR2A = 100$

If First Sample has passed in Consignee end Check

$QR2A = 40$

If First Sample has failed but second sample has passed in Consignee end Check

$QR2A = 0$

If both Samples fail

In case consignee end check has not been done for firm, if item is included in consignee end checks, QR2A Values for such firms will be 80.

b) Determination of Quality Rating Based on Field Complaints (QR2B): The values to be given will be based on number of established complaints received from consignee during period under consideration. In case of no complaint, full value to be given and in case of 4 or more complaint, no value is to be given. In between distribution will be as under:

QR2B =100 if no field Complaint

QR2B =80 if one field Complaint

QR2B =55 if two field Complaint

QR2B =25 if three field Complaint

QR2B =0 if four or more field Complaint

c) Determination of QR2:

For Items where regular consignee end checks are done:

$$QR2 = (QR2A + QR2B) \div 2$$

For items where regular consignee end checks are not done:

$$QR2 = QR2B$$

Determination of Delivery Rating:

Delivery Rating (DR) is to be worked out by following formula:

$$DR = \left(\frac{Q1}{Q}\right) \times T/(T \times p + T1 \times q)$$

Where Q= Total ordered Quantity

Q1= Quantity supplied within D.P.

T= Delivery Period

T1= time taken to supply full quantity

$$p = Q1 \div Q$$

$$q = 1 - p$$

If vendor has not undertaken any supply during period under consideration, the DR value shall be Zero (0) for such vendors. However a note shall be indicated in vendor rating sheet.

Determination of Service and System Rating:

The rating is basically reflective of vendor's performance for compliance of provisions of approval and instructions issued by organisation for updating of documents/ infrastructure and maintenance of proper systems as found out during audits/ inspections etc.

Service & System Rating (SR) to be worked out on following formula:

$$SR = (SR1 + SR\ 2) \div 2$$

Where SR1= Service Rating

SR2= System Rating

Determination of Service Rating in timely action about Reassessment (SR1) includes the following:

1) Timely Re-assessment: Weightage 25% of SR1

a) Full Marks are assigned, if timely application and timely successful reassessment done,

b) 75% Marks: if timely application but delay in form of extension by firm etc,

c) 50% Marks: if delayed application but reassessment is got done on scheduled date, and

d) 0% Marks: unsuccessful re-assessment such as failure of samples during reassessment etc.

2) Timely action and compliance of directives: weightage 25% of SR1

a) Full Marks: Documents/ Infrastructure updated within stipulated time,

b) 50% Marks: Documents/ Infrastructure updated within extended time, and

c) 0% Marks: Documents/ Infrastructure not updated even within extended time.

3) Complaints from Zonal Railways about behavior in tenders etc: Weightage 50% of SR1

a) 10% of marks to be deducted for every complaint received.

Determination of System Rating (SR2):

This is decided based on observation regarding reassessment / quality audit/ inspections and other general parameters which are not covered in rating system,
SR2 Values to 10-100

Classification of Vendors:

Based on vendor rating (VR) calculated above, each vendor will be classified into three classes as under:
Rating Obtained Class of Vendor.

Table 4: classification of vendors

Vendor Rating	Category
90 and above	A
75 to 90	B
Below 75	C

5.1.1. Analysis: The standard lays down the comparative weightage of various factors based on criticality of component on quality and delivery consideration. Organization used factor based rating system on different parameters for evaluation of suppliers. Company does classification of vendors on the basis of vendor rating (VR) obtained. A category of vendors are those who score 90 and above. 75 to 90 scorers have been categorized into B category. Vendors who have scores below 75 are categorized in C category.

5.2. Case 2:

5.2.1. Case description: VES practised by steel manufacturer in western India had been examined. Company is having large number of suppliers from different parts of country and industry. Efficient supply chain management is again

an important issue for the organization. Here VES used in vendor management is again factor rating.

5.2.2. Vendor rating score is calculated on following criteria:

a. Score of receipt inspection of material at organisations stores,

b. Timely deliveries,

c. Inspections results during pre-dispatch inspection, and

d. Site performance/in process rejection.

Table 5: Criterion and corresponding weightage

Criteria	Weight Assigned (Points)
Quality	50
Timely deliveries	30
Inspection at Vendor end (PDI)	10
Site Performance/in process rejections	10

Rating Calculation: Rating calculations are done as follows:

a. Quality = Receipt Quantity- Rejected Quantity) x 50 ÷ Receipt Quantity

b.Delivery= (in time receipt quantiy-Rejected quantity) x 30÷ purchase order quantity

c. Pre Dispatch Inspection Results:

Data is collected from QA inspection reports during PDI. If percentage of acceptance is 100%, 10 points are assigned. If acceptance is between 96 % - 99 %, 7 points are assigned. If acceptance is between 90 % - 95 %, 4 points are assigned. If acceptance is below 90%, (-10) are assigned.

d. Site Performance or in process Rejections: the fourth area of rating calculation is based on site performance with sense of timely deliveries and quality. Finally it is indicated negatively in-process rejections. The method utilized in case is:

i) For no site incidences, or no in-process rejections in the review period, 10 points are assigned.

ii) For 1 incidence, 7 points are assigned.

iii) For 2 incidences, 4 points are assigned.

iv) For site incidences / in in-processes rejections above 2 during the review period, (-10) points are assigned.

e. Vendor Rating Grade: overall vendor rating grades are given as in table 6.

Table 6: vendor rating grade

Rating	Grade
>90 %	Excellent
76%-90%	Good
60%-75%	Satisfactory
<60%	Unsatisfactory

5.2.3.Analysis: here company used different five factors for vendor rating. Highest weightage has been given to quality factor of 50 %. Timely deliveries have weightage of 30 %. PDI or inspection at vendor end. Site performance / in-process rejection has been given weightage of 10 % only. Case 2 organizations utilized this rating grade for awarding their performance. The same factor ratings were in use for making improvements in different parameters whereever scoring is negative towards performance. Here rating above 90 % is meant for excellent supplier rating. Ratings between 76-90% are considered to be good. whereas ratings of 60-75 % are graded as satisfactory, but ratings below 60% are considered as unsatisfactory and supplies are discontinued from such suppliers.

5.3. Case 3:

5.3.1.Case description: The situation discussed was practised at one of the well-known heavy electrical manufacturers of India. The company has different manufacturing units throughout the country. Materials management department of the company is highly dependent on their vendors for having high level of efficiency. The company uses factor rating method for evaluating supplier's performance which is referred as supplier performance rating (SPR).

5.3.2.VES Method: Vendor performance rating is used for assessing performance of supplier in comparison to other. This helps in vendor selection decisions. Supplies are discontinued if rating is below a certain limit (defined). Here, supplier performance rating is done considering the following main factor. These ratings are calculated for each consignment or purchase orders. Overall rating is done on three factors viz. quality, delivery and service. The detailed factor ratings are as given in table7.

Table 7: Overall factor rating

Factor	Weightage
Quality	60
Delivery	30
Service	10
Total	100

Quality rating(QR) 60% weightage

$$QR = \frac{Q1+0.75\times Q2+0\times Q3\times 60}{Q}$$

Where

Q= Quantity inspected

Q1= Quantity accepted

Q2= Quantity accepted with concession/ deviation/ rectification

Q3= Quantity rejected

Delivery Rating (DR) 30% weightage

Suppliers were rated on delivery parameters wherein Delivery rating shall be 30 in case of adherence to purchase order (PO) delivery. For non-adherence to PO delivery (i.e. delay in supply), marks to be deducted in proportion of delay to PO delivery, where deduction is calculated as:

Deduction = 30 x delay in days/PO delivery in days.

Service, Rating (SR) 10% weightage

The criteria for service rating were based on the demerit factor (negative rating) to be updated by the user/ quality/ materials management group. The service rating shall be 10 in case there is no negative feedback against the supplier for the given supply. Else, the service rating should be reduced proportionally based on the demerit factor. In case negative feedback (substantiated by documentary evidence) is received from shop floor/ Site on the supplies made, at a later date, demerit factor should be applied again accordingly.

By calculating all three different ratings, overall rating was calculated as:

Supplier Performance Rating (SPR) = QR + DR + SR

5.3.3. Analysis: In present case supplier rating pattern is simple and objective. Utilization of three primary factors (quality, service and delivery) has been done. SPR shall be calculated for the period of previous year plus elapsed period of current year or average of last three executed purchase orders, whichever is more as the case may be. In case no PO has been executed by the supplier, SPR will be taken as "not assessed." Further usage of performance rating is done as per the SPR score. On the basis of score, different supplier grades have been awarded like A1, A, B, C, and D. The detailed criteria for different grading are given in table 8.

Table 8: SPR score, grade and action

SPR Score	Grade	Action
>95	A1	Company may consider award appreciation/ commendation letter
>90 and <=95	A	Supplier can be considered for self-certification or for reduced witness points during inspection
>75 < =90	B	No action in normal course. If any deterioration comes to notice on analysis, the supplier may be informed
>=60 <=75	C	(i)Thorough analysis for identification of areas for improvement (ii) Enquiry to be sent only after concerned MM head approval
< 60	D	To be dealt in accordance with the extant guidelines on Suspension of Business Dealings with Suppliers/ Contractors

The above scores are useful in taking decisions regarding improvements and supplier selection or continuation. Organisation also utilizes same grading for awarding its suppliers.

6. Discussion

Indian manufacturing sector is developing in good pace and allied industries too. Managing supply chains has been emerged as challenge for such industry. Despite having large number of vendors companies are managing efficiently their procurement and purchase activities. The above study shows way of discussion that factor rating method is still useful where number of vendors is not too large. In both cases discussed, factor rating method has been used for vendor evaluation and rating. The basic framework is dependent on factors and their weightage. In case 1 company is applying different parameters of vendor evaluation by means of assigning different weightage to factors like quality of products, delivery performance of supplier and service system performance by the vendor. Again classification of different performances has been done for more objectivity in vendor evaluation. Similarly in case 2 company used factor weightage assigning method on different factors like Quality, Timely deliveries, Inspection at Vendor end (PDI), Site Performance/in- process rejections. The companies used their own way of deciding weightage to different factors. Overall rating of vendor was dependent on three ratings: quality rating, delivery rating, and services system rating. Company used to calculate different ratings in different fraction like quality of product, quality of service, quality of delivery (in time). In Case 2 company used different grading system on the basis of performances by vendors like: Excellent, Good, Satisfactory, and Unsatisfactory. Here rating calculations had been done in different factors like quality and delivery performances using data from stores reports regarding different receipts of materials. VES provided base for multi criterion decision making in both above discussed cases. Finally it can be said that further improved systems of VES can be used, which are widely in practice in different sectors. In case 3 the application of factor rating is again done in classical way. Supplier performance rating is calculated with help of calculating three different ratings-quality, delivery and service. Again objective weightage has been assigned to these factors. Further these factor ratings are used to categorize, rate or grade, improve or control supplier performance. Above all these all, factor ratings are also used for award and recognition of vendor based on their performance. When looking into a compsarative mode of these all methods at different organization it was found that each organizations decided different factors for rating on their own priorities. Weightage to these factors is also subject to objectives of VES in case organization. In case 1 five different factors have been used like quality, delivery, price, service, and system. Where as in case 2, Quality, delivery, PDI and site performance factors has been used. The case 3 included three major factors like quality, delivery and service. Weightage assigning is again one complex area in these cases. It has been found that major weightage in all cases has been given to quality (35, 50 and 60 % respectively in case 1, 2 and 3). While second important factor in these cases was delivery (20,35 and 30 % respectively). Factor of service was again common in all these three cases with weightage of (15, 10 and 10%). Overall vendor rating has been used for grading or classifying vendors. The classifications have been done on the basis of score. Case-1organization rated vendors in category A, B and C on the basis of scores. Case-2 organisation categorize in form of excellent, good, satisfactory and unsatisfactory grades which are useful in knowing the performance of particular vendor. Decision may be done on repurchase or awarding vendor on the basis of such grades here. On the basis of SPR score case 3 organizations go for different actions like awarding or appreciation, continuing or discontinuing supplies from vendors. Different grades are given on the basis of SPR score like A1, A, B, C, and D, which indicates performance of vendor. The comparison shown that factors used in such vendor ratings are specific to organization but are usually driven by basic frame work of vendor rating system. Weightages are again different in different systems but they are assigned while keeping in mind the level of impact of such performance in overall performance of vendor.

4. Findings and Conclusion

Vendor evaluation and selection has always been considered as an important function of SCM for the companies. Teaming up with the right vendor and managing them is getting more significance now with the strategic partnerships being implemented with vendors to achieve a competitive advantage and the involvement of suppliers in product development stages. Therefore, effective methodologies that have the capability of evaluating and continually monitoring suppliers' performance are still needed. The paper gives insight on Vendor Evaluation System. The essence of VES lies for Multi criterion decision making in supply chain

management. The VES methods practised are being discussed here. The literature review reveals that they are quite complex in nature. Difficulties in VES are common. The researchers in past tried and came up with many solutions like AHP and. Fuzzy Logic. While coming to Factor rating method it was found that it was able to control most of the difficulties and came up with solution for Multi criterion decision making for Vendor Evaluation System. Later the Factor rating is examined with empirical studies on two cases of Indian Industry where comfortably factor rating methods are being used for such decisions. Some of the advanced methods are still lapsed for application in Indian industry. Kahraman et al. (2003) stated, some criteria may be impractical to evaluate, information may be difficult to obtain, complex to analyze, or there may not be sufficient time to perform these issues. When the performances of alternative vendors can be only approximately determined, Fuzzy Set Theory (FST) efficiently helps to formulate uncertainty and inaccuracy in vendor evaluation problems. The present study shows how efficiently factor rating method is applied in above three cases. Factor and their rating based on weightage provide enough ground for evaluating vendor performance. Such ratings are quite helpful in different decision areas like vendor evaluation, vendor selection, vendor relationship management and day to day co-ordination with respect to supplies. In above cases we found factor ratings are been used for recognition and warding vendor. Ratings have also been used in penalizing defaulter suppliers or notifying them for making improvements in the concerned areas of performance like quality and delivery as in cases.The comparison shows that factors used in such vendor ratings are specific to organization but are usually driven by basic frame work of vendor rating system. Weightages are again different in different systems but they are assigned while keeping in mind the level of impact of such performance in overall performance of vendor. Furthermore, the extension of this methodology which can handle veto situation may give more realistic results for strategic vendor evaluation problem.

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Gravity Model: India's Exports

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Abstract

The Gravity model has created somewhat strong interest amongst trade economists since 1990s. While the model has explained trade direction of many countries only a few studies focus on India's case. Indian international trade has increased tremendously in last 25 years, thanks to the renewed vision of realizing the gains from trade and more liberal trade policies. These changes are also supported by a huge improvement in technology sector.

The present paper investigates the regional and commodity diversification of India's trade and specifically tests the Gravity model. The trade between two countries is dictated by sizes of their GDPs and the distances. Clearly higher GDPs of both countries would increase the trade volume of these trading partners, while increase in distance between the two is expected to lower the exports. India's trade primarily has been with many Asian and European countries and with USA. We shall test whether this trade fits the explanation of the Gravity model or not. For the sake of suitable estimation we use only exports of India as a proxy for her total trade volume.

After the introductory section, Section 2 explains the theoretical part of the Gravity model and reviews the literature. Section 3 explains the trade relations of India with other countries and tests the Gravity Model for its relevance. Section 4 summarizes the results and makes the conclusion. Our results are robust, indicating that both hypotheses fit well for Indian exports.



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Section 1 : Introduction

Over the years numerous explanations have been offered for the economic gains from international trade. While the traditional explanations of Ricardo's comparative advantage theory, Heckscher –Ohlin-Samuelson theorem and Neoclassical model of trade concentrated on the production side, some explanations such as Linder's hypothesis pointed out the advantages from international trade by focusing on demand side. The newly evolved explanation of the Gravity model however looks at physical distance between two countries as the main reason for gains from trading. Admittedly, some countries would not freely trade with each other due to political reasons, despite being very close geographically, such as India and Pakistan, North Korea and South Korea; nonetheless, as a general argument, the Gravity model predicts that the trade volume is higher/shorteras per the distance between trading countries. This paper aims at testing this hypothesis after initially exploring the arguments for it. While some studies of similar nature for other countries do exist in large number, for India there are very few such studies.

The remainder of this paper is organized as follows: Section 2 carries out extensive literature survey to summarize the findings of similar studies of the Gravity model. This section also explains the main arguments of the Gravity model and constructs the model. Section 3 evaluates India's export data with ten other trading partners and puts the model to test. The sample of ten countries is selected in such a way that countries with short and long distances are represented. Section 4 carries out the summary of results and makes the conclusion.

Section 2: Literature Review and the Gravity Model Construction

The origins of the Gravity model are in the classic Newtonian argument in Physics about the Earth's gravity. Just like farther the distance would create lower gravity and a smaller attractive force, farther the geographic distance in international trade is expected to generate lower trade volume for the countries. Included in this argument is the realization that when countries are far apart, there are increased number of bottlenecks created by higher transport cost, fewer cultural similarities, demand conditions such as consumer preferences and expectations. Of course, the trade volume is also dependent upon the stage of economic growth, so the model also gives enough credence to the levels of real GDPs of the trading partners. Therefore, in simplistic terms the arguments of the Gravity model can be summarized as: 1) Farther the physical distance between two trading nations, the lower is the expected trade volume and 2) the Higher are the real GDPs of the trading nations, the greater is the trade volume.

Even if the model's arguments are simplistic in nature, its predictability of trade volume is consistently high. Numerous studies such as Anderson (2010), Leamer and Levinsohn (1995), Bergstrand (1985) and Feenstra, Markusen and Rose (2001) have tested the relevance of the Gravity model and have concluded that the model has substantial predictability for the empirical experiences.The standard textbooks in international economics in general and in international trade in particular, spend a lot of pages in describing the model. Famous textbooks by Krugman-Obstfeld (2010), Husted-Melvin (2013), Feenstra-Taylor (2013) and Appleyard- Field (2014) all have included the discussion of Gravity model in their analysis of modern theoretical explanations of why countries trade. Appleyard-Field book concludes that there is a little doubt about the trade volume being satisfactorily explained by the Gravity model, but the question is what other explanatory variables should appear in this equation. In a recent paper by Stay and Kulkarni (2013)the Gravity model is applied to the case of UK and her trading partners. They conclude that the model does possess the ability to explain the trade volume.

Development of the Gravity Model for Estimation:

Using Anderson (1979) and Anderson and Wincoop (2003) as the basis of theoretical arguments, the testable model developed is as follows. Appealing Newton's law of gravity which claims that 2 objects X and Y, with distance (D_{xy}) between them and with masses of M_x and M_y will have force of mutual attraction (MA) as follows:

$$MA = \frac{J.M_x.M_y}{D_{xy}\ldots\ldots} \quad (1)$$

(1) Substituting trade volume on the left hand side between 2 countries A and B, recognizing that Mass can be measured by real GDP, Y_A and Y_B respectively we can state

$$T_{AB} = \frac{J.Y_A.Y_B}{DAB} \quad (2)$$

(2) For the estimation purposes we can take log form of both sides to express the equation (2) as follows:

$$\log T_{AB} = J + \log Y_A + \log Y_b - \log DAB + e \quad \ldots \quad (3)$$

In case of the one year lag of effects of changes in GDP we can express equation (3) as follows:

$$\log T_{AB}^{t} = j_{+} \log Y_A^{t-1} + \log Y_B^{t-1} - \log D_{AB} + e_t \quad \ldots\ldots \quad (4)$$

We use the data of India's ten trading partners to test the Gravity model. Moreover, the trade volume is measured by exports alone as there is (assumed) one-to-one relationship between exports and total trade volume. In the following section we carry out the actual estimation.

Section 3: Case of India's Trade Volume and Gravity Model

Since the reforms of 1991 Indian trade has become more open, creating opportunities for more exports and imports. Therefore, there has been commodity as well as regional diversification in India's trade. While before reforms, India had to import items like agricultural implements, heavy machinery for manufacturing, and oil, after reforms the imports more influenced by oil, manufacturing equipment, fertilizers, edible oils, iron and steel, papers and computer

technology. As far as the exports are concerned, India's modern exports consist of 7500 commodities, with leading one is the computer software. India has made trade links with almost all regions of the world with exports finding the destinations to 190 countries and imports originate from 140 countries. It is interesting to note that 95% of India's trade is done by sea with four major ports at Mumbai, Chennai, Kochi and Kolkata. Overall there are only 12 ports that are responsible for 90% of the total trade by water. The road (land) trade is not possible due to the mountain ranges in North, the only easy road traffic being to Pakistan. Despite a significant growth in trade volume since 1991, India's share in total world trade is only about 1%. The country that is home to 16% of the population of the world does have a wide room to improve her trade performance. Then again, the Indian private sector has smaller share of Indian exports and imports as the state agencies (the public sector) are more busy giving orders for imports. Naturally with exceptions of only two years 1972-73 and 1976-77 (Rs. 1040 million and 640 million respectively), India's trade balance has never been in surplus after independence.

In very recent times the trade volume has grown at an increasing rate. During first half of 2011-2012 alone, exports grew by 52% to $160.0 billion and imports grew by 32% to $ 233.5 billion, leaving a trade deficit of $73.5 billion for the year. Until 2007 USA claimed the top position for the largest trading partner for Indian trade. However in 2009 USA was the third, UAE was the first, and China was the second. In 2013, the same ranking continues with Saudi Arabia being the fourth largest trading partner for India.

Our estimated results for individual year are as follows: Table 1 presents the data of India's exports as related to the real GDP of the ten trading countries for year 1991.

Table 1: Year 1991

Estimated Equation : logE = 1.975 + 0.92Log (YiYj) – 0.829 Log D

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.975	2.380		.830	.434
	Logyiyj	.893	.355	.920	2.512	.040
	logD	-1.888	.835	-.829	-2.262	.058

a. Dependent Variable: log E (E= exports)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.704[a]	.496	.351	.61186

a. Predictors: (Constant), logD, Logyiyj

b. Dependent Variable: logE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.575	2	1.287	3.439	.091[b]
	Residual	2.621	7	.374		
	Total	5.195	9			

a. Dependent Variable: logE

b. Predictors: (Constant), logD (D = distance), Logyiyj (Y is GDP of ith and jth country)

Data Set:

Countries	GDP	GDP (india)	Yiyj	log yiyj	Distance	log d	Exports	log E
Bangladesh	29.921	353.943	10590.329	4.025	1433.92	3.156524922	0.3246	-0.4887
Malaysia	62.783	353.943	22221.459	4.347	3801.96	3.580007543	0.2028	-0.69297
Singapore	52.243	353.943	18491.154	4.267	4125.16	3.615440798	0.3895	-0.40946
Indonesia	163.491	353.943	57866.532	4.762	4938.78	3.693619681	0.1470	-0.83267
United States	8222.939	353.943	2910450.654	6.464	12202.21	4.086438495	2.9268	0.466388
United Kingdom	1465.490	353.943	518699.894	5.715	6770.35	3.830611121	1.1405	0.057105
Mexico	588.058	353.943	208138.769	5.318	14774.25	4.169505444	0.0280	-1.55317
Brazil	607.558	353.943	215040.738	5.333	6649.13	3.822764824	0.0173	-1.76152
France	1640.715	353.943	580719.272	5.764	14203.4	4.152392318	0.4263	-0.37033
Argentina	119.915	353.943	42443.158	4.628	15779.28	4.198087183	0.0166	-1.77932

As can be seen above in year 1991, both hypotheses are tested with positive results. Distance in fact negatively affected the exports and real GDP size has a positive effect on India's exports. We shall repeat the same results in Table 2 onwards for other years as follows:

Table 2: Year 1995

Estimated Equation Log E = 2.750 + 0.992 Logyiyj – 0.988 Log D

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.750	1.844		1.491	.180
	Logyiyj	.927	.288	.992	3.224	.015
	logD	-2.078	.647	-.988	-3.211	.015

a. Dependent Variable: loge

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.799[a]	.638	.535	.47826

a. Predictors: (Constant), logD, Logyiyj

b Dependent Variable: logE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.828	2	1.414	6.182	.028[b]
	Residual	1.601	7	.229		
	Total	4.429	9			

a. Dependent Variable: logE

b. Predictors: (Constant), logD, Logyiyj

Data Set:

Countries	GDP	GDP (india)	yiyj	logyiyj	Distance	log D	Exports	log E
Bangladesh	35.894	448.722	16106.297	4.207	1433.92	3.156524922	1.0459	0.019477
Malaysia	90.110	448.722	40434.348	4.607	3801.96	3.580007543	0.3920	-0.40677
Singapore	73.944	448.722	33180.439	4.521	4125.16	3.615440798	0.8989	-0.0463
Indonesia	219.165	448.722	98343.990	4.993	4938.78	3.693619681	0.6604	-0.18019
United States	9349.639	448.722	4195384.184	6.623	12202.21	4.086438495	5.5050	0.740759
United Kingdom	1669.349	448.722	749073.046	5.875	6770.35	3.830611121	2.0067	0.302484
Mexico	625.880	448.722	280845.754	5.448	14774.25	4.169505444	0.0547	-1.26238
Brazil	696.142	448.722	312373.815	5.495	6649.13	3.822764824	0.0859	-1.06608
France	1725.641	448.722	774332.473	5.889	14203.4	4.152392318	0.7447	-0.12801
Argentina	146.179	448.722	65593.761	4.817	15779.28	4.198087183	0.0375	-1.42635

Table 3 Year1999:

Estimated Equation Log E = 0.725 + 1.124 Log (yiyj)
– 0.852 Log D. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.725	1.481		.489	.640
	Logyiyj	.930	.232	1.124	4.003	.005
	logD	-1.580	.520	-.852	-3.036	.019

a. Dependent Variable: logE

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.836[a]	.699	.613	.38483

a. Predictors: (Constant), logD, Logyiyj

b. Dependent Variable: logE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.405	2	1.202	8.119	.015[b]
	Residual	1.037	7	.148		
	Total	3.442	9			

a. Dependent Variable: logE

b. Predictors: (Constant), logD, Logyiyj

Data Set:

Countries	GDP	GDP (india)	yiyj	log yiyj	Distance	log D	Exports	Log E
Bangladesh	43.673	580.362	25345.885	4.404	1433.92	3.156524922	0.6400	-0.19382
Malaysia	104.602	580.362	60706.927	4.783	3801.96	3.580007543	0.4493	-0.34749
Singapore	89.715	580.362	52067.331	4.717	4125.16	3.615440798	0.6727	-0.17219
Indonesia	216.277	580.362	125519.015	5.099	4938.78	3.693619681	0.3248	-0.48841
United States	11104.542	580.362	6444654.548	6.809	12202.21	4.086438495	8.4367	0.926171
United Kingdom	1921.959	580.362	1115432.164	6.047	6770.35	3.830611121	2.0436	0.310388
Mexico	761.907	580.362	442181.742	5.646	14774.25	4.169505444	0.1417	-0.84851
Brazil	737.249	580.362	427871.332	5.631	6649.13	3.822764824	0.1358	-0.86717
France	1903.008	580.362	1104433.575	6.043	14203.4	4.152392318	0.9089	-0.0415
Argentina	167.328	580.362	97110.631	4.987	15779.28	4.198087183	0.0630	-1.20074

Table 4 Year 2005

Estimated EquationLog E = 1.122 + 1.036 Log Yiyj – 0.850 Log D

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.122	1.374		.817	.441
	Logyiyj	.771	.216	1.036	3.569	.009
	logD	-1.370	.468	-.850	-2.926	.022

a. Dependent Variable: logE

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.810[a]	.657	.559	.35725

a. Predictors: (Constant), logD, Logyiyj

b. Dependent Variable: logE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.710	2	.855	6.697	.024[b]
	Residual	.893	7	.128		
	Total	2.603	9			

a. Dependent Variable: logE

b. Predictors: (Constant), logD, Logyiyj

Data Set :

Countries	GDP	GDP (india)	yiyj	log yiyj	Distance	log D	Exports	log E
Bangladesh	60.278	834.215	50284.446	4.701	1433.92	3.156524922	1.7198	0.235475
Malaysia	143.533	834.215	119737.510	5.078	3801.96	3.580007543	1.1438	0.05834
Singapore	123.507	834.215	103031.304	5.013	4125.16	3.615440798	5.4276	0.734604
Indonesia	285.869	834.215	238475.886	5.377	4938.78	3.693619681	1.3901	0.143035
United States	13095.400	834.215	10924379.289	7.038	12202.21	4.086438495	16.5427	1.218606
United Kingdom	2321.359	834.215	1936512.822	6.287	6770.35	3.830611121	4.9589	0.695382
Mexico	870.215	834.215	725946.489	5.861	14774.25	4.169505444	0.4058	-0.39173
Brazil	882.186	834.215	735932.558	5.867	6649.13	3.822764824	0.9698	-0.01331
France	2136.556	834.215	1782346.874	6.251	14203.4	4.152392318	2.0157	0.304422
Argentina	183.193	834.215	152822.700	5.184	15779.28	4.198087183	0.2590	-0.58675

Table 5 Year:2008

Estimated EuationLog E = 1.733 + 1.058 Log YiYj – 0.983 Log D

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.733	1.150		1.507	.176
	Logyiyj	.764	.188	1.058	4.066	.005
	logD	-1.485	.393	-.983	-3.779	.007

a. Dependent Variable: logE

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853[a]	.728	.650	.29794

a. Predictors: (Constant), logD, Logyiyj

b. Dependent Variable: logE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.663	2	.832	9.369	.010[b]
	Residual	.621	7	.089		
	Total	2.285	9			

a. Dependent Variable: logE

b. Predictors: (Constant), logD, Logyiyj

Data Set:

Countries	GDP	GDP (india)	yiyj	log yiyj	Distance	log D	Exports	log E
Bangladesh	72.640	1039.778	75528.950	4.878	1433.92	3.156524922	3.2434	0.510997
Malaysia	168.879	1039.778	175596.617	5.245	3801.96	3.580007543	3.0344	0.482074
Singapore	148.813	1039.778	154732.588	5.190	4125.16	3.615440798	8.8539	0.947135
Indonesia	340.018	1039.778	353543.162	5.548	4938.78	3.693619681	2.6593	0.42477
United States	13645.503	1039.778	14188287.515	7.152	12202.21	4.086438495	21.4071	1.330558
United Kingdom	2448.080	1039.778	2545458.152	6.406	6770.35	3.830611121	6.5975	0.819381
Mexico	955.702	1039.778	993717.690	5.997	14774.25	4.169505444	0.6843	-0.16473
Brazil	1023.276	1039.778	1063979.637	6.027	6649.13	3.822764824	3.2500	0.51189
France	2237.484	1039.778	2326486.036	6.367	14203.4	4.152392318	3.0864	0.489452
Argentina	230.488	1039.778	239656.632	5.380	15779.28	4.198087183	0.3808	-0.41936

Table 6: Year 2012

Estimated Equation:Log E = -3.154 + 0.867 Log YiYj – 0.375 Log D

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.154	4.525		-.697	.508
	Logyiyj	1.854	.768	.867	2.413	.047
	logD	-1.495	1.526	-.352	-.979	.360

a. Dependent Variable: logE

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.692[a]	.479	.330	1.15915

a. Predictors: (Constant), logD, Logyiyj

b. Dependent Variable: logE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.640	2	4.320	3.215	.102[b]
	Residual	9.405	7	1.344		
	Total	18.046	9			

a. Dependent Variable: logE

b. Predictors: (Constant), logD, Logyiyj

Data Set:

Countries	GDP	GDP (india)	yiyj	log yiyj	Distance	log D	Exports	log E
Bangladesh	92.356	1389.049	128287.504	5.108	1433.92	3.156525	4.9367	0.693434
Malaysia	198.428	1389.049	275625.690	5.440	3801.96	3.580008	21.3500	1.329399
Singapore	180.561	1389.049	250807.528	5.399	4125.16	3.615441	20.0902	1.302984
Indonesia	427.483	1389.049	593795.073	5.774	4938.78	3.69362	14231.575	4.153253
United States	14231.575	1389.049	19768360.460	7.296	12202.21	4.086438	2392.406	3.378835
United Kingdom	2392.406	1389.049	3323169.972	6.522	6770.35	3.830611	1032.688	3.013969
Mexico	1032.688	1389.049	1434454.448	6.157	14774.25	4.169505	1136.556	3.055591
Brazil	1136.556	1389.049	1578732.329	6.198	6649.13	3.822765	2249.440	3.352074
France	2249.440	1389.049	3124583.129	6.495	14203.4	4.152392	281.496	2.449472
Argentina	281.496	1389.049	391011.625	5.592	15779.28	4.198087	0.5028	-0.29858

As can be seen from the above results real GDP did affect the Indian exports in a significant and a positive way for all the years that we tested. Moreover the distance term has a negative estimated coefficient for all the years as well. This constitutes a valid test of the Gravity model for all the years of Indian economy's data that we observed. The model therefore does have some important say in the trade literature.

Summary and Conclusions:

In this paper we set out to understand the implications of the Gravity model on India's trade. In its simple form the Gravity model expected to have a positive effect of real GDP of trading partners.

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Performance of Oscillators: Index Futures

Avinash A. Jawade, Kanchan Naidu, and Akash Agrawal

Abstract

In technical analysis, oscillators are very objective tools for checking trend reversals. Momentum oscillators are price based and volume oscillators are based on price and volume both. The accountability of such oscillators as RSI, Stochastic and MFI for predicting significant changes in benchmark futures, reveals that RSI and stochastic are useful in predicting trend reversal while Money Flow Index is ambiguous in prediction. Volumes are significant for study purposes as their correlation to price in following price trend or digressing from it goes a long way in studying the charts.

Key Words : *Relative Strength Index, Money Flow Index, Stochastic, oscillator, trend reversal, overbought, oversold, momentum*

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In the article "Effectiveness of Technical Indicators – A Study on CNX IT Index," K. Prabhakaran and S.Nagarajan conclude that due to buying pressure, RSI was mostly in positive zone and they were unable to identify any oversold zones. MFI failed to give any overbought zones. Both Welles Wilder (originator of RSI) and Martin Pring ("technical Analysis Explained") insist on going beyond the usual oscillators values and recommend construction of trend lines even on oscillator charts to deduct better trend reversals in price.

The study intends to bridge this gap by studying momentum oscillators such as RSI for oversold zones as well as add Stochastic as indicator under study to check if that adds value to study in spotting overbought and oversold areas. Momentum is the rate of rise or fall in price.

Technical analysis is the study of past trends of stock price movements and identifying trends and patterns to be able to predict future movements of same stock. It is of the view that market discounts everything that could possibly affect

stock price movement and thus attaches no significance to the fundamental factors. It believes that its stakeholders: promoters, lenders, suppliers are aware of the financial state of the company and these stakeholders are already influencing the stock price movement while the financial state of company is getting affected. Technical analysis believes that history repeats itself and hence stock price will follow repetitive patterns which can be studied to predict future price ranges.

Technical analysis through trade setup mechanism helps investor in booking profits at the appropriate time. Let's understand trade setup first. It suggests at what levels to buy the stock; whether at current market price or after it reaches a certain higher level (vice versa for short sell: selling first at higher level and later buying at lower level). Based on the studies it recommends two or even three targets for booking profit. Now suppose the stock achieves first level of profit, the investor can decide whether he wishes to wait for achievement of second higher price target or book profit at first target and exit from the stock. Trade setup along with mentioning at what price to buy and price targets to sell, also gives a stop loss price. Stop loss is that price at which investor must book his loss and exit from the stock if it moves unfavourably for the investor.

Technical analysis gives price targets for a varied range of time frames. Be it intraday, positional trade, few days, weeks, months or more, investor based upon his choice of suitable time frame can invest in a stock. If between that time frame either his targets are achieved he can book his profits or if his stop loss is triggered he gets to exit out of the stock. Thus technical analysis answers the questions: What to buy? When to buy? When to sell?

Technical analysis is the study of human psyche. Technical analysis is about riding a wave (trending upwards or downwards) and identifying reversal of that wave with reasonable amount of certainty. It helps you to go with general perception and sentiment about that security/index. Riding with the wave is always safer and better than riding against it. It is never possible to get in the market at absolute bottom and get out at exact top. However if trend changing signals are identified one can buy into a stock before others (thus helping him get that stock at a lower price) do and sell out a stock before it gets too late.

Momentum oscillators are certain calculations of recent past price trends that vary between a certain definite ranges to suggest where price could move based on their values. Similarly volume oscillators use volume traded in that stock for suggesting whether buying or selling is happening in the stock with or without support of significant volumes. Uptrend suggests an upward movement of price over a certain period and downtrend suggests downward movement of price.

This research intends to study the effectiveness of certain momentum and volume oscillators. Also researchers and analysts have studied/concluded the effect volumes traded have on price movement. The study intends to understand this dependency also.

Objective of the study: - The specific objectives are as follows:-

1. To study the effectiveness of momentum oscillators in predicting trend change,
2. To compare the observed values of these momentum oscillators against predefined standards, and
3. To check the impact of volumes in price fluctuation during uptrend and downtrend.

Scope of the study: -

The study intends to judge the impact of oscillators on prediction of trend reversal in Nifty futures. The research covers the study of above mentioned oscillators for a 5% or more change in Nifty futures price. For calculating this 5%, distinctive peaks and troughs which are easily identifiable on price chart have been taken. From a particular peak (a candlestick showing Open, High, Low, price of each day) the downtrend is traced upto an identifiable bottom (or trough, again through candlestick of that day). If the difference between High price of the peak to the Low price of bottom/trough exceeds 5% from high price, then the trend constitutes part of this study. For less than 5% downtrend, it is ignored. Similar process is followed for uptrend. Study is done for 1 year (24 September 2012 -20 September 2013) only.

Limitations of the study:

- The research will be carried out for Nifty (index) futures only and it will not necessarily give similar results

when performed on stocks or other indices which might have liquidity crisis.

- Study also does not assume that there is a linear correlation in the movement of spot Nifty index and its futures, hence study of oscillators for stock futures need not corroborate with study of oscillators for same stocks in cash segment.

- Study will assume generally accepted absolute values for studying trend reversal. If few analysts refer certain other values for judging reversal signals, they may find the conclusions irrelevant.

- Study is carried out for certain period (24 September 2012 -20 September 2013). If this period has index performing steadily without any drastic falls or unimaginable rise in markets or remains in a dull sideways trend, then the study does not guarantee it might apply to above three mentioned phases of market. Its vice versa also stands true.

- The peaks and troughs (top and bottom) have been identified from the chart by the researcher visually subject to 5% criteria.

Data Source: Data has been taken from websites which provide technical analysis data. Secondary data will be used for study.

Observations & Data Analysis – Data analysis is carried out with the help of SPSS version 17.

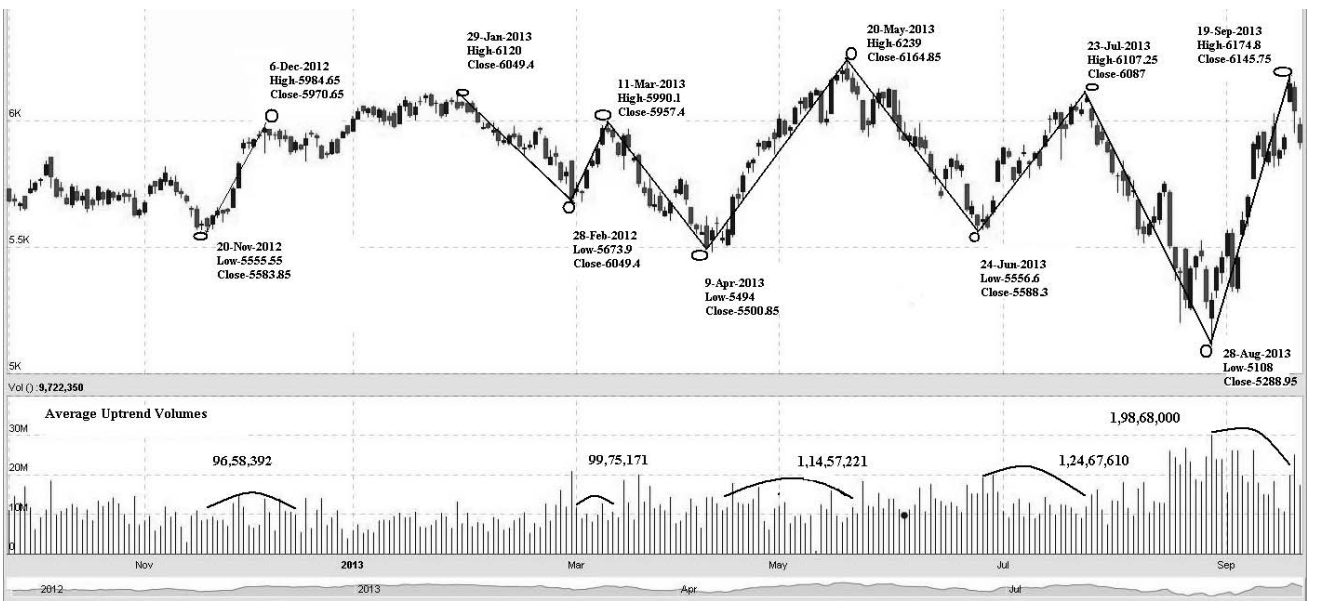

Fig.1 : Price Volume Chart for Nifty Futures: 24 September 2012- 20 September 2013

Source: www.nseindia.com.

As can be seen from Fig.1 there are 11 instances of movements higher than 5% which are being studied.

A) RSI – The RSI (Relative Strength Index) is a popular momentum oscillator in use today. It was introduced in a book by J. Welles Wilder (1978). RSI helps to signal overbought and oversold conditions in a security. The indicator is plotted in a range between zero and 100.

Formula: RSI = 100 - 100/(1 + RS)

where RS (Relative Strength) = Average of x days' up closes/ Average of x days' down closes.

A reading above 70 is used to suggest that a security is overbought (imminent selling expected), while a reading below 30 is used to suggest that it is oversold (imminent buying expected).

The standard calculation for RSI uses 14 trading days as the basis.

Hypothesis 1:

Null Hypothesis: The observed RSI values confirm with the defined standards (Lower 30 & Higher 70).

Alternate Hypothesis: The observed values have a significant variation from defined standards.

Table indicating RSI values on trend start and finish date:

Sr.No.	Trend Start Date	Trend End date	Trend	RSI on start date	RSI on end date
1)	20 Nov 2012	6 Dec 2012	Uptrend	37.97	74.15
2)	29 January 2013	28 Feb 2013	Downtrend	54.68	26.63
3)	28 Feb 2013	11 March 2013	Uptrend	26.63	56.94
4)	11 March 2013	09 April 2013	Downtrend	56.94	29.73
5)	09 April 2013	20 May 2013	Uptrend	29.73	65.29
6)	20 May 2013	24 June 2013	Downtrend	65.29	30.7
7)	24 June 2013	23 July 2013	Uptrend	30.7	62.98
8)	23 July 2013	28 August 2013	Downtrend	62.98	32.83
9)	28 August 2013	19 September 2013	Uptrend	32.83	68.97

Lower RSI stats:

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
LRSI	5	31.5720	4.21585	1.88539

One-Sample Test						
	Test Value = 30					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
LRSI	.834	4	.451	1.57200	-3.6627	6.8067

Higher RSI Stats:

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
HRSI	4	59.9725	4.98422	2.49211

One-Sample Test						
	Test Value = 70					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
HRSI	-4.024	3	.028	-10.02750	-17.9585	-2.0965

Interpretation – t-test results for lower RSI (LSI) for generating buy signals suggest that the observed mean value (31.57) do not significantly (5% significance) differ from predefined levels of 30 thus not giving a reason to reject null hypothesis. Thus for period under study RSI confirms to defined standard of 30. However for higher RSI (HRSI) generating sell signal, mean of 59.97 differed significantly from 70 and we reject the null hypothesis and deduct that observed values differ significantly from standard i.e. 70.

B) Stochastic –Depicted by two lines (%K and % D), buy and sell signals are generated for readings below 20 and above 80 respectively and also when %K line crosses over %D line (%K crossing over %D from below is buy and %K crossing %D from above is sell).

Formula for %K = (Current Close - Lowest Low) / (Highest High - Lowest Low) * 100

Highest High and Lowest lows are checked for last 14 days.

Hypothesis 2:

Null Hypothesis : The observed stochastic values confirm with the defined standards (Lower bound 20 & upper bound 80).

Alternate Hypothesis – The observed stochastic values differ significantly from defined standards.

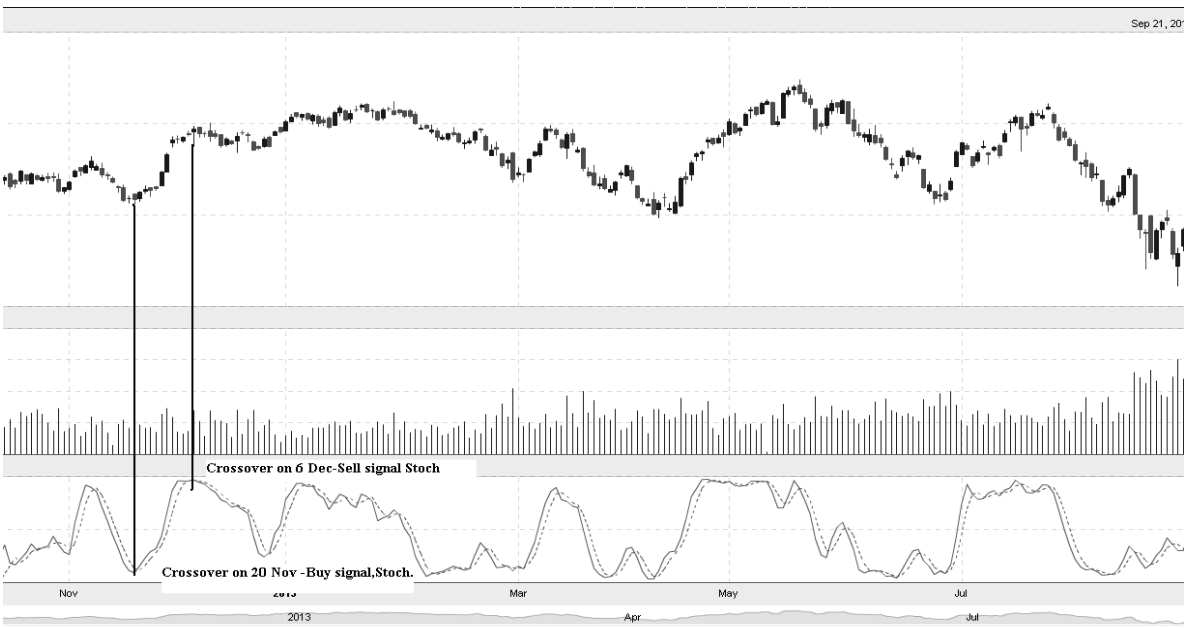

Fig.2 : Stochastic Chart for Nifty Futures

(Source : www.nseindia.com)

Firm line represents %K and dotted line represents %D. Crossover of two generates buy and sell signals as highlighted in above chart for first uptrend of 20 Nov- 6 Dec 2012.

Table indicating stochastic values and crossover on trend start and finish dates:

Sr. No.	Trend Start Date	Trend End date	Trend	Stochastic on start date	Stochastic on end date	Crossover of %K & %D on start date	Crossover Of %K & %D on end date
1)	20 Nov 2012	6 Dec 2012	Uptrend	8.89	96.56	Yes(n)	Yes(n)
2)	29 January 2013	28 Feb 2013	Downtrend	68.40	10.77	No(n+1)	No(n+1)
3)	28 Feb 2013	11 March 2013	Uptrend	10.77	85.68	No(n+1)	No(n+1)
4)	11 March 2013	09 April 2013	Downtrend	85.68	3.09	No(n+1)	Yes(n)
5)	09 April 2013	20 May 2013	Uptrend	3.09	88.71	Yes(n)	Yes(n)
6)	20 May 2013	24 June 2013	Downtrend	88.71	7.25	Yes(n)	No(n+1)
7)	24 June 2013	23 July 2013	Uptrend	7.25	91.43	No(n+1)	Yes(n)
8)	23 July 2013	28 August 2013	Downtrend	91.43	30.13	Yes(n)	No(n+1)
9)	28 August 2013	19 September 2013	Uptrend	30.13	89.07	No(n+1)	No(n+1)

where denotes the day of start of trend. So n+1 denotes that the crossover happened after 1 day of start of respective trend.

Lower bound Stochastic

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
LSTOC	5	12.0260	10.50987	4.70015

One-Sample Test						
	Test Value = 20					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
LSTOC	-1.697	4	.165	-7.97400	-21.0237	5.0757

Upper bound Stochastic

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
HSTOC	4	90.5950	4.61840	2.30920

One-Sample Test						
	Test Val ue = 80					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
HSTOC	4.588	3	.019	10.59500	3.2461	17.9439

Interpretation: Lower bound stochastic is 12.02 and t-test result reveals (p=0.165) that the stochastic does not significantly deviate from defined standard of 20. On the upper side mean value of 90.59 is a significant deviation (5% significance) from the standard of 80(p=0.019) leading to rejection of null hypothesis.

Out of 5 instances 2 times in an uptrend crossover (refer fig.2 for 1st crossover) happened on exact date of trend start date. Out of 4 instances in a downtrend, 2 times the crossover happened on trend start date. However the crossover happened on immediate next day for remaining cases.

So the crossover of stochastic is a significant contributor to spot trend change rather than absolute values as the crossover is happening on the day of start of trend or with a delay of 1 day.

C) MFI –Money Flow Index

MFI takes volume traded in consideration. Computation of MFI is follows:

1) Typical price for each day of period under study is calculated as

$$\text{Typical Price} = \frac{\text{High} + \text{Low} + \text{Close}}{3}$$

2) Money flow is calculated as follows:

Money flow = Typical Price x Volume.

Positive money flow occurs where the day's typical price is higher than yesterday's typical price. Similarly it applies for negative money flow.

Money Ratio = Positive Money Flow / Negative Money Flow .

Finally the MFI is given as $100 - \frac{100}{1 + \text{Money Ratio}}$

MFI values are typically taken for 14 day period. MFI calculations here are taken for 14 day period. MFI value above 80 are considered overbought (sell signal) and values below 20 are oversold (buy signal).

Table indicating MFI values on trend start and finish dates

Sr.No.	Trend Start Date	Trend End date	Trend	MFI on start date	MFI on end date
1)	20 Nov 2012	6 Dec 2012	Uptrend	44.04	69.31
2)	29 Jan. 2013	28 Feb 2013	Downtrend	47.34	41.61
3)	28 Feb 2013	11 March 2013	Uptrend	41.61	50.89
4)	11 March 2013	09 April 2013	Downtrend	50.89	17.67
5)	09 April 2013	20 May 2013	Uptrend	17.67	62.23
6)	20 May 2013	24 June 2013	Downtrend	62.23	19.47
7)	24 June 2013	23 July 2013	Uptrend	19.47	72.31
8)	23 July 2013	28 August 2013	Downtrend	72.31	48.71
9)	28 August 2013	19 September 2013	Uptrend	48.71	74.46

Interpretation:

Average MFI – Oversold Average = 34.3 (Standard Deviation of 14.53)

Overbought average = 58.19 (Standard Deviation of 11.53)

Average values of MFI were 34.3 (71.5% difference over Standard value of 20) and 58.19 (27.26% difference over standard value of 80).

So overall, MFI on its own has less contribution in predicting trends.

D) Volumes (Ref.Fig.1):

Sr.No.	Trend Start Date	Trend End date	Trend	Average Volume	Price Volume Correlation
1)	20 Nov 2012	6 Dec 2012	Uptrend	9658392	0.209
2)	29 January 2013	28 Feb 2013	Downtrend	8074953	0.219
3)	28 Feb 2013	11 March 2013	Uptrend	99,75,171	0.103
4)	11 March 2013	09 April 2013	Downtrend	1,22,30,405	0.044
5)	09 April 2013	20 May 2013	Uptrend	11457221	-0.393
6)	20 May 2013	24 June 2013	Downtrend	13242026	-0.349
7)	24 June 2013	23 July 2013	Uptrend	12467610	-0.636
8)	23 July 2013	28 August 2013	Downtrend	16718883	-0.767
9)	28 August 2013	19 September 2013	Uptrend	19868000	-0.641

Hypothesis 3:

Null Hypothesis – Price moves independent of volume in an uptrend.

Alternate Hypothesis – There exists a positive correlation between price and traded volume in an uptrend.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.501[a]	.251	.242	174.32142
a. Predictors: (Constant), VO				

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6099.173	53.918		113.119	.000
	VO	-2.010E-005	.000	-.501	-5.176	.000
a. Dependent Variable: PR						

Interpretation: Price –Volume statistics

Volumes & Uptrend – Average volumes have gone up with consequent up trends. Of the 4 up trends which form a part of this study the increase in average volumes have been 3.2%, 14.8%, 8.81% and 59.35% respectively. For the correlation test conducted between price and volume for all uptrends (cumulative), the correlation coefficient came to -0.501 which was significantly negative. On applying regression test, the adjusted R-square value of 0.242 shows lesser impact of volumes on fuelling price movements. Hence we accept null hypothesis that price moves independent of volume,

We can thus interpret that during uptrend when correction happens (price going down), it actually happens on large volumes and when index again resumes its upward trend it does so on lower volumes and hence the negative effect.

Volumes & Downtrend - In downtrends, the volumes show a more clear trend.

Hypothesis 4:

Null Hypothesis: Price moves independent of the volume in a downtrend.

Alternate Hypothesis: There exists a negative correlation between price and volume in a downtrend.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.606[a]	.367	.359	161.47885
a. Predictors: (Constant), DOWN				

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6130.553	51.128		119.906	.000
	DOWN	-2.561E-005	.000	-.606	-6.894	.000
a. Dependent Variable: DPR						

Interpretation:

In a downtrend, there exists a significant negative correlation of -0.606 proving the alternate hypothesis valid. It means that selling has been accompanied by large volumes with adjusted R square value of 0.359 which is higher than that for uptrend.

Conclusions:

a) Relative Strength Index has given good signals for uptrend rather than downtrend. It confirms closely to generally accepted value of 30 and can be a reasonably significant tool when used in conjunction with other tools.

b) Stochastic has yielded a significant outcome for trend under study. Rather than depending upon absolute values the crossover of %K and % D has yielded a trend reversal signal almost immediately on commencement of trend.

c) MFI is innocuous in predicting trend reversals.

d) Volumes eventually play most important part in technical analysis. However this study proposes that uptrend need not be backed by significant volumes as is generally presumed. In fact the study shows a gradually increasing negative correlation between price and volume depicting a lame confidence of investing fraternity in rallies. This is also confirmed by the fact that downtrends have shown a strong negative correlation which means that after the index has reached a certain level; the selling has been more vigorous in subsequent downtrends depicting lower expectations of new highs and reduced risk appetite.

Recommendations:

1) Usage of RSI and Stochastic in tandem can have a good impact on studying trend reversal rather than their study in isolation.

2) Though the studies did not find a significant correlation between price and volumes in uptrend, ignoring volumes in bull runs would be a preposterous assumption. Any trend reversal at bottom with volumes higher by 40-50% of the average of last 5 days and accompanied by validation from other oscillators and technical analysis tools should inspire confidence.

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Causal Relationship: Gold Price and Nifty

K. Mallikarjuna Rao

Abstract

Universally, gold price and stock market move in opposite directions. Basically, when gold price goes down, people withdraw their investment from gold and invest the same in stock market which in turn increases the value of the stock market due to heavy investment. When the economy is in a downturn and stock markets are going down, investors tend to park their funds in gold and wait out the storm. The demand for gold increases in a downturn economy, and consequently the value of gold also increases. Gold is a substitute investment avenue for Indian investors. This paper is an attempt made to investigate the existence of unidirectional relationship between gold price and Nifty for the period of 10 years (2004-2014). The results of the analysis show that there is causality between the gold price and Nifty.

Key Words : *gold, Nifty, Augmented Dickey-Fuller and causality*

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Gold is traditionally considered by investors as a safe investment, especially during recession with high risks of inflation, exchange rates depreciating and bank collages. The main reason for gold being the safest investment is that, unlike any currency, gold has an intrinsic value. It is a precious metal being widely used in modem technologies. Historically gold was used as currency in old times. Therefore, the gold price movements are of keen interest with all the segments of Indian society.

There are several economic reasons for gold that has high demand in India. The first reason is security; gold offers full security as long as it is retained by central banks. There is no credit risk attached to gold. Secondly, gold is able to maintain its liquidity even at times of crisis situations like high global inflation or political turbulence.

The third reason for holding gold is to build a diversified portfolio. Gold also has taken the role of an asset of last resort. World Economic History shows that countries have

repeatedly used gold as security against loans when they have had difficulties with their Balance of Payments and have felt the need to borrow on the international capital markets (Prof. S. P. Narang).

As the gold price rises, Indian investors tend to invest less in stocks, causing stock prices to fall. Therefore, a negative relationship is expected between gold price and stock price. The historical evidence on movements of gold price and stock price in India data indicates that when the stock market crashes or when the dollar weakens, gold continues to be a safe haven investment because gold prices rise in such circumstances (Gaur and Bansal, 2010).

Data and Methodology

This paper aims at investigating the dynamic relationship between gold prices and stock market indices Nifty in India for the period 2004-2014. This study is mainly based on secondary data that have been collected from the database on National Stock Exchange and World gold council database. The study analyses the daily data on domestic gold prices and stock market in India for the aforesaid period. Wherever data are missing, the averages of the data of the previous month and next month have been taken.

Review of Literature

For the present research study, the researchers have consulted the literature in various national and international journals. Krauth (2011) in his article has mentioned about some factors affecting prices of gold. Ho, Wang and Liou (2010) also have stated that gold prices are affected by dollar index. Aggarwal and Lucey (2005) have also discussed crossing psychological price barriers of gold. Feldstein (1978) has mentioned how gold prices are affected by inflation. Greely and Currie (2005) in their paper have examined the causes for increase in demand for gold in last decade and how this contributed towards price rise of gold. Butler J. (2012) in his book has stated how increasing gold prices will affect economies of countries and gave measures to cope with this scenario.

Fan Fei (2010) explains in his paper about another attempt to disentangle the price movement of gold after the Bretton-Woods system, the last international monetary regime based on gold. Author states that in recent years, the world witnessed an aggressive growth in gold price. The role of gold in investment has drawn more attention since this transformational economic crisis began to unfold in 2008. Liao S. and Chen (2008) believe that commodity prices should have different degrees of influences to individual industries instead of the whole market. The fluctuations in the gold prices will be affected by the severe fluctuations in the oil prices. This tidal wave started from the year 2005 and it seems the trend keeps expanding on their ways. Mishra and Mohan, 2012 in the paper depict that domestic and international gold prices are closely interlinked. And then it examines the nature of changes in the factors affecting international gold prices during the last two decades. Short-run volatility in international gold prices used to be traditional factors such as international commodity prices, US dollar exchange rate and equity prices. Mishra et al. (2012) in their paper attempt to analyze the causality relation that may run between domestic gold prices and stock market returns in India. The study by taking into consideration the domestic gold prices and stock market returns based on BSE 100 index, investigates the Granger causality in the Vector Error Correction Model for the period January 1991 to December 2009. The analysis provided the evidence of feedback causality between the variables.

Objective of this study

- To examine the relationship between Domestic Gold Price and Nifty Index movement of NSE, and
- To assess the causal relationship between the above two variables.

Sources of data

The study is based on secondary data obtained from various appropriate data sources including NSE database and World gold council database etc. Besides, the facts, figures and findings advanced in similar earlier studies and the government publications are also used to supplement the secondary data.

UNIT ROOT TEST

Augmented Dickey-Fuller (ADF) Test

The standard ADF test is carried out by estimating the following equation after subtracting yt-1 from both sides of the equation:

Dyt = ayt – 1 + xt ¢d + et,

where a = r – 1. The null and alternative hypotheses may be written as,

H0: a = 0
H1: a < 0

The Phillips – Perron test

The Phillips – Perron test is carried out by estimating the following equation

$$\nabla y_t = \nabla y_{t-1} + u_t$$

Where yt is the time series data under consideration.

The KPPS (1992) Test is based on the residuals (åt) from an ordinary least square regression of the variable of interest on the exogenous variable(s) as follows:

$$Yt = X' t â + åt \quad (2)$$

where Yt is the variable of interest (real exchange rate) and Xt is a vector of exogenous variable(s). The Lagrange Multiplier (LM) statistic used in the test as follows:

$$\mathbf{TM} = \mathbf{T^{-2}} \sum_{i=1}^{t} \mathbf{S(t)^2} / \boldsymbol{fo}$$

where T is the sample size, S(t) is the partial sum of residuals which is calculated as

$$\mathbf{S(t)} = \sum_{i=1}^{t} \mathbf{S\,r}$$

Here åt is the estimated residual from (3.1). f0 is an estimator of the residual spectrum at frequency zero. This statistic has to be compared with KPSS et al. (1992) critical values.

Granger causality test

The test was carried out to identify the directional effect of selected indices. To test for Granger causality, the following two equations were estimated.

$$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + u_t$$

$$X_t = \sum_{i=1}^{m} \gamma_i Y_{t-i} + \sum_{i=1}^{m} \delta_i X_{t-i} + e_t$$

Johansen cointegration test

The condition for testing Johansen cointegration test for any time series data is that the data should be non stationary at their level i.e. the natural logarithm of time series data should be non stationary and the first difference in the data should be stationary. If the return indices of different markets are correlated, the value may raise or fall. On the other hand, if the time series data are cointegreted, then the series in the long run will come to equilibrium point.

EMPIRICAL RESULTS AND ANALYSIS

Descriptive statistics results

Figure 1 revealed that the variables considered in the scope of the analysis are examined, the average values of variables were found to be Nifty (4352.345) and Gold Price (49974.90), standard deviation values are found to be Nifty(1417.58), and Gold Price(25207.66). When average values of the variables are considered in terms of the case that data do not have normal distribution and that variables are not distributed normally in full, but are distributed very close to normal distribution as the median values of variables are very close to average values.

Regarding whether series are distributed normally or not; skewness, kurtosis and Jarque-Bera statistics were considered. If kurtosis value of relevant variables is bigger than three, it indicates that series is sharp, if it is smaller than three, it indicates that series is oblate. In consideration of skewness values, if skewness value is equal to zero, it indicates that series has normal distribution, if the skewness value is bigger than zero; it means that series is skew in the positive direction, if skewness value is smaller than zero; it indicates that series is skew in negative direction. Following values were found: skewness value of Nifty variable (-0.5252), kurtosis value (2.001), Jarque-Bera value (216.93) and skewness value of Gold Price variable(0.3243), kurtosis value (1.6551), Jarque-Bera value (246.89). It has been found that Nifty variable is skew (inclined) and oblate in negative direction and Gold Price variable is skew (inclined) and oblate in positive direction.

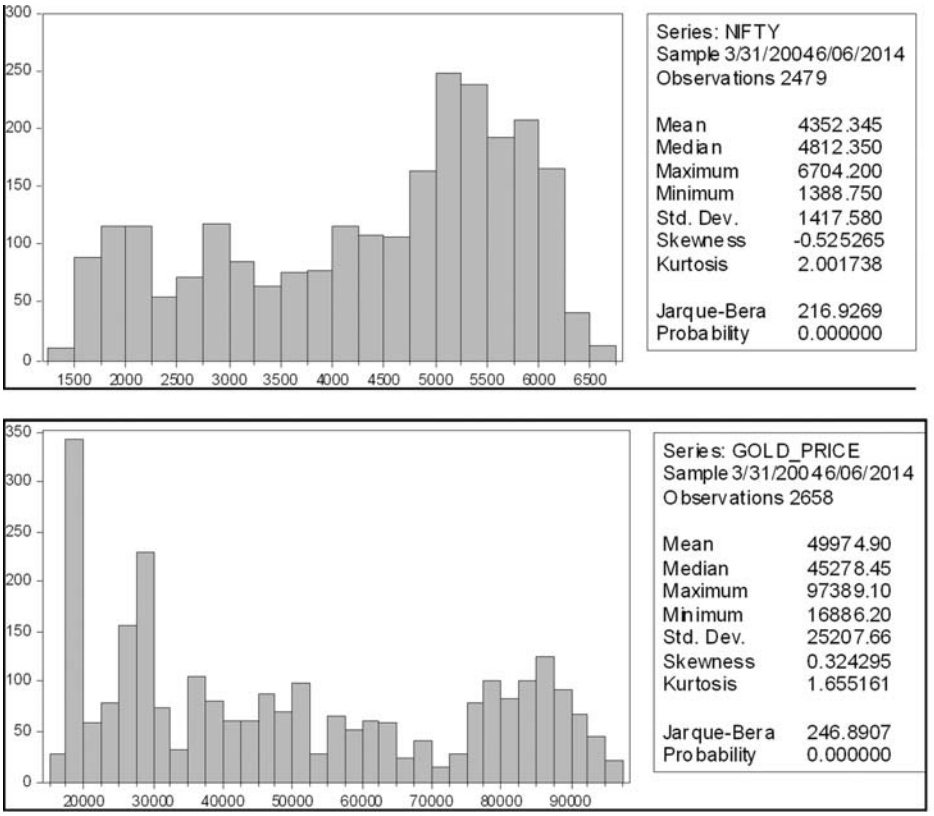

Figure 1

Table 1 showing unit root test results

	Augmented Dickey -Fuller test statistic		Phillips-Perron test statistic		Kwiatkowski-Phillips-Schmidt-Shin test statistic	
	Level	**1st Difference**	**Level**	**1st Difference**	**Level**	**1st Difference**
NIFTY	-1.2889	-7.8621	-1.60002	-45.2566	0.10228	0.061782
GOLD	-0.95568	-52.1011	-0.95203	-52.1023	6.22324	0.108544

Note: *ADF and PP Test critical values: 1% level -3.48, 5% level-2.88, 10% level -2.57; KPSS Asymptotic critical values: 1% level 0.73, 5% level 0.46, 10% level 0.34.*

Table 1 presents the results of the unit root test. The results show that all the variables of our interest, namely GOLD, NIFTY did not attain stationarity after first differencing, I(1), using both ADF and PP test. The augmented Dickey Fuller Test and Phillips-Perron (P-P) Test fail to provide result of stationary at first difference at all lag differences. The results indicate that the null hypothesis of a unit root cannot be rejected for the given variable as neither the ADF value nor PP value is smaller than the critical t-value at 1%, 5% and 10% level of significance for all variables and, hence, one can conclude that the variables are not stationary at their levels and first differences both in ADF and PP test.

To circumvent the low power in the standard unit root tests, the newly developed KPSS test is applied to test the null of stationary real exchange against the alternative of non-

stationarity. The results of applying the KPSS test on these variables show strong evidence of stationarity since the null of stationarity is accepted at the 1, 5 and 10 percent significance level. An inspection of the figures reveals in table-1 that each series is first difference stationary at 1%,5% and 10% level using the KPSS test. However, the ADF and PP test result are not as impressive, as all the variables did not pass the differenced stationarity test at the one, five and ten percent levels. We therefore rely on the KPSS test result as a basis for a cointegration test among all stationary series of the same order meaning that the two series are stationary at their first differences [they are integrated of the order one i.e I(1)].

Table 2 showing the Granger causality test results

Null Hypothesis:	F-Statistic	Prob.	Decision
NIFTY does not Granger Cause GOLD PRICE	1.92842	0.1456	No Causality
GOLD PRICE does not Granger Cause NIFTY	1.67523	0.1875	No Causality

Note: Pairwise Granger Causality tests are performed on the first differences of logged variables.
*Decisions are made at 5% significance level.

Granger Causality Test Results

The Granger Casualty test is done on the stationary values. It can be inferred from Table 2. We will accept the null hypothesis that Gold price does not cause and effect the Nifty index return or Nifty index return does not cause and effect gold price.

Table 3 showing the Johnasen cointegration test result (lags interval: 2)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.180221	477.1292	15.49471	0.0001
At most 1 *	8.290000	0.198884	3.841466	0.6556

Cointegration test results:

Table-3 exhibits the multivariate cointegration test results through Johansen approach that gives surety about affiliation between two commodity market indicators i.e., Gold price and stock market index of National stock exchange in the long period because trace statistics is more than critical value in case of both the likelihood ratio test, that is, the trace test and the maximum eigen value test. Therefore, the results of the multivariate cointegration test accept the null hypothesis. This test also confirmed the number (two) of cointegration vectors. In other words, there is a long run association between Gold Price and Nifty.

Conclusion

The Study examined casual relationship between Nifty and gold price. The study used the daily data which is collected from NSE database and World Gold Council database for the period from April 1, 2004 to March 31, 2014. The unit root properties of the data were examined using the Augmented Dickey Fuller test (ADF), Phillips-Perron (PP) Test, Kwiatkowski, Phillips, Schmidt and Shinn (KPSS) test after which the cointegration and causality tests were conducted. The unit root test clarified that both gold price and stock price are non-stationary at both level and the first differences in case of Augmented Dickey Fuller test (ADF), and Phillips-Perron (PP) Test. But, the series of both variables of our consideration gold price and stock price were found to be integrated of order one using the Kwiatkowski, Phillips, Schmidt and Shinn (KPSS) test for unit root. Johansen's co-integration test showed that there is a relation between gold prices and nifty in the long run period. The results of Granger causality test reveal that returns of Nifty index do not lead to increase in gold price and rise in gold price does not lead to increase in Nifty.

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Stress and Job Performance: among Nurses

D. Rajan

Abstract

This descriptive research has been undertaken in Tirunelveli District, Tamilnadu as comparative study to identify and differentiate sources of stress and its impact on job performance of nurses working in four core departments namely intensive care unit, operation theatre, emergency department and ward. Sources of stress have been identified under three dimensions namely organization structure and policy related stressors, work shift related stressors, and interpersonal relationship at workplace related stressors. The study has sampled 360 nurses from 45 general types of private hospitals using stratified sampling technique. Weighted average method has been applied to analyse sources of stress. Mean, standard deviation and coefficient of variation have been used to understand perception of nurses working in four core departments towards sources of stress. Kruskal Wallis test has been administered to examine the relationship between sources of stress and demographic variables. Multiple regression models have been used to know relationship between sources of stress and job performance. The result with all three dimensions of stressors, has been perceived at medium level by majority of the nurses. The study has given suitable suggestions to overcome the stress.

Key Words : Nurse,Stress, Job Performance, Private Hospital, Tirunelveli District

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Stress has been viewed as a complex and dynamic transaction between individuals and their environments (Evans William and Kelly Billy, 2004). It is a situation which will force a person to deviate from normal functioning due to the change (i.e., disrupt or enhance) in his or her psychological and/or physiological condition (Beehr and Newman, 1978). It is also a factor which potentially hinders organizational effectiveness by contributing to lower employee performance (McGrath, 1976) and to employee withdrawal behaviour such as absenteeism and turnover (Lyons, 1971; Hrebeniak and Alutto, 1972). Nowadays, the turnover is found as a major issue among all occupational groups. Nursing profession is a foremost occupational group among them.

Nursing, the paramedical sector has occupied a key role in health care industry. The role of nursing profession is crucial for effective functioning of the hospital.The main objectives of nursing profession are to promote and maintain health, to care for people when their health is compromised, to assist recovery, to facilitate independence, to meet needs and to

improve well being and quality of life.The responsibilities of staff nurses are to admit and discharge the patients, to maintain personal hygiene and comforts of the patient, to attend to the nutritional needs of the patient, to prepare invalid's diet and feed helpless patients, to maintain clean and safe environment for the patients, to implement and maintain ward policies and routines, to co-ordinate patient care with various health team members, to follow the doctor's rounds, to perform technical tasks (e.g., administration of medication, to assist doctors in various medical procedures, to prepare articles and the patient for medical or nursing procedures, to record vital signs, to give tube feeding, to give enema, bowel wash, dressing, stomach wash, eye and ear-care, collection and sending of specimens, pre-and post-operative care, to assist administration of transfusion, perineal care, breast care, baby care and the like), to help doctors in diagnosis and treatment, to maintain intake and output chart, to observe the change in patient's condition and records, to take necessary action and report to the concerned authority, to impart health education to the patient and his or her family, to accompany very ill-patients sent to other departments or transferred to other institutions, to hand over and take over patient, equipment and supply, to keep the ward neat and tidy, to maintain safety of the equipments, to prepare and check ward supplies, to assist ward supervisor or sister in ward management and officiate in her or his absence, to assist in taking inventories and to maintain ward record as assigned to her by the sister incharge.

Thus, they are directly dealing with the patients to prevent illness, to restore health and to alleviate suffering.It has been indicated that health care professionals are regularly indicated in the literature exploring work-related stress (Payne and Firth-Cozens 1987). Indeed, it has also been reported that nurses and doctors experience the highest levels of stress within the health care team (Payne and Firth-Cozens 1987, Scalzi 1988, Kalliath et al. 1998, Anderson et al. 1996). Every day the nurse confronts stark suffering, grief, and death as few other people do. Many of their tasks are mundane and unrewarding. Many are, by normal standards, distasteful, even disgusting, others are often degrading, some are simply frightening (Hingey, 1984).

The study area, Tirunelveli District has attained a remarkable development in the healthcare sector in the past few years. The number of hospitals, laboratories and pharmaceuticals has increased tremendously. Though there have been developments in health care aspects, still unclear organization structure and policy, ill-defined hierarchy structure, unhealthy shift work system (two shift work system), unhealthy interpersonal relationship, long working hours, lack of salary, inadequate protective equipment, negligible waste disposal methods and high patient loads are found in many hospitals. These factors not only cause stress among nurses but also deteriorate their job performance. Hence, in the study area the study of such as work related stress can help in improving the job performance of nurses by alleviating the factors producing stress. Consequently, the study of stressors specific to nursing in Tirunelveli District seems to be important. However, it is also important to establish the reliability and validity of a measure of perceived stress of nurses. In light of these grounds, the present study has been undertaken.

Statement of the Problem

Organization structure and policy, work shift and interpersonal relationship at work place have occupied the major place in determining job performance of an employee. When these factors are clear, fair and healthy, they will not only enhance motivation of the employees but also improve their performance and productivity. At the same time, when these factors are negative, i.e., unclear and non-transparent organization structure and policy, unfair work shift and unhealthy interpersonal relationship such as conflict, dispute at workplace will cause stress which will further affect their job performance. When nurse develops stress, job performance of the nurse is affected which will further threaten safety of the patients, e.g. to forget giving medicines in time, recording vital, signs of the patients, reporting to the doctors about patients' conditions. Therefore, it seems important to analyse the sources of stress arising as a result of organization structure and policy, work shift and interpersonal relationship so as to prevent stress and thereby improve job performance of nurses. Hence, the present study is undertaken in the study area with the objectives of identifying and differentiating sources of stress and its impact on job performance of nurses working in four core departments in private hospitals.

Scope of the Study

The study has focused female nurses working in general type of private hospitals in Tirunelveli District, Tamilnadu with the qualification of Diploma in General Nursing and Midwifery (DGNM) and Bachelor of Science in Nursing courses. The study has exclusively focused the nurses

working in intensive care unit, operation theatre, ward and emergency departments. The study also focused the variables namely organization structure and policy related stressors, work shift related stressors and interpersonal relationship at workplace related stressors and job performance.

Significance of the Study

The study has discussed about the sources of stress arising in form of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at workplace related stressors. The results and suggestions will be useful for hospital management and other organizations which are offering similar services to regulate their policy in terms of organization structure and policy, work shift and interpersonal relationship at workplace. The present study will serve as secondary data for future research scholars.

Profile of the Study Area

The study area, Tirunelveli District is located in southern part of Tamil Nadu. It consists of 11 taluks and 19 blocks. The total population of the district census is 3072880 of which male population are 1518595 and female are 1554285 (source: Census, 2011). There are five colleges offering DGNM course and eight colleges offering B.Sc Nursing course. There are 482 government hospitals including primary health centres and sub centres and 221 private hospitals including nursing homes and clinics (source: office of Deputy Director of Health, Tirunelveli district, Biomedical waste management department).

Research Objectives

The following were the objectives of the study:

i. To identify the source of stress among nurses in terms of organization structure and policy, work shift and interpersonal relationship at workplace,

ii. To examine impact of stress on job performance of nurses,

iii. To understand extent of perception of nurses towards sources of stress,

iv. To compare the perception of nurses working in various departments towards source of stress,

v. To examine the relationship between demographic variables and sources of stress, and

vi. To provide suitable suggestions to prevent and manage stress.

Research Hypotheses

The following were the hypotheses of the study:

There is no significant difference in the perception scores of sources of stress among:

i. the group of respondents based on age,

ii. the group of respondents based on marital status,

iii. the group of respondents based on native place,

iv. the group of respondents based on places of stay,

v. the group of respondents based on educational qualification,

vi. the group of respondents based on salary,

vii. the group of respondents based on work experience,

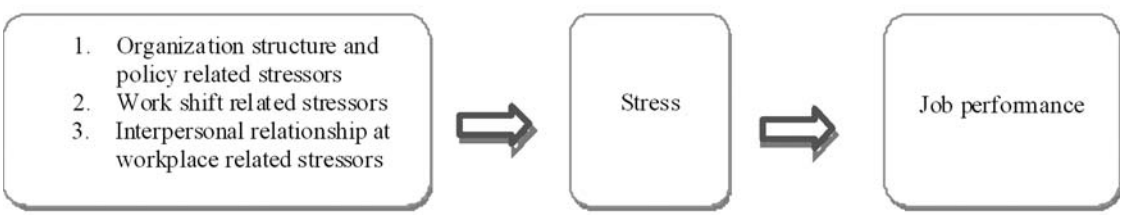
viii. the group of respondents based on ward allotment,

ix. the group of respondents based on work shift, and

x. the group of respondents based on job situation.

Conceptual Framework of the Study

The conceptual framework of the study which explains independent variables of the study (organization structure and policy related stressors, work shift related stressors and interpersonal relationship at workplace related stressors) and dependent variables (job performance) of the study is depicted as follows.



Definition

Job stress is a state of mind of personal dysfunction as a result of the conditions in the workplace, and one's psychological and physiological reactions to these uncomfortable, adverse, or intimidating workplace conditions. A high level of job stress is assumed to change an individual's normal behaviour and it affects his or her performance (Daniel, 1996).

It is the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, responses, or need of the worker (National Institutes for Occupational Safety and Health, 1999). It is any characteristic of the job environment that poses a threat to the individual, either excessive demands or insufficient supplies to meet the need and lead to a rising tension in a person (Hinshaw, 1993; Edwards, 1995). It is the experience of negative feelings, such as frustration, worry and anxiety, perceived to arise from work related factors (Kyriacou, 2001). Job stressors are the environmental factors that are involved in the stress process (Schaufeli and Peeters, 2000). They are the situations or events that have the potential to affect health outcomes (Barling Julian, 1990).

Relationship between Stress and Job Performance

Job performance can be viewed as an activity in which an individual is able to accomplish the task assigned to him/her successfully, subject to the normal constraints of reasonable utilization of the available resources. There are four types of relationships between the measures of job stress and job performance (Jamal M. 2007). One is a negative linear relationship, when productivity decreases with stress (distress). Productivity can also increase as a consequence of stress, thereby implying a positive relationship between the two. Thirdly, there could be a U shaped or a curvilinear relationship wherein, mild stress could increase the productivity initially up to a peak and then it declines as the person descends into a state of distress.The Yerkes and Dodson (1908) suggest that a higher stress leads to a higher job performance for simple jobs, whereas lower stress is active in affecting highly complicated jobs. This means that a moderate stress, and not an extra-ordinary stress, could be good to improve an individual's job performance.

Previous Studies Related to Stress and Job Performance

Ajeet Kumar Singh and Nidhi Bhatia Gogia (2014) analysed the effect of work stress on performance and productivity of hoteliers in hotels of Delhi and NCT. The result found that role conflict, role ambiguity, peer pressure, highly conflict environment and performance pressure had positive effect on employee motivation and also they enhanced the overall performance and productivity. The study suggested that management should implement activity based appreciation, recognition programmes, certification and some monetary benefits if the employees performed well. Moreover, management should organize some recreational activities for employees and help hoteliers to increase their performance and productivity.

Akif Latifi Al Khasawneh and Aahar Mohammed Futa (2013) analysed the relationship between job stress and nurses performance in the Jordanian Hospitals. The study assessed the relationship between job stresses with nurses' performance. The study found the following were stressors: organizational climate, economic factors, job difficulty, competition, and family factors. Creativity and innovation have primarily been affected by stress followed by problem solving and decision making abilities. Hypothesis results indicated that economic factors had troublesome results on nurses' performance. Physical, emotional, informational requirements of nursing job were distress factors for their performance. The dysfunctional competition and nature of contact with peers could lead to performance erosion. Organizational climate was the most influential stressor on creativity and innovation and on the nurses' ability in problem solving and making reasonable decision.

Arbalisarjou *et al*. (2013) analysed the relationship between job stress and performance among the hospital nurses. The sample consists of 491 nurses from the hospitals in the year 2012-2013. The result of the study indicated that the variables role, demand, control, support, relationship and change had significant relationship with job performance. The study also reported that, though employees do their work regularly, workload and time constraints reduced their performance.

Suresh (2013) studied stress and its impact on women working in BPOs from the samples of 132 middle level employees. The study analysed 30 factors that influenced the stress of working women. The result found that among the 30 factors, over work load, depression due to hurt, to work under tension, encountering criticism from boss for minor mistakes, facing abusive verbal or written comments, loss of weight, difficulty taking decision and encountering offensive or patronizing language were the foremost factors influenced in creating stress among the women employees working in BPOs.

Aasia Manzoor *et al.* (2012) investigated the impact of work stress on job performance of textile sectors. The study has found that job ambiguity, pressure due to heavy work load, physical dangers and noise at work causing ringing in their ears, job insecurity, long work hours with undesirable timings and not getting much time to spend with their family were the sources of stress. Majority of the respondents reported that job stress has not affected their job performance and they have also said that they were able to work and record quickly and effectively and they were also willing to pay additional efforts to reach their targets, they were able to be a good team member and they could get along with their colleagues easily. The correlation table showed that no significant relationship existed between job stress and employee job performance.

Rajan and Joseph (2012) analyzed organization related stressors and pharmacist's specific stressors. The study also examined impact of stress on job satisfaction and coping strategies. Unclear and undirected role, inadequate salary, conflict with medical staffs and other departmental staffs, lack of staff, sufficient space and ventilation, inadequate environment facilities to practise professional pharmacist role, unfair performance evaluation, poor communication system, difficulty to contact administrative personnel during emergency situations, lack of job security, long working hours, difficulty with shift work, being under pressure due to over work load and paper work, difficulty doing multiple work at the same time, frequent interruption over phone, equipment failures, manual work to handle the situations, doing non pharmacist's work, dealing with emotionally and physically threatening patients, doctors prescribing the drugs which are not in stock, difficulty to understand the handwriting of the doctors, are the stressors of the pharmacists. Lack of recognition, growth and development opportunities, lack of health and safety practice, lack of opportunity in decision making and training and development facilities are the dissatisfaction factors among the pharmacists. The study has proved that there is a significant relationship between stress and job satisfaction.

Rajan and Joseph (2012) examined organization structure and policy, managers' specific professionalism and career development, superior and subordinates, interpersonal relationship and support and role and work-home conflict related stressors of hospital managers. The study also analysed impact of stress on behaviour, physical health and mental health. The result of the study found that complex hierarchies of authorities, lack of motivation, receiving the orders not only from owners but also from their family members and other relatives, monotonous and not challenging type of work which limit the skills within a small circle and affect the development of personal skills and career, irritation and criticism by higher officers in front of subordinates, patients and their relatives, lack of interaction and coordination with other departmental managers, unclear job description about the expectations of the hospital as a manager, are the major stressors causing stress among the middle level managers working in non medical department. Over reaction and irritation to small things, difficulty in getting sleep and depression and negative thinking are the impact of stress. The study found that sex, and marital status have significant relationship with all kinds of stressors.

Rajan and Joseph (2012) analyzed organization related stressors and medical record technicians specific stressors and also examined the impact of stress on job performance of medical record technicians and their coping style. The findings showed that long working hours and rigid policy with regard to the working hours, inadequate salary, inadequate staff, lack of recognition, fear of job insecurity, inadequate welfare facilities, performing multiple tasks at the same time, dealing with death and dying, unavailability of the doctors, dealing with police personnel, searching the case sheets of very past year, sitting in the same posture for long time, are the major stressors causing stress among the medical record technicians. Committing mistakes in the record work, slow work speed, difficulty in recalling instruction of doctors, inability to finish the work in time, decreased efficiency and productivity, forgetfulness, extending lack of cooperation to other departmental staffs are the major impact of stress. The study found significant relationship between age and organization related stressors and marital status and medical record technicians' specific stressors.

Yau Yu Sui *et al.* (2012) examined job stress level and stressors among China nurses. The study found that the most stressful domains were work load and time, working environment and resources, nursing profession and clinical duty, patient care and management, and interpersonal relationship. Participants working in paediatric unit were found to have the highest stress level. Study reported that job would directly affect their health and job induced tension was the highest stress among the participants. Among the stressors, work load and time was the most serious source

of stress. Increased work load among the nursing staff had a negative impact on nurses' job satisfaction. Women were found to have more psychological strains and depression and to experience greater sadness and anxiety and also more vulnerable to repeated stress exposure. Not being respected by physicians, patient's and patients' relatives, being physically attacked and not trusted by patients and being yelled at by physicians were the most common stressors.

From the above literature survey, it could be understood that though there were study in the area related to stress of various occupational groups, they were limited to Tirunelveli city only and they did not cover entire district. Therefore, there was a scope to undertake the research covering entire district. The present research fulfilled that gap by means of covering entire Tirunelveli district.

Research Design

This survey research is descriptive in nature. It describes the nature and characteristics of stress of nurses in the private hospitals by using the following methodology.

Sampling Techniques and Sampling Procedure

The general types of private hospitals having more than twenty five beds and having the facilities of wards, operation theatres, intensive care units and casualty departments, were randomly selected for study from the list of hospital obtained from office of the Deputy Director of Health, Tirunelveli District. In order to sample the respondents the researcher stratified the target population into four categories namely nurses working in ward, intensive care unit, operation theatre and casualty departments. From each category, the researcher sampled two nurses using proportionate type of stratified random sampling technique. Thus a total of eight nurses were sampled from a single hospital. The same method has been extended to 45 hospitals. Thus a total of 360 nurses (samples) were sampled for this research. The total population of nurses working in these selected hospitals were 1100.

Instrumentation

The self constructed questionnaire has been administered to collect primary data from the respondents. The questionnaire was composed of four sections namely Section 'A' that dealt with profile of the respondents, Section 'B' that dealt with sources of Stress, Section 'C' that talked about impact of stress and Section 'D' that discussed coping strategies. The questionnaire was made based on Likerts five points scale namely 'Strongly Agree,' 'Agree,' 'No opinion,' 'Disagree,' and 'Strongly Disagree.' The points were allotted for them as 5, 4, 3, 2, and 1 respectively.

Data Collection

Primary data were collected directly from the nurses using structured questionnaire. Moreover, personal observation discussion with nurses was also made to collect primary data. Secondary data for the study have been collected from books, theses, dissertations, journals and the internet to provide appropriate significance to the study.

Tools of Analysis

The tools administered to analyse the data are given as follows.

a) Weighted Average

In order to analyse the sources of stress and impact of stress, the weighted average method has been used. The formula of weighted average is given as follows.

Weighted average = $w_1x_1 + w_2x_2 \ldots w_nx_n$, where, w is relative weight and x is value.

b) Mean, Standard Deviation and Coefficient of Variation

In order to compare sources of stress among the nurses working in various departments and to compare the dimensions of stressors, mean and standard deviation have been employed. Their formula is given as follows.

Mean: ì =ΣX/n, where 'Σx' is sum of all data valued and 'n' is number of data items in sample.

Standard deviation: $\sigma = \frac{\sqrt{X-\bar{X}}}{N}$ where '◘' is the standard deviation of a sample, '©X' is sum of each value in the data set, 'X' is mean of all values in the data set and 'N' is number of values in the data set.

The co-efficient of variation: Standard deviation / Arithmetic mean x 100

c) Extent of Perception

The extent of perception of the respondents towards sources of stress have been analysed as follows.

(i) High perception: Scores above (arithmetic mean + standard deviation).

(ii) Medium perception: scores ranging from (arithmetic mean – standard deviation) to (arithmetic mean + standard deviation); and

(iii) Low perception: scores less than (arithmetic mean – standard deviation).

d) Multiple Regression Test

In order to analyse the impact of each dimension of stressors on job performance of nurses, multiple regression analysis has been used.

$$R_{y.x1x2} = \sqrt{b_1 \Sigma x_{1i} y_i + b_2 \Sigma x_{2i} y_i / \Sigma Y_i^2}$$

Where, $x_{1i} = (X_{1i} - X_1)$, $x_{1i} = (X_{2i} - X_2)$, $y_i = (Y_i - Y)$

e) Kruskal Wallis test or H test

In order to test the relationship between demographic variables and sources of stress the Kruskal-Wallis Test has been used.

$$H = \frac{12}{N(N+1)} \left(\frac{R_1^2}{n_1} + \frac{R_2^2}{n_2} + \cdots + \frac{R_k^2}{n_k} \right) - 3(N+1)$$

Where

$n_1, n_2, \ldots n_k$ are the number in each of k samples

$N = n_1 + n_2 + \ldots + n_k$ and $R_1, R_2, \ldots R_k$ are rank sums of each sample

Demographic Variables

Table 1: Profile of the Respondents

S.No.	Measure	Item	Frequency	Percentage
1	Sex	Female	360	100
2	Marital status	Married	60	16.7
		Unmarried	300	83.3
3	Age	Below 22 years	6	1.7
		Between 22 and 26 years	288	80.0
		Between 26 and 30 years	42	11.7
		Above 30 years	24	0.7
4	Native place	Rural	204	56.7
		Urban	156	43.3
5	Residential status	Owned house	288	80
		Rented house	72	20
	Places of stay	Home	204	56.7
		Hostel	156	43.3
7	Educational qualification	B.Sc Nursing	84	23.3
		DGNM	276	76.7
8	Strength of family member	Below 4 members	108	30.0
		Between 4 and 6 members	216	60.0
		Between 6 and 8 members	30	8.3
		Above 8 members	6	1.7
9	Salary	Below 5000	174	48.3
		Between 5000 and 8000	162	45.0
		Between 8000 and 11000	18	5.0
		Above 11000	6	1.7
10	Year of working experience	Below 1 year	126	35
		Between 1 and 3 years	150	41.7
		Between 3 and 5 years	30	8.3
		Above 5 years	54	15
11	Department	Casualty	90	25
		Intensive Care Unit	90	25
		Operation Theatre	90	25
		Ward	90	25

12	Job situation	Full time permanent	132	36.7
		Full time temporary	222	61.7
		Part time permanent	6	1.7
13	Work shift	Rotating eight hour shift	60	16.7
		Rotating twelve hour shift	276	76.7
		Permanent day shift	24	6.7
14	Allotment of nurses in department	Between 1 and 2 nurses	186	51.7
		Between 2 and 4 nurses	120	33.3
		Between 4 and 6 nurses	54	15.0
15	Mode of travel	Public transport	162	45.0
		Hospital bus	6	1.7
		Two wheeler	60	16.7
		Walking	132	36.7

Source: Primary Data

RESULTS AND DISCUSSION

It would be understood that all 100% respondents were female. Among them, 83.3% were married and 16.7% were unmarried. Of them, 1.7% were below 22years of age, 80% between 22 and 26 years, 11.7% between 26 and 30 years and 0.7% were above 30 years of age. Besides, 56.7% belonged to rural and 43.3% belonged to urban. Moreover, 80% had owned house and 20% had rented house, 56.7% were staying in house and 43.3% were staying at hostel. Of them, 23.3% were qualified with B.Sc Nursing and 76.6% were qualified with DGNM courses.

Moreover, 30.0% had below 4 members, 60.0% had between 4 and 6, 8.3% had between 6 and 8 and 1.7% had above 8 members in their family. Among them, 48% were drawing below 5000, 45% between 5000 and 8000, 5% between 8000 and 11000 and 1.7% were drawing above 11000 salaries in rupees. In all, 35% were below 1 year, 41.7% between 1 and 3 years, 8.3% between 3 and 5 years and 15% had above 5 years of work experience.

Overall, 36.7% were full time permanent, 61.7% full time temporary and 1.7% was part time permanent employees. Among them, 16.7% had rotating eight hour shift, 76.7% had rotating twelve hour shift and 6.7% had permanent day shift.

Furthermore, 51.7% reported that they had between 1 and 2 nurses, 33.3% between 2 and 4 nurses and 15% had between 4 and 6 nurses in their ward. Overall, 45% of the respondents

Table 2: Organization Structure and Policy Related Stressors

S. No.	Organization Structure and Policy	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree	Total Score
1	Unclear objectives and hierarchy level of the hospital	96	162	48	36	18	1362
2	Unfair and biased performance evaluation, increment, incentives and promotion	42	174	66	30	48	1212
3	Strict and rigid rules, regulations of the hospital	90	168	60	36	6	1380
4	Unclear and untransparent communication and information flow	72	138	66	66	18	1260
5	Unmotivated and biased leadership style of head nurse	36	126	126	36	36	1170
6	Absence or lack of opportunity to take part in decision making process of the ward or hospital	66	120	66	78	30	1194

Source: Primary data

used public transport, 1.7% hospital bus and 16.7% used two wheelers to travel and 36.7% came by walk to the duty.

Sources of Stress

It would be known from Table 2 that strict, rigid rules and regulations of the hospital and unclear objectives and hierarchy level of the hospital are the major organization structure and policy related stressors. They have occupied the total score of 1380 and 1362 respectively. The greater importance given to these factors may be due to the rigid policy of the hospital in terms of working hours, leave, shift changes and the unclear job descriptions of nurses. In light of the importance given to this factor it is indicated that nurses expect some flexible rules in terms of leave, working hours, work shift and clear job descriptions. Unclear and untransparent communication and information flow, unfair and biased performance evaluation, increment, incentives and promotion are the next foremost organization structure and policy related stressors. They have occupied the total score of 1260 and 1212 respectively. Absence or lack of opportunity to take part in decision making process of the ward or hospital and unmotivated and biased leadership style of head nurse are the least organization structure and policy related stressors. They have occupied the total score of 1194 and 1170 respectively.

Table 3: Work Shift Related Stressors

S. No.	Work Shift	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree	Total Score
1	Inequity in the allocation of work shift	42	138	66	90	24	1164
2	Rotation to different ward without seeking the consent	42	78	84	138	18	1068
3	Refusal of request by head nurse for changing the off or change in the duty schedule	12	180	60	90	18	1158
4	Allotment of too long day shift or night shift	54	108	78	102	18	1158
5	Often working alone at night	60	114	18	108	60	1086
6	Senior nurses ask for change of shift	84	84	24	120	48	1116

Source: Primary data

From Table 3 it could be noted that inequity in the allocation of work shift has been the major stressor. It has occupied the highest total score of 1164. The greater importance given to this factor may be due to the partial treatment of the head nurse in allocating the duty shift. The importance given to this factor indicates that the head nurse not being neutral in duty allocation increases stress. Refusal of request by head nurse for changing the off or change in the duty schedule and allotment of too long day shift or night shift have occupied the next two places with the same total score of 1158 respectively as stressors. Senior nurses ask for change of shift, working alone at night often and rotation to different wards without seeking the consent are the least work shift related stressors. They have occupied the total score of 1116, 1086 and 1068 respectively.

Table 4: Interpersonal Relationship at the Work Place Related Stressors

S. No.	Interpersonal Relationship	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Total Score
1	Lack of opportunity for meaningful interaction and relationship with superiors and co-workers	102	228	18	12	0	1500
2	Encountering disputes with medical staffs	54	108	132	42	24	1206
3	Disputes with other staff in the ward, and difficulty to work	24	138	78	78	42	1104
4	Conflict with non medical staffs (Housekeeping, reception)	48	150	36	78	48	1152
5	Inadequate support of superiors and administrative staff during emergency and crisis situations	138	144	18	36	24	1416

Source: Primary data

It could be known from Table 4 lack of opportunity for meaningful interaction and relationship with superiors and co-workers and inadequate support of superiors and administrative staff during emergency and crisis situations have occupied the first two places in interpersonal relationship, conflict and support at the work place related stressors with the total score of 1500 and 1416 respectively. The greater importance given to this factor may be due to high work load, lack of time, inadequate interdepartmental meeting, refresh programmes and lack of involvement of superiors and administrative staffs. The importance given to these factors indicate that they require refresh programmes and meetings to develop inter personal relationship and reduce the conflict. They also require the involvement of incharge and administrative personnel during the emergency situations. Encountering disputes with medical staffs, conflict with non medical staffs (Housekeeping, reception and the like) and disputes with other staff in the ward, and difficulty to work are next in line with the total score of 1206, 1152 and 1104 respectively.

Table 5: Extent of Perception towards Sources of Stress

S. No	Sources of Stress	Low		Medium		High	
		No of respondents	% of respondents	No of respondents	% of respondents	No of respondents	% of respondents
1	Organization structure and policy related stressors	54	15	258	71. 67	48	13. 33
2	Work shift related stressors	42	11.67	252	70	66	18. 33
3	Interpersonal relationship at workplace related stressors	66	18.33	240	66. 67	54	15

Source: Primary data

It could be understood from Table 5 that all dimensions of stressors are perceived at medium level by majority of the respondents. The same is depicted in figure 1 as follows.

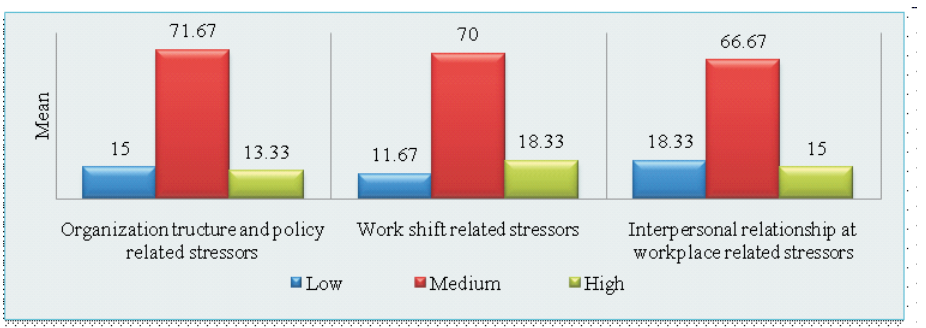


Figure 1: Extent of Perception towards Sources of Stress

Table 6: Comparative Analysis of Sources of Stress

S.No.	Sources of Stress	Mean	Standard Deviation	Coefficient of Variation (%)
1	Organization structure and policy related stressors	70.17	14.50	20.02
2	Work shift related stressors	62.50	16.18	25.88
3	Interpersonal relationship at workplace related stressors	70.87	13.78	19.45

Source: Computed from primary data

It would be known from Table 6 that among three dimensions of stressors, interpersonal relationship at workplace related stressors occupied first rank with the mean score of 70.87. Organization structure and policy related stressors and work shift related stressors are next in line with the mean score of 70.17 and 62.50. Comparative analysis of different dimensions of stressors among themselves is given below in figure 2.

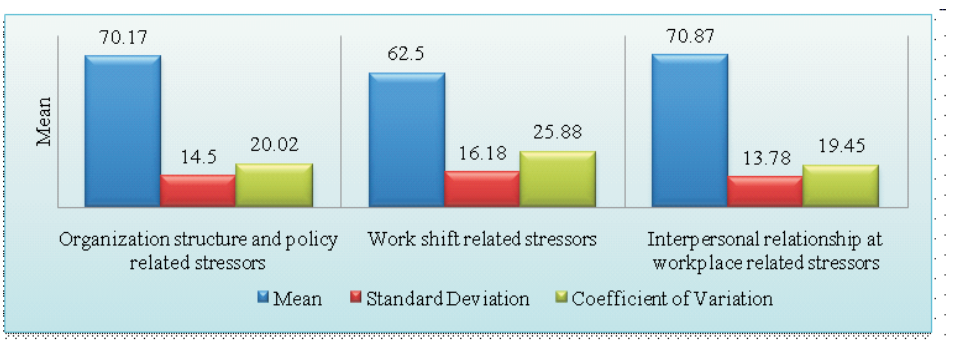


Figure 2: Comparison of Sources of Stress

Table 7: Comparison of Sources of Stress among Departments

S. No.	Sources of Stress	Ward			Operation theatre			Intensive Care Unit			Casualty		
		Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV
1	Organization structure	67.56	14.56	21.55	69.11	6.64	9.61	66.44	17.11	25.76	77.56	13.04	16.81
2	Work shift	63.56	12.86	20.23	50.22	13.32	26.52	69.33	12.19	17.58	66.88	18.54	27.72
3	Interpersonal relationship at the work place	74.93	9.11	12.16	62.67	13.83	22.07	72.27	16.19	22.40	73.60	11.64	15.82

Source: Computed from primary data

It could be known from Table 7 that organization structure and policy related stressors have been revealed by operation theatre nurses with the highest mean score of 69.11. Casualty, ward and intensive care unit nurses are following them with the mean score of 77.56, 67.56 and 66.44 respectively.

Work shift related stressors have been mostly pointed out by Intensive care unit nurses. Their mean score value is 69.33. Casualty, ward and operation theatre nurses have been next in line with mean score of 66.88, 63.56 and 50.22 respectively.

Interpersonal relationship at the work place related stressors have been indicated mostly by ward nurses. Their mean score have been 74.92. Casualty, intensive care unit and operation theatre nurses have been next in line with the mean score of 73.60, 72.27 and 62.67 respectively.The results of comparative analysis of sources of stress among various departments are displayed in figure 3 as follows.

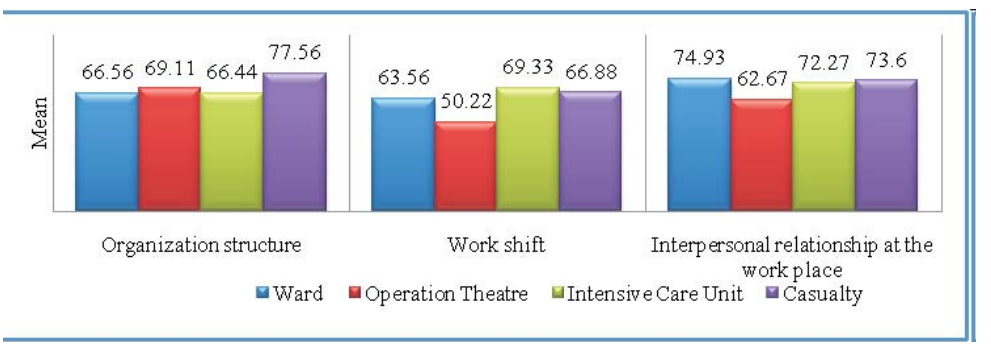


Figure 3: Comparison of Sources of Stress among Departments

Table 8: Impact of Stress on Job Performance

S. No.	Job Performance	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree	Total score
1	Not finishing work in time and receiving complaints from colleagues and patients	42	144	36	90	48	1122
2	Feeling of reduced productivity and expressing over reaction to small things	24	138	54	120	24	1098
3	Finding difficulty in recalling instructions and understanding routine procedures	54	126	24	120	36	1122
4	Taking longer time to complete deadliness and daily job function	36	138	36	96	54	1086
5	Being inattentive during work	12	126	72	90	60	1020
6	Losing patience and postponing patient care	12	54	24	204	66	822
7	Availing leave frequently	36	72	36	174	42	966

Source: Primary data

Impact of Stress

It would be known from the total score of table 8 that stress has an impact on job performance of nurses. It could also be known from the table that not finishing work in time and receiving complaints from colleagues and patients and finding difficulty in recalling instructions and understanding routine procedures are the major impact of the stress on job performance of nurses. They have occupied the first two places in the stress impact on job performance with the total score of 1122 respectively. Feeling of reduced productivity and expressing over reaction to small things, taking longer time to complete deadliness and daily job function are the next foremost impact of stress on job performance of nurses. They have occupied the total score of 1098 and 1086 respectively. Being inattentive during work, availing leave frequently and losing patience and postponing patient care are the other impacts, of stress on job performance in line with the total score of 1020, 966 and 822 respectively.

Relationship between Demographic Variables and Sources of Stress

The results of Kruskal Wallis Test used to test hypothesis is presented as follows:

Table 9: Relationship between Age and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	27.161	0.000	Significant
2	Work shift related stressors	38.985	0.000	Significant
3	Interpersonal relationship at the work place related stressors	16.352	0.001	Significant
4	Total score	26.406	0.000	Significant

Degree of freedom: 3, at 5 per cent level

It would be known from Table 9 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.000, 0.000, and 0.001 respectively. It could be observed from the value of level of significance that there is a significant relationship between age and perception scores of all three dimensions of stressors. With regard to the total score, the value of level of significance (0.000) is less than 0.05 (5% level), and hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on age.

Table 10: Relationship between Marital Status and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	2.169	0.141	Not significant
2	Work shift related stressors	2.023	0.155	Not significant
3	Interpersonal relationship at the work place related stressors	3.880	0.049	Significant
4	Total score	0.239	0.625	Not significant

Degree of freedom: 1, at 5 per cent level

It would be indicated from Table 10 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.141, 0.155 and 0.049 respectively. It could be known from the value of level of significance that there is no significant relationship between marital status and perception scores of organization structure and policy related stressors, and work shift related stressors. It could also be known that there is a significant relationship between marital status and perception score of interpersonal relationship at the work place related stressors. With regard to the total score, the value of level of significance is more than 0.05 (5 percent level) and hence the null hypothesis is accepted stating that there is no significant difference in the perception scores of sources of stress among the group of respondents based on marital status.

Table 11: Relationship between Native Place and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	0.180	0.671	Not significant
2	Work shift related stressors	4.578	0.032	Significant
3	Interpersonal relationship at the work place related stressors	0.892	0.345	Not significant
4	Total score	0.195	0.659	Not significant

Degree of freedom: 1, at 5 per cent level

It would be explained from Table 11 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.671, 0.032 and 0.345 respectively. It could be understood from the value of level of significance that there is a significant relationship between native place and perception scores of work shift related stressors. There is no significant relationship between native place and perception scores of organization structure and policy related stressors and interpersonal relationship at the work place related stressors. With regard to the total score, the value of level of significance is more than 0.05 (5 percent level) and hence, the null hypothesis is accepted stating that there is no significant difference in the perception scores of sources of stress among the group of respondents based on native place.

Table 12: Relationship between Places of Stay and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	9.391	0.002	Significant
2	Work shift related stressors	27.439	0.000	Significant
3	Interpersonal relationship at the work place related stressors	15.556	0.000	Significant
4	Total score	24.678	0.000	Significant

Degree of freedom: 1, at 5 per cent level

It would be highlighted from Table 12 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.002, 0.000, and 0.000 respectively. It could be known from the value of level of significance that there is a significant relationship between places of stay which refers to home or house of the respondents and perception scores of all three dimensions of stressors. With regard to the total score, the value of level of significance is less than 0.05 (5 percent level), hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on places of stay.

Table 13: Relationship between Educational Qualification and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	23.055	0.000	Significant
2	Work shift related stressors	10.507	0.001	Significant
3	Interpersonal relationship at the work place related stressors	24.253	0.000	Significant
4	Total score	7.377	0.007	Significant

Degree of freedom: 1, at 5 per cent level

It would be pinpointed from Table 13 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.000, 0.001 and 0.000 respectively. It could be understood from the value of level of significance that there is a significant relationship between educational qualification and perception score of all three dimensions of stressors. With regard to the total score, the value of level of significance is less than 0.05 (5 percent level), hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on educational qualification.

Table 14: Relationship between Salary and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	22.812	0.000	Significant
2	Work shift related stressors	13.614	0.003	Significant
3	Interpersonal relationship at the work place related stressors	25.795	0.000	Significant
4	Total score	24.827	0.000	Significant

Degree of freedom: 3, at 5 per cent level

It would be addressed from Table 14 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.000, 0.003 and 0.000 respectively. It could be known from the value of level of significance that there is a significant relationship between salary and perception scores of all three dimensions of stressors. With regard to the total score, the value of level of significance is less than 0.05 (5 percent level) and hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on salary.

Table 15: Relationship between Work Experience and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical value	Level of significance	Result
1	Organization structure and policy related stressors	39.103	0.000	Significant
2	Work shift related stressors	29.202	0.000	Significant
3	Interpersonal relationship at the work place related stressors	4.085	0.252	Not significant
4	Total score	9.830	0.020	Significant

Degree of freedom: 3, at 5 per cent level

It would be addressed from Table15 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.000, 0.000 and 0.252 respectively. It could be understood from the value of level of significance that there is a significant relationship between work experience and perception score of organization structure and policy related stressors and work shift related stressors. There is no significant relationship between work experience and perception scores of interpersonal relationship at the work place related stressors. With regard to the total score, the value of level of significance is more than 0.05 (5percent level) and hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on work experience.

Table 16: Relationship between Ward Allotment and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical Value	Level of significance	Result
1	Organization structure and policy related stressors	35.193	0.000	Significant
2	Work shift related stressors	70.643	0.000	Significant
3	Interpersonal relationship at the work place related stressors	43.674	0.000	Significant
4	Total score	66.331	0.000	Significant

Degree of freedom: 3, at 5 per cent level

It would be shown from Table 16 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.000, 0.000, and 0.000 respectively. It could be understood from the value of level of significance that there is a significant relationship between ward allotment and perception score of all three dimensions of stressors. With regard to the total score, the value of level of significance is less than 0.05 (5 percent level) and hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on ward allotment.

Table 17: Relationship between Work shift and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical value	Level of significance	Result
1	Organization structure and policy related stressors	13.104	0.001	Significant
2	Work shift related stressors	28.908	0.000	Significant
3	Interpersonal relationship at the work place related stressors	3.147	0.207	Not significant
4	Total score	13.976	0.001	Significant

Degree of freedom: 2, at 5 per cent level

It would be seen from Table 17 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.001, 0.000 and 0.207 respectively. It could be known from the value of level of significance that there is a significant relationship between work shift and perception scores of organization structure and policy related stressors and work shift related stressors. It could also be known from the value of level of significance that there is no significant relationship between work shift and perception scores of interpersonal relationship at the work place related stressors. With regard to the total score, the value of level of significance is less than 0.05 (5 percent level) and hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of sources of stress among the group of respondents based on work shift.

Table 18: Relationships between Job situation and Perception scores of Sources of Stress

S. No.	Sources of Stress	Critical value	Level of significance	Result
1	Organization structure and policy related stressors	1.120	0.571	Not significant
2	Work shift related stressors	40.408	0.000	Significant
3	Interpersonal relationship at the work place related stressors	11.707	0.003	Significant
4	Total score	1.342	0.511	Not significant

Degree of freedom: 2, at 5 per cent level

It would be revealed from Table 18 that the value of level of significance of organization structure and policy related stressors, work shift related stressors and interpersonal relationship at the work place related stressors are 0.571, 0.000 and 0.003 respectively. It could be understood from the value of level of significance that there is a significant relationship between job situation and perception score of work shift related stressors and interpersonal relationship at the work place related stressors. It could also be known from the value of level of significance that there is no significant relationship between job situation and perception scores of organization structure and policy related stressors. With regard to the total score, the value of level of significance is more than 0.05 (5 percent level) and hence the null hypothesis is accepted stating that there is no significant difference in the perception scores of sources of stress among the group of respondents based on job situation.

Relationship between Sources of Stress and Job Performance

The result of the multiple regression tests used to analyse the impact of stress on job performance is presented as follows.

Table 19: Multiple Regression Model Summary of Impact of Stress on Job Performance

Model	R	R Square	Adjusted R square	Standard Error of the Estimate
1	0.754	0.568	0.549	3.909

Source: Computed from primary data
Predictors: (Constant), OSS, WSS, IRS

From Table 19 it could be observed that the adjusted R square value of 0.549 indicates that around 54% of the independent variables (sources of stress) have impact on job performance.

Table 20: Multiple Regressions ANOVA of Impact of Stress on Job Performance

Model	Sum of squares	df	Mean square	F	Sig
Regression	6907.624	15	460.508	30.135	0.000
Residual	5256.776	344	15.281		
Total	12164.400	359			

Dependent variable: Job performance
Predictors: (Constant), OSS, WSS, IRS,

From Table 20 it could be observed that table value 0.05 is greater than the calculated value 0.000. It indicates that there is a significant relationship between independent variables and dependent variables. Therefore it could be known that stress has an impact on job performance.

Table 21: Multiple Regression Coefficients of Impact of Stress on Job Performance

S. No.	Variables	Unstandardized Coefficient		Standardized Coefficient	t	Sig
		B	Std Error	Beta		
1	Constant	3.238	2.744		1.180	0.239
2	Organization structure and policy related stressors	-0.214	0.065	-0.155	-3.294	0.001
3	Work shift related stressors	0.426	0.066	0.355	6.406	0.000
4	Interpersonal relationship related stressors	0.059	0.097	0.035	0.611	0.541

Dependent variable: Job performance

From Table 21 it could be noticed organization structure and policy related stressors and work shift related stressors have significant impact on job performance of nurses as their level of significance is less than 0.05. Interpersonal relationship related stressorshave no significant impact on job performance of nurses as their level of significance is more than 0.05.

From the above findings the following regression model can be developed.

SIOJP = 3.238 +(-0.214X1) + (0.426X2)

T values = (-3.294) (6.406)

Level of significance = (0.001) (0.000)

R Square (Adj) = 0.549 F = 30.135

Where

SIOJP = Stress Impact on Job Performance

X1= Organization structure and policy related stressors

X2 = Work shift related stressors

Here

X1 (Organization structure and policy related stressors) = -0.155 i.e., 100% change in organization structure and policy related stressors have 15.5% impact on job performance.

X2 (Work shift related stressors) = 0.355 i.e., 100% change in work shift related stressors have 35.5% impact on job performance.

Discussion

The results of the present study say that unmotivated and biased leadership style of head nurse and unclear and non-transparent communication and information flow are the sources of stress. These findings go in par with the study of Schabracq and Cooper (2000), McHugh (1993), Murphy and Sauter (2003) and Wahab (2010) who have found that occupational stress contributes to low motivation and morale, decrease in performance, high turnover, accidents, low job satisfaction, low quality products and services, and poor internal communication and conflicts. The present study has found that inability in finishing the work in time and postpone the work, over reaction to small things, difficulty to think logically and take the decisions, on the job absenteeism, difficulty in concentration and lack of interest are the impact of job stress job performance. Theses findings are similar to the study of Arandelovic M. and Ilic I. (2006) who reported that frequent lateness, complaints from co-workers, social withdrawal at the workplace, overreaction to small things, accidents on the job, taking longer time to complete deadlines and daily job functions, difficulty in recalling instructions and understanding procedures, and on the job absenteeism.The present study found that unhealthy shift work and poor interpersonal relationship are the sources of stress among nurses. This result goes on a par with the study of NIOSH (1998) which indicated that stress arises due to number of factors such as poor working condition, excessive work load, shift work, long hours of work, role ambiguity, role conflicts, poor relationships with the boss, colleagues, or subordinate officers, risk and danger.

The present study identified that poor interpersonal relationship is the stressor of nurses. These findings provide support for the study of Bailey (1985) who indicated that workload, patient care, interpersonalrelationships with physicians and colleagues, insufficient knowledge of nursing and nursing skills, and bureaucratic-political constraints.The present study found that inadequate support of superiors and administrative staff during emergency and crisis situations is the stressor of nurses. This finding is corroborated with the study of Tyler and Cushway (1995), Simoni and Paterson (1997), and Boswell (1992) who reported that shortage of staff, work overload, too much administrative work, lack of support from superiors and peers and uncertainty concerning treatment were some stressors commonly encountered by nurses.The present study explained that absence or lack of opportunity to take part in decision making process of the ward or hospital and unclear organization structure are the sources of stress. These findings are consistent with the study of Franch and Caplan (1972) and Margolis et al. (1974) who identified overload, role vagueness, role conflict, responsibility for people, participation, lack of feedback, keeping up with quick technological change, being in an innovative role, career growth, organizational structure and environment, and recent episodic events, overload, excessive work or work that is outside one's capability are the causes of stress. The present study also found that stress has an impact on job performance of nurses. This finding goes on a par with the study of Jex (1998) who concluded that high stress reduces job performance.

SUGGESTION AND CONCLUSION

Suggestions

Upon the basis of findings, the researcher presents following suggestions.

1. Clear departmental objectives and a well defined hierarchy level should be established for nurses and communicated to them. Appropriate standards and guidelines with reference to nursing practice should be established and communicated to them. Expectation of the hospital, as to how nurses should care for the patients and interact with the relatives should be provided clearly. Performance evaluation, salary, increment, incentives, allowance and promotion should be fair, unbiased and transparent and the standard policy regarding these aspects should be created so as to improve the job performance and thereby effective patient care.

2. The head nurses should be instructed to be motivating and unbiased in nature. They should be counselled to treat all nurses equally and not to allocate more work load for newly joined or junior nurses and lighter work load to senior and experienced nurses. They should also be instructed to consider the request of nurses for 'leave' and change of 'off' in flexible manner so as to improve their effective contribution. Strict policy should not be followed in providing 'leave, and changing 'off.' They should also be instructed not to limit their work with the allocation and scheduling of work; but also extend their support at the time of critical situations, and whenever the help is required with regard to nursing procedures.

3. Fair and equal distribution of work load should be done for nurse. Nurses should be allowed to take part in the decision making process of the department and hospital in terms of scheduling of work shift, week off and allotment of the duty to various departments. They should not be disturbed by head nurses or higher officers either by phone or any other mode after they have left the duty and when they are on 'off duty' or on 'leave' unless it is an emergency one. Positive inputs about the work environment should be given to nurses by making them understand about the importance and characteristics of their work in order to improve the motivation and therebyjob performance.

4. Allotment and rotation of nurses to the various departments should be done after seeking their consent. Their interest, ability, previous experience and health should be considered in order to improve their skills and career in the particular area. Work shift should be scheduled in the manner that no single nurse should work alone at night. The change of shift should be done in the systematic manner. Too long day or night shift should be avoided. Senior nurses should be instructed not to force the juniors to alter the shift duty for their convenience. The head nurse should be instructed to monitor it. Nurses should be made aware about the importance of arriving a few minutes earlier than the appointed hours in order to relieve those who have worked in the previous shift. This will help all those concerned to find regular and safe means of transport.

5. Interpersonal relationship should be strengthened by conducting inter departmental meetings with medical, other paramedical and non- medical staffs at frequent intervals so as to improve the healthy inter personal relationship, cooperation among the departments to reduce the conflict, jealousy and ego among the staffs. These will be helpful for nurses to improve their job performance.

Limitations of the Study

The study has been limited to Tirunelveli District only. The study has covered only female nurses working in wards, intensive care units, operation theatres and casualty departments of general type of private hospital having these four departments. It has not covered other nurses such as nurses working in government hospitals, single speciality hospitals, dialysis units, cath labs and any other units.

The present study has also been limited to nurses qualified with Diploma in General Nursing and Midwifery (DGNM) and Bachelor of Science in Nursing (B.Sc) and it has not included any other category of nurses such as Female Nursing Assistants (FNA), Diploma in Nursing Assistants (DNA), Post Certificate B.Sc Nursing (PCBSc), Master of Nursing (M.Sc), Nursing Supervisors and Head nurses.

As the respondents are literate they could respond to all questions intelligently. Many of the respondents were afraid of the management to provide data and some of them were busy in their work, and hence, the researcher had to spend more time to elicit the responses. In the study the researcher observed that some of the nursing incharges and senior nurses were reluctant to speak about the nurses in their department.

Directions for Future Research

This study is relevant in second tier cities all over the country wherever there are hospitals that are being run with similar facilities, rules and procedures. Though there have been studies on similar parameters of stress, the focus on nurses, the arteries of any hospital, has been insignificant. The present study has covered only 360 nurses working in four areas of private hospital namely wards, intensive care units, operation theatres, and casualty departments. The future research can be undertaken with more number of samples covering other departments with an increased number of variables. The future study can also be conducted in the following ways:

i. The comparative study of stress between nurses and other paramedical staffs,

ii. The comparative study of stress between medical and paramedical staffs,

iii. The comparative study of stress between nurses and non medical staffs, and

iv. The comparative study of stress between nurses working in private hospitals and nurses working in government hospital.

Conclusion

The objectives of this descriptive research undertaken in Tirunelveli District, Tamilnadu as comparative study were to identify and differentiate sources of stress organization structure and policy related stressors, work shift related stressors and interpersonal relationship at workplace related stressors and its impact on job performance of nurses working in four departments namely intensive care unit, operation theatre, emergency department and ward. In order to achieve these objectives the study sampled 360 nurses qualified with Diploma in General Nursing and Midwifery and Bachelor of Science in Nursing courses from 45 general types of private hospitals using stratified sampling technique. The study has applied weighted average method to analyse sources of stress. Mean, standard deviation and coefficient of variation have been used to understand perception of nurses working in those four departments towards sources of stress. Kruskal Wallis test has been administered to examine the relationship between sources of stress and demographic variables. Multiple regression tests have been used to find the relationship between sources of stress and job performance. The results identified from these three dimensions of stressors indicated that strict, rigid rules and regulations of the hospital, unclear objectives and hierarchy level of the hospital, inequity in the allocation of work shift, refusal of request by head nurse for changing the off or change in the duty schedule, lack of opportunity for meaningful interaction and relationship with superiors and co-workers and inadequate support of superiors and administrative staff during emergency and crisis situations have been the foremost stressors of nurses. The result also found that among three dimensions of stressors interpersonal relationship at workplace related stressors, has occupied the first place and organization structure and policy and work shift related stressors have been next in line. Besides, among the stressors, organization structure and policy related stressors and work shift related stressors, have had significant impact on job performance of nurses.

Clear organization structure including hierarchy, healthy shift schedule and interpersonal relationship at work place are essential factors for the better contribution of nurses towards their work. It is the essential duty of the hospital management to focus attention on these factors and take necessary steps to establish and strengthen those factors so as to prevent stress and thereby enhance their job performance.

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Competency Mapping Correctional Officers

N. Srividya and Rita Basu

Abstract

Today the organizational success is solely dependent on human resources, as the other assets are equally available to everyone. The conception of human resources differs from one another and it may relate to competency, skills, emotional intelligence, etc. They are actually referred as human capital now a days. The organizational success merely depends on the competency of the human capital and it is necessary to understand the competency of the human capital before measuring or estimating the success of the organization. This present study explores only the competency point of view of the human capital in both analytical and survey methods identifying the major components of the competencies of the Correctional Officers of West Bengal.

Key Words : *Competency mapping, managerial skills, developmental skills, team relationship*

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Competency mapping is a process of identifying key competencies for a company or organization and the jobs and functions within it. Competency required for a particular job depends on many factors. The factors may be cultural, nature of the business, business environment, organizational culture, work environment and so on. Some of these factors may change with time, and environment making the competency requirements also change for the same job position in the organization. Unlike other resources, human resources are appreciated with time by learning and experience. Competencies provide the design for an organization to make human resources learn and add value to the firm.

Understanding Competencies

Boyatzis (1982) defined a competency as "an underlying characteristic of a person in that it may be a motive, trait or skill aspect of one's self-image or social role or body of knowledge."

Competency mapping is a way of assessing the strengths and weaknesses of a worker or organization. It's about identifying a person's job skills and strengths in areas like teamwork, leadership, and decision-making. Large organizations may use some form of this technique to understand how to best use each worker or how to combine the strengths of different employees to produce the highest quality work. Individuals may also find that this type of assessment can help them prepare for a career change or advance in a specific job field.

According to Wikipedia (2014), a competency is the state or quality of being adequately or well qualified physically (and intellectually) to perform a specific task or role. Further, a competency is a set of defined behaviours that provide a structured guide enabling the identification, evaluation, and development of the required behaviours of employees. Competencies can be defined for job, business, or management activities. It is a combination of knowledge, skills, and behavioural patterns for the improved performance. It may include emotional intelligence and skills in influence and negotiation.

Competencies are "sets of behaviours that are instrumental in the delivery of desired results" (Bartram et al., 2002). In business environment, they are behaviours that support the achievement of the objectives. The focus is on the behaviours and not on the results or consequences of those behaviours or on personal attributes with no behavioural expression in the work environment.

Need of Competency Mapping

The competency mapping is required to reinforce corporate strategy, culture and vision (Sahu 2009). Competency mapping establishes expectations for performance excellence thereby increasing improved job satisfaction and better employee retention.

- It sets up behavioural standards of excellence.
- It will provide a common framework to implement and communicate key strategies.
- It provides organization-wide standards for career levels to move across business boundaries.
- It identifies performance criteria to improve the accuracy and ease of hiring and selection process.
- It provides a foundation for dialogue between manager and employee about performance, development and career-related issues.
- It offers the behavioural standards of performance excellence required to be successful in their role.
- It supports a more specific assessment of their strengths and targets the areas for professional development (Seema 2007).

These are the popular eight competencies that are sought after in the workplace.

"Great Eight" Competencies	
Leading and Deciding	Takes control and exercises leadership. Initiates action, gives direction and takes responsibility.
Supporting and Co-operating	Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients and staff. Behaves consistently with clear personal values that complement those of the organisation.
Interacting and Presenting	Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident and relaxed manner.
Analysing and Interpreting	Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly learns new technology. Communicates well in writing.

Creating and Conceptualising	Open to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organisational change.
Organising and Executing	Plans ahead and works in a systematic and organised way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.
Adapting and Coping	Adapts and responds well to change. Manages pressure effectively and copes with setbacks.
Enterprising and Performing	Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce and finance. Seeks opportunities for self-development and career advancement.

Competency is like a catalyst to stay competitive and attain competitive advantage of the firm despite numerous complexities and unpredictability in the business.

The crux of the organization survival in this knowledge era hinges upon employee competency, which lies as seed unless explored, nourished and nurtured, to achieve competitive advantage for the firm. The most powerful way to prevail in global competition is still invisible to many companies. During 1980s, top executives were judged on their abilities to restructure and delayer their corporations. But during 1990s, they were judged on their ability to identify, cultivate and exploit the core competencies that made the growth possible. Given the fact that environments are becoming increasingly dynamic, strategic planning based on static and rational view have lost their relevance and ceased to suffice. In order to create competitive advantage in a changing environment firms are now focusing on building core competence and transferring them to/between various business units.

Employee competency is an intangible resource and this is the only resource, which can take a company forward and not its physical and financial assets. Global firms after the lapse of considerable time have realized that it is the employee competencies, which can guarantee all turbulence, odds and vicissitudes in the business. In the turbulent oceanic current the vessel may be capsized or may sink, if the captain and the crew were to be competent they will foresee the future, reduce the risks through strategic planning and execution, and navigate the vessel to the sea shore, thus the competencies of the captain of the ship and his crew are the trump card for the safe landing of the ship. Similarly the organizations in the complex and ever changing environment are subject to constant change and it is the employee competency, which creates and sustains competitive advantage for the firms.

The main objective of competency mapping is to conduct a complete analysis of job role and incorporating those competencies throughout the various processes (i.e. job evaluation, training, recruitment) of the organization. Competency Management is defined to encompass all instruments and methods used in an organization to systematically assess current and future competencies required for the work to be performed, and to assess available competencies of the workforce. Competencies are defined as the cognitive (e.g. Knowledge and skills), affective (e.g. Attitude and Values), behavioural and motivational (e.g. Motives) characteristics or dispositions of a person, which enable him or her to perform well in a specific situation.

With a competency based job description, you are on your way to begin mapping the competencies throughout your human resources processes. The competencies of the respective job description become your factors for assessment on the performance evaluation. Using competencies will help guide you to perform more objective evaluations based on displayed or not displayed behaviors.

As an HR Manager, one has to establish and foster a culture, building strong working relationships within the organization, working closely with the team, ensure that

needs are met, issues are addressed, and situations are managed in a collaborative, consultative, creative and flexible manner. One has to continuously enhance the process and be a part of the business plan.

Application of Competencies

There are four main areas within an HR organization where a competency-based management approach can be used:

Recruiting—A competency-based recruiting approach relies on using a series of assessment tools to identify not only a candidate's technical skills, but also his or her behavioral capabilities. This approach relies on building complex job profiles that look at the responsibilities and activities of the job and the competencies required to accomplish them. A competency-based recruiting approach aims to help support valid (and fair) hiring decisions.

Learning/Training—A competency-based approach to learning/training employees is important, as an organization needs a common language set to achieve and assess desired learning outcomes. Competencies provide the learner with a clear roadmap and the navigational tools necessary to move expeditiously toward his or her goals.

Performance Management—Integrating competencies within the performance management process supports feedback to employees on both "what" they have accomplished and "how" their work was performed (using competencies for providing feedback).

Succession Planning—Measuring competencies is a key component of effective succession planning. The ability to measure competencies for individuals and jobs stored in a competency database or library is critical for not only quickly identifying potential future replacements for specific roles, but also in planning career progression for individuals within the organization.

Though an organization can try determining these competencies or related skills on its own, having a guideline or starting point is generally recommended. Many organizations turn to competency dictionaries or libraries as a basis for building their competency-based management programs.

Skill Gap Analysis (Career Development & Succession Planning) - Once a company understands that desired competencies are associated with specific positions or roles, it can influence the individualized training that employees receive. This is especially important in succession planning, where companies need to identify high-potential employees they will want to retain, move into critical positions, or consider for future leadership opportunities.

So understanding that each position or role is associated with a set of competencies (specific knowledge, skills, and behaviors) enables an organization to readily determine the gaps between what the employee possesses (competencies) and what they need to know/learn (objectives). The organization then assigns learning objectives—and develops suitable learning tools to achieve them. Once the employer has delivered the learning content via the appropriate or desired learning channel, (formal instructor-led training, online training, on-the-job training, etc.), the identified gaps are closed and the employee is more competent and motivated.

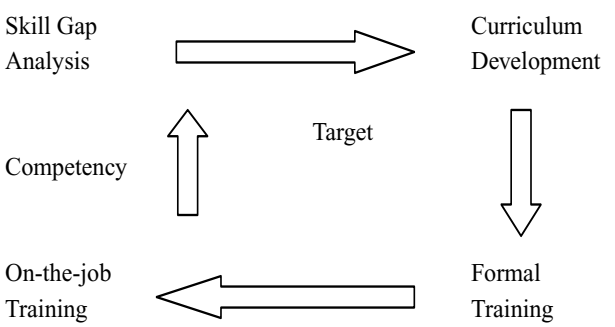

Figure 1. Competencies and Career Development and Training

One major review that has insights related to the Excellence in human resource management, is of particular significance particularly in view of growing and unpredictable impacts and consequences of globalization. In the present day, achieving excellence requires Organizations to become global and in both cases, human resource management will be playing a pivotal role. HRM must be capable of providing pathway / roadmap to Organizations aspiring to become global and an Organization which has become global, HRM must achieve excellence. Lengnick-Hall (2003, 2005) point out to HR at crossroads in many Organisations as one that can be outsourced automated and relegated to a secondary support role as they have primarily considered themselves as deliverer of HR services. Continuing to operate along principles and methods that were effective in the industrial era will lead to the declining importance of HR function and an erosion of its ability to contribute directly to Organisational effectiveness.

Review of Literature

Farah (2009) in qualitative discussion identified that the performance of companies depends mostly on the quality of their human resource. For obvious economic and business reasons, organizations have always been concerned about the competence of its people.

Kodwani (2009) has focused on: Performance is the mantra of today's business organization. People with right competencies are the key to superior performance. Competencies are the set of such skills and abilities (technical as well as behavioral), which are required for desired level of performance.

Rice (2006) in his study on the leadership development among healthcare executives in the U.S. found that competency-based leadership development does not just drift, however it intentionally focuses on clear career aspirations. Meanwhile, he stressed that disciplined approach to career growth will enhance the organization's performance and he believes along with these career planning for health leaders would set as innovative strategies for development.

Nigam et al. (2009) in their research paper entitled 'Competence Mapping: An Innovative Management Practice Tool' expounds that employee competency mapping for assessing the value of human capital and its development is one such innovative practice that is widely being used by organizations today. Care needs to be taken to ensure the involvement of the entire organization as a tool to add value to their key resource areas.

Cernusca and Dima (2007) in their research essay explained the concept of competency and how competency is linked to performance and one's career development. A business might possess extremely capable human resources, but they might not work on the position that suits them. This is where competency mapping and the appraisal tools come to help the HR experts choose who should work on what position.

Rothwell and Lindholm (2008) addressing employee competency efforts in the USA programmes, have evolved from an early focus on distinctions between best in class (exemplary) and fully successful performers to become a link between organizational strategy and organizational and individual performance. Interest in competency-based approaches is growing. Training and development professionals are using competency models to clarify organization-specific competencies to improve human performance and unify individual capabilities with organizational core competencies.

Gouwen (2010) explains the concrete application of a competence-based HRM system in the petro-chemicals industry illustrates the task of linking an organization's core competences to the personal competences of employees by making use of HRM instruments. He ends with a summary of the challenges HRM professionals face in competence-based organizations.

RESEARCH GAP

Much of research is done on competency mapping in several industries especially in IT industry. But no research is done in relation to the Public sector organization in India, specifically on Correctional Officers of West Bengal. The West Bengal Correctional Services Bill, 1992 also places a lot of responsibility on the Staff in ensuring that a prison is basically for the reformation of a prisoner so that on his release from the Jail he is able to adjust easily into the community life. This includes, wipe out the evil influence of anti social ways of life from their minds and rehabilitate them in society as good and useful citizens with positive attitude, healthy social sense and a sense of abhorrence against the anti social ways of life. Depending on the types of inmates, types of Government order, and the situation of the home, correctional officers need to take part in counseling, advising, controlling, monitoring and developing the activities inside the home. As there are

correctional officers, their skills and competencies would be much different from others in the other fields and their job competency skills also vary much with that of IT professionals.

Much of research is done with connecting the competency mapping with the career planning, but nothing is done in identifying the components of the competencies and correlating them among themselves.

Statement of the Problem

As it is already mentioned the job skills and competencies of Correctional Officers are much different from the others in the other fields. This research is done to identify the various job skills and competencies required by them to perform their tasks.

Objectives of the Study

To identify the major components for competency of Correctional Officers of West Bengal and their interrelationship.

Research Methodology

Sampling

The sample size of the study was 110 including all the three (top, middle and lower) levels of Correctional Officers of West Bengal and was selected purposefully.

Instrument

The data was collected with the help of tailor made questionnaire having ten components viz, responsibility, teamwork, communication, organizing and planning, problem solving techniques and decision making, analytical abilities, general attitude, leadership skills, interpersonal skills and learning attitude in a five points scale. A brief description about these is given in the Appendix I. The questionnaire was checked and modified by two management teachers, two senior professors of different discipline, two corporate executives and the higher authority of correctional officers for content validity.

Collection and Analysis of Data

The questions were asked both positively and negatively to extract the correct data. Face-to-face interview are also conducted with proper clarification of items and the result was analyzed with the application of statistical test.

Data Analysis and Findings
Calculation of the mean scores

Table I: Mean Scores of the components of Competencies of

Correctional Officers of West Bengal Correctional Home (N=110)

Sl. No	Components	Mean
1	Responsibility	3.66
2	Team Work	3.88
3	Communication	3.89
4	Organizing and Planning	3.53
5	Problem Solving techniques and decision making	3.32
6	Analytical Abilities	3.76
7	General or Overall Attitude	3.55
8	Leadership skills	4.06
9	Interpersonal skills	3.70
10	Learning Attitude	3.70

The mean scores (table I) of all the components are high in nature, which indicate the possibilities of the requirement and importance of all the components for their job competency. To find out the degree of association among the components and with the total score for competency, bivariate correlation were calculated and shown in Table II

Table II Calculation of the Correlation between components and the total score

	Respon-sibility	Commu-nication	Problem Solving & Decision Making skills	Attitude	Inter-personal skills	Team skills	Organising & Planning skills	Analy-tical Ability	Leader-ship Qualities	Learning Attitude	Total
Responsibility	1.000	.031	.349**	.243*	.434**	.429**	.016	.178	.082	.473**	.628**
Communication		1.000	-.147	-.212*	.241*	.303**	.172	.487**	.259**	.269**	.384**
Problem Solving & Decision Making skills			1.000	.379**	.189*	.598**	.178	-.273**	-.014	.272**	.488**
Attitude				1.000	.476**	.191*	.531**	.025	.138	.342**	.552**
Interpersonal skills					1.000	.378**	.231*	.239*	.491**	.478**	.773**
Team skills						1.000	-.024	.255**	-.026	.181	.632**
Organising & Planning							1.000	-.003	.072	.356**	.380**
Analytical Ability								1.000	.386**	.471**	.468**
Leadership Qualities									1.000	.422**	.502**
Learning Attitude										1.000	.732**
Total											1.000

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

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

Table III correlation between significant correlation coefficient and the components

	Respon-sibility	Commu-nication	Problem Solving & Decision Making skills	Attitude	Inter-personal skills	Team skills	Organising & Planning skills	Analy-tical Ability	Leader-ship Qualities	Learning Attitude	Total
Responsibility	1.000				.434**	.429**				.473**	.628**
Communication		1.000						.487**			
Problem Solving & Decision Making skills			1.000			.598**					.488**
Attitude				1.000	.476**		.531**				.552**
Interpersonal skills					1.000				.491**	.478**	.773**
Team skills						1.000					.632**
Organising & Planning							1.000				
Analytical Ability								1.000		.471**	.468**
Leadership Qualities									1.000	.422**	.502**
Learning Attitude										1.000	.732**
Total											1.000

From Table II and Table III it is seen that there exists a positive and significant association between the components viz, with the total score of competency, where the components: Communication and Organizing and Planning are not significantly associated. This indicates that these eight components represent the competency of the correctional officers of West Bengal. The following issues are evident in the table.

1. Responsibility of the correctional officers is associated positively with interpersonal relationship, team relationship and their attitude towards learning from the experience.
2. Problem solving techniques and decision making of the correctional officers depends on the team relationship.
3. There is a significant positive association between general or overall attitude and interpersonal relationship.
4. Their interpersonal relationship is linked with leadership skills and attitude towards learning.
5. Their analytical ability is associated positively with attitude towards learning.
6. Their leadership skills is linked with an attitude towards learning.
7. The components team relationship and attitude towards learning are independent in nature.

Conclusion

It has been identified that complements viz, interpersonal relationship, team relationship and learning attitude are the key components of the competency of the correctional officers of West Bengal. It can also be said that the team relationship i.e., collection and participative discussion of opinions and ideas for the benefit and accomplishment of all the team members and attitude towards learning i.e., learning through experience, experiment, analysis and mistake are the core components for the competency of correctional officers of West Bengal.

Scope for Future Study

This research merely studies the various components of the competencies of the correctional officers in West Bengal. Basing on this research, the organizational success can be measured in a separate study with the help of the components. As the job of the correctional officers is quite different from the several in mainstream, this study also throws some light about this forgotten industry in the society.

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APPENDIX I

The ten components taken for the study are as follows.

Responsibility	The extent of taking the ownership and responsibility for the tasks they are performing.
Communication	How good they are at communicating to others.
Problem Solving & Decision Making skills	How good they are at tackling the problems in finding solutions to them.
Attitude	How effective is the overall attitude of the employee towards the job,organisation, employer etc.
Interpersonal skills	How good they are at mingling each other and making and maintaining relationships with others.
Team skills	How good they are working in teams and managing the teams.
Organising & Planning	How well they organize and plan their work especially in busy schedules.
Analytical Ability	How good they are about analyzing the problem or the situation to take proper decisions.
Leadership Qualities	How good they are guiding their teams, walking the talk and show cause themselves as role models to follow
Learning Attitude	How early or easily or comfortably they can learn new things and what their attitude about learning new things or skills at their job

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Emotional Intelligence: Pre-Post Flying Incidents

K. S. Gupta and Sanjay Kumar

Abstract

*This paper intends to bring out the importance of Emotional Intelligence for civil and military pilots. It adequately stresses upon awareness and managing self emotion (regulation of emotions) like fear, disgust, shame, anger, ecstasy and over excitement particularly in context of pilots flying commercial or military aircraft. The majority of flying incidents and accidents are due to human errors driven by uncontrolled emotions. It cites a very interesting case study related to major commercial passenger aeroplanes and explains the emotive reasons of fatal accid*ent.

Key Words : *Emotional Intelligence, Leadership*

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Undoubtedly, flying an airplane is one of the most regarded professions. It definitely requires passion to become a pilot. It is one of the most risky and challenging professions which not only demands excellence in piloting skills but also warrants physical and psychological adaptability in every situation that may arise on ground and in air.

The safety of every flight relies on the necessary knowledge of a multitude of different data, and the mastery of very demanding skills. But without the knowledge and mastery of one's own limits, emotions and mental state – the core foundation of safety is put in jeopardy. The human factor, the Liveware, is the center of the safety equation.

Pilots are the people who are trained from the start to think in the most rational manner possible, brainwashed to operate based on a *modus operandi* that was set in stone for legal and safety reasons.

And so there it is. The million dollar question. How does one make safe – *safer*, only to use somebody else's words.

How do you make a pilot, a person, keep all his humanness aside and perform the mission that he or she has been trained for in a perfect, safe and efficient manner. Every time?

A pilot has got to have very high IQ, physical fitness, healthy well being, iron will and a strong mental drive to face the challenges of scanning the skies with defined combat missions. Today the sky is not free and friendly as it used to be earlier. With advancement of technology, each moment, the world is on lookout to occupy every inch of aero space. The dense civil and military flying environment coupled with unpredictable weather phenomena makes the task of a pilot more daunting.

The profession of flying an aircraft is just not related to merely scanning the sky and reaching destination. The ground environment is equally tough and demanding. The situation on ground could be related to flying machines, its related support services, other issues such as resource crunch, human interventions, competitive rivalry, and undue expectations of bosses at different echelons that too on top of all social and family demands. All these situations clubbed together mount the pressure on pilots which has an impact on his mental well being. This can create jitter and turbulence in their head and heart which gives birth to aggressive and negative emotions. If they are not kept under control, it may lead to human errors which are one of the major reasons of flying incidents and accidents. Therefore the psychological well being of a pilot is a must.

As per researchers, the human psyche has myriad hue that is very vulnerable to change its true colour if not tamed on time. When a pilot goes through traumatic experience of major accidents, it generates upsetting emotions, frightening memories and sense of constantly pricking danger. He may even get symptoms like under confidence, stress, disconnect, numbness, depression and withdrawal. To get rid of such unwanted and negative thoughts he has got to tame his emotions by applying emotional intelligence.

Objective

The objectives of this study are:

- to study the importance of the emotional intelligence in flying airplanes, and
- to understand the situation and effect of the emotional competence to exhibit the leadership.

Emotional Intelligence allows us to more clearly understand our relation and interaction with the problems as they become apparent, and thus more effectively deal with them. Pilots are trained to understand and deal with any problem that might arise with their airplanes, but seldom trained to understand the most complex machine: themselves. Safety can only be attained by combining proper training on both parts, in order to perform under diverse and/or adverse conditions.

Emotional intelligence is defined as the ability to perceive and express emotion, assimilate in thought, understand and reason with emotion and regulate emotion in the self and others. The definition emphasizes on four major areas of skills pertaining to accuracy in (a) perceiving emotions (b) using emotions to facilitate thought, (c) understanding emotions and (d) managing emotions in a way that enhances personal growth and social relations. It is the ability to identify accurately and understand one's own emotional reactions and those of others. It also involves the ability to regulate one's emotions to use them to make good decisions and to act effectively.

Over the past 15 years, the Emotional Intelligence (EI) has received considerable attention within scientific research. EI is viewed as a predictor of success in the workplace through its significant association with transformational leadership, ability to foster workgroup cohesiveness, strengthen commitment to the organization and permit self-esteem. Research suggests that people with high levels of EI experience more career success, feel less job insecurity and lead more effectively are more adaptable to stressful events are more effective in team leadership and team performance are more adaptable to organizational changes .

Paradigm of Emotion

Emotional Intelligence is a way of recognizing, understanding, and choosing how we think, feel, and act. It shapes our interactions with others and our understanding of ourselves. It defines how and what we learn; it allows us to set priorities; it determines the majority of our daily actions. There are five basic competencies that comprise the field of Emotional Intelligence. The first three are Intra-personal: they are invisible to others and occur inside of us. The last two are inter-personal: they occur between us and other people and are observable in our behavior. The better developed your intra-personal skills, the easier it is to

demonstrate your inter-personal skills. Daniel Goleman introduced EQ as a focused set of five skills that drive and enhance leadership.

Emotion is widely used in many contexts to define personality, situation and circumstances. Psychologists and Behavioural Scientists have quibbled over for more than many decades to define this term in many ways. However, always there has been debate to quantify this term in most precise manner. The Oxford English Dictionary defines emotion as "any agitation or disturbance of mind, feeling, passion and any vehement or excited mental state." There are hundreds of emotions along with their blends, variations, mutations and nuances. In 2009, Katie M. Ragan published a doctoral thesis entitled: "The War fighters of Today: Personality and Cognitive Characteristics of Rated Fighter Pilots in the United States Air Force(Florida State University)." As per this study and many researchers, a fighter pilot must possess the following affirmative traits to keep the stress level at bay.

Frame work of Emotional Competence for Pilot

From the literature following parameters have been identified:

- Cognitive ability
- Emotional Stability, and
- Motivational Capability.

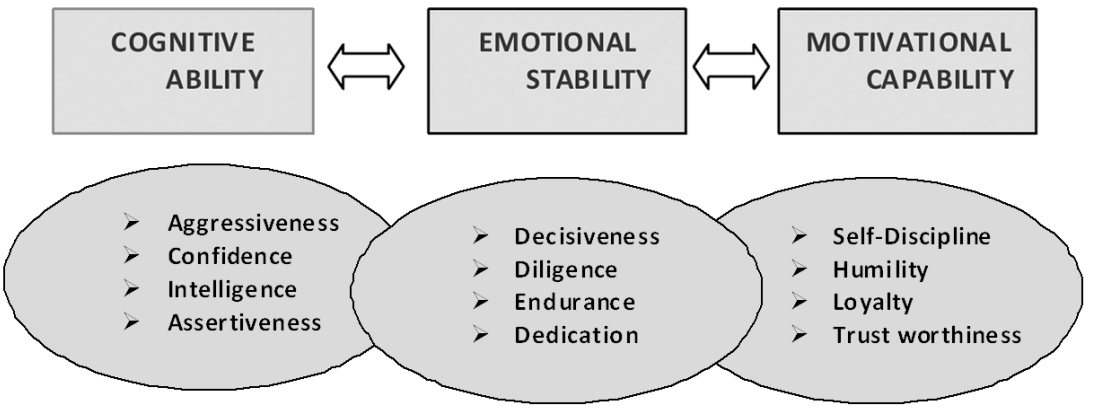

Fig 1: Frame work of Emotional Competence for Pilot

Cognitive Ability: It is the capacity to perform higher mental processes of reasoning, logical understanding, remembering and problem solving. In our parlance, it is safe to say that the ability to multitask on the level required of pilots such as tactical decisions, employ weapons(in case of a fighter pilot), and communicate efficiently during the entire flight mission.

Emotional Stability: Emotional stability is one of the most vital parameters of a flyer**.** Particularly**,** a fighter pilot has to remind himself that he is lone when he faces the contingencies in air. He has to keep his nerves cool.The combat pilots cannot afford to have loose cannons in fighter cockpits. A pilot must have strong reigns on their emotions, if they are to effectively employ their airborne weapon system. Katie M. Ragan's (2009) stresses the importance of having the traits of "**emotional composure, stress resilience, and confidence**" in the aviation world. As per a study, it has been found that Fighter pilots tend to score lower in agreeableness, self-consciousness, vulnerability, and warmth than pilots of other airframes. To a large extent it is true with commercial civil pilots too. Pilots whether in cockpit of civil or military aircraft have to regulate their emotions effectively to avoid incidents and accidents. This ability brings in pilots about the responsibility of the safety of the passengers and the leadership required for the role.

A pilot in a cockpit of aircraft is considered to be emotionally stable and composed when he does not show any sign of excitement, over enthusiasm and show off. He is supposed to be absolutely cool and focused, goal oriented, without getting influenced by passengers, cabin crew and his near

and dear ones travelling in the same plane.They do not have to get overly animated or yell when times get tough. Also, with auto pilot is engaged they do not have to be overly relaxed and to engage in pleasantry exchanges with near and dear ones.

Motivational Capability: It is the capability that always drives an individual to propel from within without any trigger. It is basically a self propagation force that keeps prompting an individual to move always in forward direction without being deterred by inertia of rest. As a pilot this quality has to be ingrained in mind to avoid looking back in case of any setback or disaster, and take the control of the situation to recover from.

Methodology

The case approach has been used to study the implication and application of Emotional Intelligence. Two cases have been taken to demonstrate the emotional ability of pilot in both the extreme situation of disaster or the leadership. The case of **Aeroflot Flight 593** is taken from the accident reports and the case of **flight delay at San Francisco** is the personal experience of the researcher.

Case: Aeroflot Flight 593

Aeroflot Flight 593 was a Moscow–Hong Kong Service operated by Aeroflot – Russian International Airlines flown with an **Airbus A310-300** that crashed into a hillside of the Kuznetsk Alatau mountain range, Kemerovo Oblast, Russia, on 23 March 1994[14,15]. All 63 passengers and 12 crew perished in the accident.

No evidence of technical malfunction was found. Cockpit voice and flight data recorders revealed the **presence of the pilot's 12-year-old daughter and 16-year-old son on the flight deck**. The children apparently had unknowingly disabled the A310 autopilot's control of the aircraft's ailerons while seated at the controls. The aircraft had then rolled into a steep bank and near-vertical dive from which the pilots were unable to regain control. Unlike Soviet planes, with which the crew had been familiar, no audible alarm accompanied the autopilot's partial disconnection, and consequently the crew remained unaware of what was happening.

Analysis:

One of the most important constructs of EI competency is **regulation of emotions**. In this case study, it is evident that the pilot has grossly neglected the professionalism and was purely driven by uncontrolled emotions (over enthusiasm, elation and ecstasy) of entertaining his own children and risking the aero plane and lives of passengers. With enhanced EQ, pilot could have exercised restraint over his emotions by not calling his children in the cockpit and saved the lives of passengers, his own children and other crew members.

Emotional and Psychological Trauma: Post Incidents and Accidents

Emotional and psychological trauma is the outcome of extraordinarily stressful events that shatter the sense of security and makes a pilot feel frightened, miserable and helpless. Even if the pilot does not suffer any physical injury, yet the incident could be traumatic because of the numerous bouts of reflections of the sad events flashing in his memory (flashbacks). But one important thing to note here is that the more frightened and helpless you feel the more likely you will get traumatized.The trauma becomes more pronounced when the incident/accident occurs

- Suddenly,
- Unexpectedly, and
- Repeatedly.

Eruption of Likely Emotions Post Incidents/Accidents

It is very natural for any human being to generate emotions. So is the case with a pilot. The negative emotions tend to grip more when he faces the setbacks and goes through agony of major accidents. Some of the likely emotions which may erupt and become cause of serious concern are:

- **Fear:** anxiety, apprehension, nervousness, concern, consternation, mis-giving, wariness, qualm, edginess, dread, fright, terror; phobia, and panic.
- **Sadness**: grief, sorrow, cheerlessness, gloom, melancholy, self-pity, loneliness, dejection, despair, and severe depression.
- **Disgust**: contempt, disdain, scorn, abhorrence, aversion, distaste and revulsion.
- **Shame**: guilt, embarrassment, chagrin, remorse, humiliation, regret, mortification, and contrition.
- **Anger**: fury, outrage, resentment, wrath, exasperation, indignation, vexation, acrimony, animosity, annoyance, irritability, hostility, and perhaps at the extreme, hatred and violence.

Case: Flight Delay at San Francisco

For many of us in the corporate world, airline travel is a fact of life and so are occasional flight delays. When mechanical problems occur on the ground, the accompanying uncertainties understandably frustrate passengers. We wonder when we will finally depart, whether we should try to find alternate options, and what to do if we miss connecting flights. Most of the time, we queue up at the counter to speak with a gate agent. The lines are long and slow, the gate agents doing their best to help each passenger as tension starts to build.

The cabin and cockpit crew wait out the delay too, but the captain has the added responsibility for deciding whether and when the airplane can fly. Airline pilots are a special breed; they're confident, highly trained professionals who are ready for any airborne incident. From the pre-flight inspection until completion of the landing checklist, they hold the passengers' safety in their hands. During a recent travel delay, it was one captain's actions on the ground that delivered a powerful lesson in leadership.

I was traveling from San Francisco to Frankfort. All passengers have boarded the plane. The aircraft, it turned out, had a serious weight imbalance because of over fuelling to port wing:The ground maintenance crew were working out how to defuel the port wing tanks to balance the weight. After a few minutes, passengers — many of them Indian families with young kids were frustrated and uncertain about the take off and also the tension of missing the connecting flights from Frankfort. Finally, the captain strode out of the jet bridge and began speaking over the public-address system.

He explained the problem, that it was not safe to fly the plane and that it wasn't possible to predict the length of the delay. He apologized for the disruption that this indefinite delay was causing. Then he replaced the microphone and began speaking with each passenger in the airplane. He shook every passenger's hand as he answered their questions, and he listened intently to each person's concerns.

Three hours after the scheduled flight time, the captain returned to the cabin. He announced to the anxious group that a working aircraft was en route. After telling the passengers of the anticipated departure time, he thanked everyone for their patience and understanding. He apologized again for the disruption and great inconvenience. And when he set the microphone down, the passengers at the gate began applauding.

Through his actions, the captain changed the mood of the group from anxious to hopeful and from frustration to relief. By frankly admitting the reality of the situation while also conveying sincere empathy for the passengers' plight, he demonstrated that had read and interpreted their experience. In validating their perspective he also offered much-needed reassurance and details about how the airline was solving the problem.

The pilot could perfectly have fulfilled his duties without leaving his seat in the cockpit or without engaging any of the passengers, and yet he chose to do so. Not only did his leadership help passengers feel more assured, but it took a load off the ground staff and the cabin crew who would have felt the wrath of angry passengers.

Not many business leaders have the responsibility for others' lives that airline pilots do, but we'd be wise to take a lesson from this leader. What he did that evening was uncommon but not especially difficult. The key lies in the leaders' sensitivity to their followers and their ability to sense, understand, and then reorient their followers' perspective. Whenever leaders are confronted with an unhappy team — customers, employees, and colleagues alike — they can remember these simple but powerful actions:

1. **Lead from the front**. Customer-service personnel bear the brunt of customers' frustrations. But just as this captain chose to leave the cockpit and engage the passengers at the gate area, so too should leaders take responsibility for directly confronting unhappy customers or team members.

2. **Show understanding of others' experience**. It takes more than empathizing comments to convey that a leader gets it; leaders need to broaden their points of view and really see it from their followers' perspective. Leaders need to think beyond their own views and ask themselves, "What does it mean to *them*?"

3. **Remind people what's important**. Leaders need to see the big picture and help the group to focus on it. This airline pilot reiterated in both of his announcements the commitment he and his team had towards the

passengers' safety. That helped the passengers to see beyond their immediate inconvenience.

4. **Be part of the solution**. Whether reassuring each passenger in line, speaking directly with the mechanics, or calling flight operations to explore alternatives, the captain took an active part in handling the problem. Every group values leaders, who visibly work to change the current situation. Such leadership actions instill confidence during times when uncertainty prevails.

5. **Express genuine appreciation**. In tough times, the best leaders recognize and convey their gratitude for followers' efforts. When the captain thanked the passengers for their patience and cooperation, he meant it…and the passengers felt it. Getting past a problem takes everyone's help, and a sincere "thank you" means a great deal.

The airline captain in this story changed the mood and experience for over 200 people with his two brief announcements and his personal interactions with the passengers. By following his example, we can lessen our followers' frustrations, increase their trust in us, and help them overcome problems and challenges they face. A few leaders earn applause for their efforts. But by applying these leadership lessons, they have the opportunity to earn the respect and commitment of those they lead.

Conclusion

Undoubtedly, flying is a thrilling but at the same time it is a risky profession. The pilot has to be extra cautious when he is up in the air. The human error due to unregulated emotions can cause catastrophe. At the same time if they are regulated the pilot can be the leader who can take the responsibility for the safety of the passengers and also keep the passengers' anxiety under control. He, not only manages his emotions but also, manages passengers' emotions too. The case study cited in the paper is self explanatory. The enhancement of EQ is inescapable requirement for civil or military pilots.The EQ is one of the most vital parameters for brave hearts scanning the skies.They must continue flying with great passion and utmost commitment. Negative emotions can be kept at bay by practising some of the tips stipulated in this paper. It has been scientifically proved that emotions can be tamed, nurtured, strengthened at any age irrespective of gender by enhancing their **Emotional Quotient**.

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Brand Preference : Durable Goods

Aamir Hasan

Abstract

The study here would bring to light which consumer durable brand is the most preferred by the consumers and why particular consumer durable brand was preferred. Adopting a convenience sampling technique, 350 respondents of socio economic class (SEC A, B & C) were chosen among the consumer durable goods users in Lucknow City, randomly selected during the month of January and February 2014. The responses were analyzed through chi-square test and Garrett score with the help of SPSS-17.The paper has found that quality, technological innovations, and multitude of brands across price points for price sensitive consumers are the three dominant factors which influence the consumer preference for consumer durable brands. The author has found that quality has emerged as the most dominant factor influencing the consumers' preference for the consumer durable goods.

The author establishes the vibrant factors and fierce competition making it imperative to understand the dynamics of consumer durable market that depends on consumer satisfaction depending on perception and brand preference.

Key Words : Quality, Innovation, Price

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The demography has witnessed a silent revolution during the 20th century, the growth of medical science gifted greater longevity to mankind in the past century that will result in an ageing population globally. The ageing is a far more serious subject then old age; contrary to the popular misconception that both ageing and old age are synonyms (Bhatia, Hitesh 2009). Old age merely relates to the people who have surpassed the average age of the nation, now they are into the last stage of human life cycle. Ageing is an elongated process. Population ageing is defined as a process of shift in nation's population towards older ages. However, India for now is enjoying its demographic dividend and will continue to do so for couple of more decades (Kapila, Uma 2009). With fertility rate falling to 2.6 and the working age group population increasing to over 65% (CIA, World Fact Book, 2010), India will have less dependents both in the age group of below 15 and above 60

years. This shall provide India with a special window of opportunities for business, investment, human development and faster rate of economic growth during the next few decades. To reap the fruits of demographic transition India needs to up its investment in health, education and physical infrastructure. This will not only raise the productivity levels but will also make them more competitive in international markets.

Consumer durables involve any type of product purchased by consumers that is manufactured for long-term use. Durable goods are those which don't wear out quickly, yielding utility over time rather than at once. Examples of consumer durable goods include electronic equipment, home furnishings and fixtures, photographic equipment, leisure equipment and kitchen appliances. They can be further classified as either white goods, such as refrigerators, washing machines and air conditioners or brown goods such as blenders, cooking ranges and microwaves or consumer electronics such as televisions and DVD players. Such big-ticket items typically continue to be serviceable for three years at least and are characterized by long inter-purchase times. The Indian consumer durables industry has witnessed a considerable change over the last few years. Changing lifestyle and higher disposable income coupled with boom in the real estate and housing industry and a surge in advertising have been instrumental in bringing about a sea change in the consumer behavior pattern. Consumer durables have emerged as one of the fastest growing industries in India. The consumer durable market is expected to become fifth largest consumer durable market in the world, the present consumer market size in India is US$ 7.3 billion in FY 12 and is expected to double at 14.8 per cent CAGR to reach US$ 12.5 in FY 15[1]. The Indian consumer durables can be segmented into three groups.

Table 1:

White Goods	Brown Goods	Electronic Goods
Refrigerators	Mixer	Mobile Phones
Washing Machines	Grinder	Television
Air Conditioner	Micro wave oven	VCD players
	Iron	MP3 player
	Electric Fan	Camcorders

India ranks first with 131 index points in the global consumer confidence survey (Nielson 2011). Around two-thirds. of Indian population are below the age of 35, and nearly 50% are below 25. There are 56 million people in the middle class who are earning $4,400-$21,800 a year. Besides the steady growth, changing lifestyles and disposable income resulting in greater affordability have been causing fundamental change in the Indian consumer behavior. A study by PricewaterhouseCoopers (PwC) and Federation of Indian Chambers of Commerce and Industry (FICCI), for the National Manufacturing Competitiveness Council (NMCC), points out that its favorable demographics and untapped market potential, India is emerging as an attractive market for consumer durables (NMCC,2009). The urban market accounts for the major share (65 percent) of the total revenues in the consumer durables sector in India.

Despite the high growth rate, the penetration level of consumer durable categories is still very low relative to the size of the Indian market. The report by RNCOS (2010) finds that the penetration level of many appliances was very low. For example, the use of refrigerator stands at around 18%; washing machine 6%; microwave oven about 1% and air conditioner less than 2%. The low penetration of these products unveils a rewarding untapped market. Further, established brands account for less than 10% of the total consumer goods market in India. Though branded products are perceived to be costlier than the non branded products, the penetration of branded product is increasing (KPMG, 2008). This enumerated shift makes it imperative that sound understanding of the consumer profile is an urgent need for the marketers. With rising input costs and other environmental factors continuously putting pressure on margins, the competition among the consumer durable brands is building up in India. Effective marketing not only creates new and bigger markets, but also enables the firms to reduce cost, enhance demand and eventually achieve economies of scale. Therefore it is essential for the marketers to keep a close eye on markets to face new challenges and convert them into meaningful opportunities.

Indian market is very complex; it takes time to understand the dynamics of Indian market. According to Rama (2010) consumer demand in India is like a curate's egg-always good, but only in parts. S.L. Rao, the former head of National Council for Applied Economic Research (NCAER) described consumer demand in India as the walk of a drunken man. Businesses need to invest according to the pattern of the walk, which actually is not impractical, if one were able to take more coarse approach to understanding it as a sum of its many parts. Companies must be ready to digest the reality that their contributing segment would shift recurrently (Rama 2010).

Today the environment is gradually updating in India. An enterprise's marketing behavior should take the consumer as the core. By studying the influencing factors of consumer behaviors, the enterprise can identify the consumer demand, enhance the factors that promote consumer purchasing, and change unfavorable factors, taking the satisfaction of consumer as the start point and ultimate goal of marketing behaviors. Only by providing high-quality products, reasonable prices, and complete services, and satisfying consumers' material and spiritual needs, can an enterprise earn more consumers, increase market shares, and create special core competences and competitive advantages.

Figure 1 Porter's Five Forces Model: Consumer Durable Industry

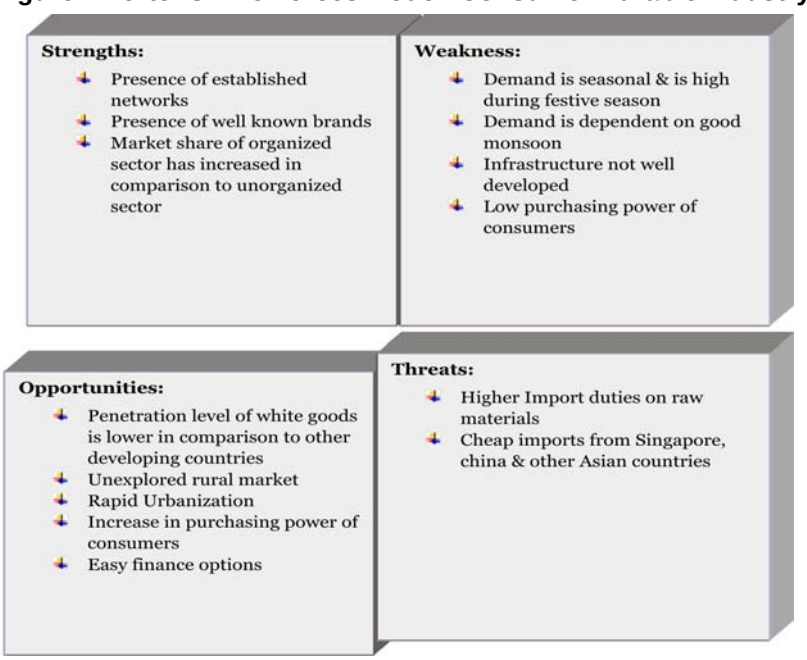

Figure 2 SWOT Analysis of Consumer Durable Industry

Over the last twenty years the consumer durables industry has become more and more commercialized. Marketing and advertising have targeted the middle to upper income groups that have the disposable income to purchase durable goods and luxury items. An increasing number of market planners find the growing complexity and uncertainty of the environment difficult to cope with. Organizations are continuously facing new equations in their operating environment in every direction (Bettis and Hitt,1995). Complex competitive status, vulnerable demand forecast, varying attitudes towards branded products, existence of too many brands, changing attitude of channel intermediaries and shortening of the product lifecycle, are making marketing decision extremely difficult and risky (Hammer,1997). To gain a better insight into the structure and drivers of consumer demand in India, marketers need to additionally develop a view of the market by looking at it through the consumer.

The paper first reviews the related literature and explains the adopted research method. It then analyses and interprets the data, discusses the limitations of the study and throws light on future research avenues before concluding.

Literature

Consumer behavior is the scientific study of the processes consumers use to select, secure, use and dispose of products and services that satisfy their needs. Knowledge of consumer behavior directly affects marketing strategy. This is because of the marketing concept, i. e., the idea that firms exist to satisfy customer needs. Firms can satisfy those needs only to the extent that they understand their customers. For this reason, marketing strategies must incorporate knowledge of consumer behavior into every facet of a strategic marketing plan. Market may be effectively segmented through statistical analysis of brand preference and selection (Henderson et al., 1998). Single brand preference can be regarded as a measure of loyalty, which also provides valuable information for customer management and worker segmentation (Gralpois, 1998).

The concept of consumer satisfaction occupies a central position in marketing thought and practice. Satisfaction is a major outcome of marketing activity and serves to link processes culminating in purchase and consumption with post purchase phenomena such as attitude change, repeat purchase and brand loyalty. The centrality of the concept is reflected by its inclusion in the marketing concept that profits are generated through the satisfaction of consumer needs and wants. The need to translate the philosophical statement of the marketing concept into pragmatic operational guidelines has directed attention to the development and measurement of consumer satisfaction. In the early 1970s consumer satisfaction began to emerge as a legitimate field of inquiry. The US Department of Agriculture's Index of Consumer Satisfaction (Pfaff 1972) was the first study to report direct information on consumer satisfaction to policy makers. Both Olshavsky and Miller (1972) and Anderson (1973) examined disconfirmed expectancies and their influence on product performance rating. The customer value concept holds that customers buy what creates the most value for them. It has also been defined as an emotional bond created between a customer and a supplier. A precondition for this bond to be established is that the product be able to meet or exceed customer's expectations. Customers can be delighted if the supplier is able to improve its performance continuously (Butz and Goodstein, 1996).

Performance refers to how well the product does, what it is supposed to do. For example, for microwave ovens, good performance involves how well the product cooks and defrosts food. Whereas for cameras, good performance involves how well the product takes pictures. For some complex consumer durables, such as automobiles, the performance dimension may itself be multidimensional. For example, for automobiles, performance involves power, safety, and comfort. To achieve high performance quality, a product must perform well and it must do so consistently. This consistency can be referred to as reliability or dependability. Thus, it is not enough that a lawn mower can start easily; it must do so every time.

The diffusion of innovation can be traced as by Rogers (1962), to the beginning of this century and has included investigations of the diffusion of new products, processes and organization practices. Towards the middle of this century, this body of work came to be dominated by the epidemic model of diffusion, represented by the logistic equation and now familiar S-curve. The S-shaped curve has remained one of the central 'stylized facts' of much of the subsequent work (Stoneman, 1995). Another characteristic of much of the innovation diffusion has been the attention paid to the adoption of technologies between firms, ignoring the diffusion of consumer goods. Companies are adopting emerging disruptive technologies like social media, mobility, cloud and data. Combination and convergence of these technologies is leading to the emergence of new products and solutions offering. With the multiplying smart devices, instant connectivity and massive growth of social media,

customers today demand real time communication and consistent experience across channels. Companies are leveraging disruptive technologies to not just meet these changed expectations, but also to innovate and present cutting-edge products and solutions.

Deneckere and de Palma (1998) developed a model of a vertically differentiated durable goods duopoly. In the version of their model with endogenous quality choice it is difficult for the low quality firm to soften competition by lowering the quality of its product. This leads to less vertical differentiation than would arise in a market for non durable goods. Whereas redefining the customer satisfaction Zeithaml et al. (1996), emphatically mentioned that companies should first examine the impact of service quality on customers' responses by asking them the following questions: What is the level of quality a supplier must deliver in order to keep the customer; what would encourage the customer to recommend the supplier; what factors would reduce the likelihood of a customer spreading negative worth-of-mouth; and should the supplier focus on proactive service improvements or on complaint handling in order to keep the customer.

Before the shift in focus towards brands and the brand building process, brands were just another step in the whole process of marketing to sell products. "For a long time, the brand has been treated in an off-hand fashion as a part of the product" (Urde 1999, p. 119). Kotler (2000) mentions branding as "a major issue in product strategy" (p.404). As the brand was only part of the product, the communication strategy worked towards exposing the brand and creating brand image. Aaker and Joachimsthaler (2000) mention that within the traditional branding model the goal was to build brand image; a tactical element that drives short-term results. Four factors combine in the mind of the consumer to determine the perceived value of the brand: brand awareness; the level of perceived quality compared to competitors; the level of confidence, of significance, of empathy, of liking; and the richness and attractiveness of the images conjured up by the brand. According to Keller (2003a), brand awareness consists of brand recognition - the "consumer's ability to confirm prior exposure to the brand when given a brand as a cue"(p. 67)- and brand recall -the "consumer's ability to retrieve the brand from memory when given the product category, the needs fulfilled by the category, or a purchase or usage situation as cue" (p. 67). On the other hand, "brand image is created by marketing programs that link strong, favorable, and unique associations to the brand in the memory" (p. 70). These associations are not only controlled by the marketing program, but also through direct experience, brand information, word of mouth, assumptions of the brand itself -name, logo-, or with the brand's identification with a certain company, country, distribution channel, person, place or event.

The extant research on multi-generational durables such as software, computer chips, etc. assumes that the firm faces very high development costs and very low marginal costs. In such markets, firms usually practise skim pricing (Beskano and Wilson 1990). By setting initial prices high and reducing them later, the firm maximize profits via price discrimination. However, in such markets, some consumers learn the patterns of price changes over time and build expectations about future price reductions (Song and Chintagunta 2003). Some forward-looking consumers may delay purchasing and wait for the price to fall. The composition of the market with regard to the number of consumers who will purchase immediately versus waiting, has an important impact of the firm's pricing over time.

The topic of customer satisfaction/dissatisfaction has recently become one of the most studied issues in the field of consumer behavior. In general, researchers agree that the concept of consumer satisfaction/dissatisfaction refers to an emotional response to an evaluation of a product, store or service consumption experience (Day 1983; Dube and Schmitt 1991; Hunt 1977,1983; Westbrook 1983; Woodruff, Cadotte, and Jenkins 1983). Satisfaction can be thought of as a feeling of "delight" and dissatisfaction, a feeling of "disappointment"(Oliver and DeSarbo 1988). Positive feelings of satisfaction can have positive effects on word of mouth behavior (Swan and Oliver 1989). Pleased consumers contact the company with positive feedback (Resnik, Gnauck and Aldrich 1977), spread the "good news" among friends and acquaintances (Biehal 1983), or decide to repurchase and /or remain loyal (Bernacchi, Kono, and Willette 1980). In general however, such positive consumer actions have received less attention from researchers (and, apparently, marketers) than the seemingly more urgent negative reactions (Perkins 1993). Sarah Cook in his work: Customer Care Excellence: 'How to Create an Effective Customer Focus', 5th Edition stated as customers begin to experience a better service their expectations rise. Furthermore, the service experienced is transferable in the mind of the customer. The customer makes conscious and unconscious comparisons between different service experiences – irrespective of industry sector.

Objectives of the Study

The present study focuses on the consumers' brand preference for consumer durable goods in the Indian context with the following objectives:

- To know the brand preference of the customers purchasing consumer durable goods, and
- To study the factors which are influencing brand preference for different consumer durable goods.

Hypothesis for the Study

The paper describes the data collection process and analysis of consumers' brand preference for consumer durable goods.

The set of assumptions framed for the purpose of the study are:

H0; Attributes are uncorrelated with the population.

H1; Attributes are correlated with the population.

H2; There is no relationship between Performance, Technology, Quality, Overall Brand Image, Price, Services and the buyers of consumer durable goods.

H3; There is a relationship between Performance, Technology, Quality, Overall Brand Image, Price, Services and the buyers of consumer durable goods.

Tools Used For The Study

The tools used comprise:

- Chi Square Test,
- Factor Analysis, and
- Garrett Score Method.

Research Methodology

The data was collected through questionnaire (refer Appendix) distributed to customers in different supermarkets and hypermarkets of Lucknow city in the month of May - June 2014. The questionnaire included several scales which were continuous and categorical in nature.

The sampling technique was probabilistic. Questionnaire was randomly distributed to customers over 22 years of age. The number of valid response was 350. Demographic profile of customers is shown in Table 2.

Apart from variables like age, gender, income, data on factors influencing consumer brand preference for consumer durable goods were also included.

Variables Measurement

Questionnaire measured quality, technological innovations and pricing perceptions of the customers. Customers rated the store on a 5-point Likert scale. (1=Strongly Disagree to 5=Strongly Agree) for 6 questions related to quality, technological innovations and pricing perceptions of the customers. Also the customers were asked to rank the brand of their choice.

Data Analysis

Table 2 shows the demographics of the respondents for the survey.

Table 2: Demographics of the respondents for the Survey

	Categories	Count	Percentage
Gender	Male	200	57.1
	Female	150	42.9
Age	21-30	90	25.7
	31-40	130	37.1
	41-50	95	27.1
	>50	35	10
Education Level	Undergraduate	150	42.9
	Graduate	140	40
	Post Graduate	60	17.1
Occupation	Service Employed	70	20
	Self Employed	130	37.1
	Non Working/Working/Part time	150	42.9
Monthly Income	15,000<	30	8.6
	15,0001-30,000	100	28.6
	30,0001-40,000	120	34.3
	>40,000	100	28.6

The respondents were asked to rank the various brands of consumer durable goods they preferred to buy. The consumer durable goods- Sony, Whirlpool, Voltas, Samsung, LG, and Onida were ranked as per their preferences and the ranks are shown in the Table 3.

Table 3 Respondents' Preference for the Brands

Rank	1	2	3	4	5	6
Sony	68	65	59	52	43	63
Whirlpool	65	54	56	51	68	56
Voltas	54	65	56	64	61	50
Samsung	67	68	56	56	53	50
LG	67	54	55	64	58	52
Onida	29	44	68	63	67	79

From the Table 4, it can be inferred that the most preferred brand was Samsung (ranked 1) with a mean score of 53.01, followed by Sony. The last rank was given to Onida (ranked 6) with a mean score of 47.01.

Table 4 Respondents' Preference for the Brands-Calculated by Using Garrett Score

	1	2	3	4	5	6	Garrett Score	Mean Score	Rank
Sony	5236	4095	3186	2392	1591	1953	18453	52.72285714	2
Whirlpool	5005	3402	3024	2346	2516	1736	18029	51.51142857	4
Voltas	4158	4095	3024	2944	2257	1550	18028	51.50857143	5
Samsung	5159	4284	3024	2576	1961	1550	18554	53.01142857	1
LG	5159	3402	2970	2944	2146	1612	18233	52.09428571	3
Onida	2233	2772	3672	2898	2479	2449	16503	47.15142857	6

The presence of consumer durable brands on 4 social media platform has been shown in Table 5

Table 5 Respondents' Preference for the Brands on Social Media

From the Table 6, it can be inferred that the most preferred brand was Samsung (ranked 1) with a mean score of 4.37, followed by Sony. The last rank was given to Onida (ranked 6) with a mean score of 0.004. Samsung, Sony, and LG have strong presence on social media, whereas Whirlpool, Voltas and Onida have weak presence on social media.

Table 6 Respondents' Preference for the Brands on Social Media-Calculated by Using Garrett Score

Brands	Face book	YouTube	LinkedIn	Twitter	Garrett Score	Mean Score	Rank
Samsung	352427283	63363160	9574092	11826000	437190535	4.371905	1
Sony	138189219	2069200	8665844	12339000	161263263	1.612633	2
Whirlpool	15384312	52192	3851980	6399	19294883	0.192949	4
LG	143072627	7335216	81268	8181000	158670111	1.586701	3
Onida	117238	14896	308792	4266	445192	0.004452	6
Voltas	322660	237776	486156	9882	1056474	0.010565	5

Testing of Hypothesis One

H0; Attributes are uncorrelated with the population.

H1; Attributes are correlated with the population.

The findings of the data analysis are discussed, and are instrumental in gaining an insight into the buying behavior of the consumer durable products. In order to find out the key factors which affect the purchase of consumer durable goods, exploratory factor analysis was performed and the results are shown in Table 9.

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

The KMO measure of sampling adequacy is an index used to examine the appropriateness of factor analysis. High values (between 0.6 and 1.0) indicate factor analysis is appropriate. Value below 0.6 implies that factor analysis may not be appropriate.

Table 7 KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.812
Bartlett's Test of Sphericity	Approx. Chi-Square	1696.011
	df	15
	Sig.	.000

For our factor analysis, the KMO measure of sampling adequacy = 0.812, which is greater than 0.6. This also implies that the scales of all variables of the questionnaire were properly understood by all the respondents and they have answered correctly to the scale. Additionally, the Barlett's test of sphericity has a high chi square value and the significance is 0.000 which is less than 0.05. Hence the null hypothesis is rejected and H1 is accepted, as the factors are correlated with each other.

In order to identify the key preferences of the consumer durable goods buyers, an exploratory factor analysis was conducted. The respondents were asked to rate the 6 variables using a 5-point Likert scale, which ranged from 'strongly disagree' to 'strongly agree.' The inter-term consistency reliability of these 6 variables was tested before carrying out the factor analysis.

Table 8 Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.943	11

The result for Cronbach's Alpha test was 0.943. The closer the reliability coefficient is to 1.0, the better is the reliability of the measure (Cronbach, 1951). This scale can be considered to be good.

Table 9 shows the factor analysis of 6 variables which consumers give preference to when purchasing consumer durable goods. This factor analysis extracted three factors from the 6 variables.

Table 9 Component Matrix

Component Matrix[a]			
	Component		
	1	2	3
Performance	.609	-.585	-.245
Technology	.552	-.186	.810
Durability	.945	.086	-.090
Overall Brand Image	.962	-.023	-.085
Price	.386	.843	.030
Service	.945	.079	-.152
Extraction Method: Principal Component Analysis.			
a. 3 components extracted.			

Table 10 shows the factor analysis of the 6 variables which would be considered as key drivers influencing the shopping behavior of the customers in retail stores.

Table 10 Factor Analysis

Structure Matrix			
	Component		
	1	2	3
Performance	.705		
Technology			.997
Durability	.928		
Overall Brand Image	.955		
Price		.905	
Service	.942		
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.			

Table 11 shows that these variables account for 89.89% of the total variance.

Table 11 Rotated Component Matrix

Rotated Component Matrix							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.536	58.941	58.941	3.536	58.941	58.941	3.387
2	1.102	18.359	77.300	1.102	18.359	77.300	1.214
3	1.012	12.589	89.890	.755	12.589	89.890	1.594
Extraction Method: Principal Component Analysis.							
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.							

Testing of Hypothesis Two

H2; There is no relationship between Performance, Technology, Quality,Overall Brand Image, Price, Services and the buyers of consumer durable goods.

H3; There is a relationship between Performance, Technololgy, Quality, Overall Brand Image, Price, Services and the buyers of consumer durable goods.

Interpretation

All the three factors as shown in Table 12 have a significant value of .000, .000, and .000 respectively which is quite less than 0.5,and therefore null hypothesis is rejected and the alternate hypothesis is accepted and it suggests that there is an evidence of a strong relationship between quality, price and technology and the consumer preference for consumer durable goods.

Table 12 Chi Square Test Statistics

Test Statistics			
	Quality factor score for analysis 1	Price factor score for analysis 1	Technology factor score for analysis 1
Chi-Square	1141.326[a]	1141.326[a]	1141.326[a]
df	53	53	53
Asymp. Sig.	.000	.000	.000
a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 6.5.			

The descriptive statistics indicates that the most important criterion in the purchase of consumer durable goods was found to be technology with a mean value of 4.38, followed by price and durability with mean of 4.33 and 3.54 respectively.

Table 13 Descriptive Statistics

Descriptive Statistics							
		Performance	Technology	Durability	Overall Brand Image	Price	Service
N	Valid	350	350	350	350	350	350
	Missing	0	0	0	0	0	0
Mean		4.33	4.38	3.54	3.23	4.31	3.31
Std. Deviation		.987	.851	1.233	1.159	.830	1.249
Percentiles	100	5.00	5.00	5.00	5.00	5.00	5.00

Conclusion

The research finding indicates that factors such as quality, technology and price have statistically proved to be significant in determining the attitude towards consumer durable goods. The market for consumer durables is becoming more competitive now a days. Therefore, the producer of durable products should understand consumer interest much to find higher sale of their products. Overall, it is argued that the study of consumer behavior is rapidly evolving as researchers recognize and implement new techniques to understand the nature of purchase and consumption behavior. A consumer prefers a particular brand based on what benefits that brand can offer to him/her. Because of such consumer preferences, the brand can charge higher prices and command more loyalty. In this study, it was observed that in forming tendency of customers to prefer a particular brand, the variables such as price of the product, quality of the product, and the innovative technologies play an essential role. Therefore this research will assist the companies in increasing their market share.

Managers need to address the buyers of consumer durable goods by showcasing the experience of users and ensuring service delivery close to the consumer‘s doorstep. Consumer durable goods companies would have to integrate social media management with the customer relationship management system, as the marketers need to move beyond complacencies of metrics such as ‘Likes’ to one which would enable the companies to more customer centric business. Quality and value are vital for the success of a new product as they bring improvement to consumer lives in terms of productivity. For products that generate the perception of providing comfort or improving the quality of everyday life, the price is not questioned and the role played by additional features is not significant in influencing choice. Managers also need to understand the product specific evaluation process from primary research to mapping the succession of their brand from consideration set to choice set. This deals with the product deficiencies in relation to competition and improves its chances of selection during evaluation. Customer satisfaction is the key to building a profitable and sustainable relationship with the consumers.

Limitation and Scope for Further Research

The study was conducted based on data acquired from the buyers of Lucknow city only, and the findings may not be applicable to other cities. The sample size is very small and it may not be the representative of the population in general. Therefore there is a wide scope for repeating this research with a more broad-based samples which could lead to a different set of results. As such, this study can be considered as exploratory.

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Appendix
Questionnaire: Consumers' preference towards consumer durable goods

Personal Information of the respondent

Age (in years) 21-30 ☐ 31-40 ☐ > 40 ☐

Gender: Male ☐ Female ☐

Highest Education Qualification:

Undergraduate ☐ Graduate ☐ Post Graduate ☐

Occupation:

Service Employed ☐ Self Employed Professional/Business ☐

Non-Working/Studying/Part-Time ☐

Monthly Household Income:

<15,000 ☐ 15, 0001-30,000 ☐ 30, 0001-45, 0000 ☐

>45,000 ☐

On the scale of 1-10 with 1 being the least and 10 being the strongest influence please rate the following brands while making your purchase decisions.(1=worst,2=very poor,3=poor,4=significantly below average, 5=average, 6=above average, 7=significantly above average, 8=good, 9=very good,10=best)

Rank Brands	1	2	3	4	5	6	7	8	9	10
Sony										
Whirlpool										
Voltas										
Samsung										
LG										
Onida										

While making the purchase for the consumer durable goods, how important the following criteria's please rate them on the scale of 1 to 5

Performance					
Technology					
Price					
Durability					
Overall Brand Image					
Service					
Note 1 -Not important; 2 -Moderately important; 3 -Neutral(Neither not important or important); 4-important; 5-Very important					

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