ISSN 2249 - 9040

VOLUME 8 NO. 1 JANUARY-JUNE 2018

IPE Journal of Management

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Aims and Scope

IPE Journal of Management is a bi-annual, peer-reviewed journal which publishes empirical, theoretical and review articles dealing with the theory and practice of management. The aim of the journal is to provide a platform for researchers, academicians, practitioners and policy-makers from diverse domains of management to share innovative research achievements and practical experience, to stimulate scholarly debate both in India and abroad on contemporary issues and emerging trends of management science and decision-making.

Published by: Satyam N Kandula on behalf of Institute of Public Enterprise

Owned by: Institute of Public Enterprise

Printed by: Satyam N Kandula on behalf of Institute of Public Enterprise

Printed at: Wide Reach Advertising Pvt Ltd, 21, Surya Enclave, Trimulgherry, Hyderabad - 500015

Place of Publication: Institute of Public Enterprise, OU Campus, Hyderabad - 500007

We thank Indian Council of Social Science Research (ICSSR) for financial assistance for publication of the journal.

IPE Journal of Management

Volume 8 No. 1 January-June 2018

IPE Journal of Management

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ISSN 2249 - 9040 Volume 8, No 1, January-June 2018 pp. 1-16

Framework of Order to Trade Ratio in Algorithmic Trading – An Evidence from Global Financial Markets

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A.M. Sherry[2]

Abstract

Fair and transparent liquidity in Financial Markets depends upon the equilibrium between punching and trading the orders which shows the maturity and transparency in the financial markets. The objective of this paper is to study the mechanism and management of Order to Trade Ratio in Algorithmic Trading in Global Financial Markets specifically Australia, Italy, Norway, Denmark, Belgium, Germany and Russia and compare this with the mechanism and management of Order to Trade Ratio in Indian Financial Markets to address the gaps in the Framework of Order to Trade Ratio to meet global best practices. Study concludes that it is important to redesign the structure of Order to Trade Ratio in terms of mechanism (limit) and Management (method of calculation) as per the Global best practices for enhancing the participation from the institutional and retail investors to maintain the market quality, market integrity and fairness.

Keywords: Algorithmic Trading, Order to Trade Ratio, High Frequency Trading

Introduction

Any Emerging Financial Market is unique on the basis of investors and issuers, different stages of development in the economy & market, and regulatory & technological standards. Algorithmic / High Frequency Trading is one of the branch of technological standards which provides a better space to market makers for market making and enabling the exchanges and regulators to develop market making schemes for improving the efficiency of trading and liquidity in the financial markets of any country. Every country evaluates the complexities, strengths and weakness of its market structure to access the requirement of the ecosystem and market development for determination of improvement in the liquidity.

All Emerging Financial Markets pass through three stages of maturity. First, Early Stage in which markets focuses on collaboration between governments and regulators for changing regulations and tax laws for the core market enhancement

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such as electronification, local investors and issuers. Second, Mid Stage in which markets prefer for expansion of products and attracting the international issuers and investor base. Third, Maturing Stage in which markets focus on the standards employed by the most developed market infrastructure in terms of regulatory principles and practices as per the international norms, fair market access for increasing network of intermediaries and enabling the technological advancement such as co-location and algorithmic trading.

Algorithmic Trading refers to the execution of trade or buying and selling thousands of shares in fraction of second automatically which is based on advanced mathematical models with super-fast speed order generation by large institutional investors.

Austin Gerig (2015), mentioned that HFT plays an important role in financial markets. By synchronizing prices, HFT facilitates information transfer between investors, which increases the accuracy of prices and redistributes profits from informed individuals to average investors by reducing transaction costs[1]. Avanidhar Subrahmanyam and Hui Zheng (2016), studied the Limit Order Book of 116 stocks traded on NASDAQ for first quarter 2011 and used the information on 26 trading firms identified by NASDAQ in HFT activities and concluded that High Frequency Trading firms manage their limit orders strategically by cancelling the order in the anticipation of price movements in short term period. They increase their liquidity provision during high volatility periods[2]. Michael Aitken, Douglas Cumming and Feng Zhan (2014), examined the impact of changes in market microstructure, particularly algorithmic trading(AT) and high frequency trading (HFT), on trade size across 24 stock exchanges around the world. Using co-location services as a proxy for AT and HFT and found that Exchanges choose to offer co-location services due to the fact HFT requires higher speed transactions[3].

Australian Securities & Investments Commission (2012), studied that ASIC discovered that 98.8% of high frequency traders held positions for holding times of more than two minutes and 88% of high-frequency trade orders were at the best price in the market[4]. By most accounts, High Frequency Trading has grown substantially over the past 10 years: estimates hold that it accounts for roughly 55% of trading volume in U.S. equity markets and about 40% in European equity markets. Likewise, HFT has grown in futures markets – to roughly 80% of foreign exchange futures volume and two-thirds of both interest rate futures and Treasury 10-year futures volumes[5].

1 Austin Gerig (2015), "High-Frequency Trading Synchronizes Prices in Financial Markets", Working Paper Series – Division of Economic and Risk Analysis, US Securities and Exchange Commission, Page No. 09 at https://www.sec.gov/files/dera-wp-hft-synchronizes.pdf

2 Avanidhar Subrahmanyam and Hui Zheng (2016), "Limit Order placement by High Frequency Traders", Borsa Istanbul Review, Volume 16, Issue 4, Pages 185-209

3 Michal Aitken, Douglas Cumming and Feng Zhan (2014), "Trade Size, High Frequency and Co-Location Around the World", European Journal of Finance, forthcoming at https://www.researchgate.net/publication/263852492_Trade_Size_High_Frequency_Trading_and_Co-Location_Around_the_World

4 ASIC Market Supervision Update Issue 45 at http://asic.gov.au/about-asic/corporate-publications/newsletters/asic-market-supervision-update/asic-market-supervision-update-previous-issues/asic-market-supervision-update-issue-45/

5 Rena S. Miller and Gary Shorter (2016), "High Frequency Trading: Overview of Recent Developments", Congressional Research Service Report, Page No. 02 at https://fas.org/sgp/crs/misc/R44443.pdf

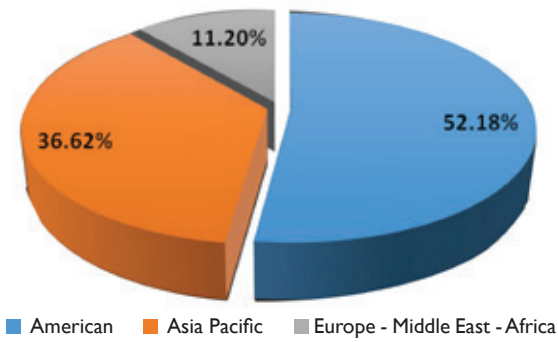
Overview of Value of Share Trading (Electronic Order Book) from World Financial Markets

Table-1: Value of Share Trading (Electronic Order Book) (In $ Trillions)

S. N.	Region	Value of Share Trading (Electronic Order Book) (In $ Trillions) in 2016	Per cent (%) Contribution in total Value of Share Trading (Electronic Order Book)
1.	American[6]	$43.93	52.18
2.	Asia Pacific[7]	$30.83	36.62
3.	Europe - Middle East - Africa[8]	$9.42	11.20
	Total	**$84.18**	**100**

Source: WFE (World Federation of Exchanges) Annual Statistics Guide 2016

Figure-1: Per cent (%) Contribution in Value of Share Trading (Electronic Order Book) in 2016



It is clear from the above Table-1 and Figure-1, American and Asia Pacific plays very important role in **'Value of Share Trading (Electronic Order Book)'** where 52.18% ($43.93 trillion) Value of Share Trading (Electronic Order Book) comes

6 American Region covers the 11 stock exchanges (BATS Global Markets, Bermuda Stock Exchange, BM&FBOVESPA S.A., Bolsa de Comercio de Buenos Aires, Bolsa de Comercio de Santiago, Bolsa de Valores de Colombia, Bolsa de Valores de Lima, Bolsa Mexicana de Valores, NYSE Group, Nasdaq – US, TMX Group)

7 Asia Pacific covers 18 stock exchanges (Australian Securities Exchange, BSE Limited, Bursa Malaysia, Colombo Stock Exchange, Hochiminh Stock Exchange, Hong Kong Exchanges and Clearing, Indonesia Stock Exchange, Japan Exchange Group, Korea Exchange, National Stock Exchange of India Limited, NZX Limited, The Philippine Stock Exchange, Shanghai Stock Exchange, Shenzhen Stock Exchange, Singapore Exchange, Stock Exchange of Thailand, Taipei Exchange, Taiwan Stock Exchange

8 Europe – Middle East – Africa covers 28 Stock Exchanges (Abu Dhabi Securities Exchange, Amman Stock Exchange, Athens Stock Exchange, Bahrain Bourse, BATS Chi-x Europe, BME Spanish Exchanges, Borsa Istanbul, Bourse de Casablanca, Cyprus Stock Exchange, Deutsche Börse AG, Dubai Financial Market, The Egyptian Exchange, Euronext, Irish Stock Exchange, Johannesburg Stock Exchange, Kazakhstan Stock Exchange, Luxembourg Stock Exchange, Malta Stock Exchange, Moscow Exchange, Muscat Securities Market, Nasdaq Nordic Exchanges, Nigerian Stock Exchange, Oslo Børs, Palestine Exchange, Qatar Stock Exchange, Saudi Stock Market (Tadawul), SIX Swiss Exchange, Stock Exchange of Mauritius

from American region while 36.62% ($30.83 trillion) come from Asia Pacific out of a total Value of Share Trading (Electronic Order Book) $84.18 trillion from all the three regions in 2016.

The researcher made an attempt to find out the percentage of Value of Share Trading (Electronic Order Book) from major stock exchanges of the world as follows which was compiled from World Federation of Exchange.

Table-2: Value of Share Trading (Electronic Order Book) (In $ Trillions) from major Stock Exchanges in World and Position of Indian Financial Markets

S. N.	Stock Exchange	Country	Value of Share Trading (Electronic Order Book) (in $ Trillions) in 2016	Per cent (%) Contribution in total Value of Share Trading (Electronic Order Book) in America, Asia Pacific and Europe - Middle East - Africa
1.	NYSE Group	America	17.31	20.57
2.	Nasdaq - US	America	11.07	13.15
3.	Shenzhen Stock Exchange	China	11.61	13.79
4.	Shanghai Stock Exchange	China	7.51	8.92
5.	Japan Exchange Group	Japan	5.62	6.68
6	National Stock Exchange of India Limited	India	0.69	0.82
7	Bombay Stock Exchange of India Limited	India	0.10	0.13
	Total		53.91	64.06

Source: WFE (World Federation of Exchanges) Annual Statistics Guide 2016

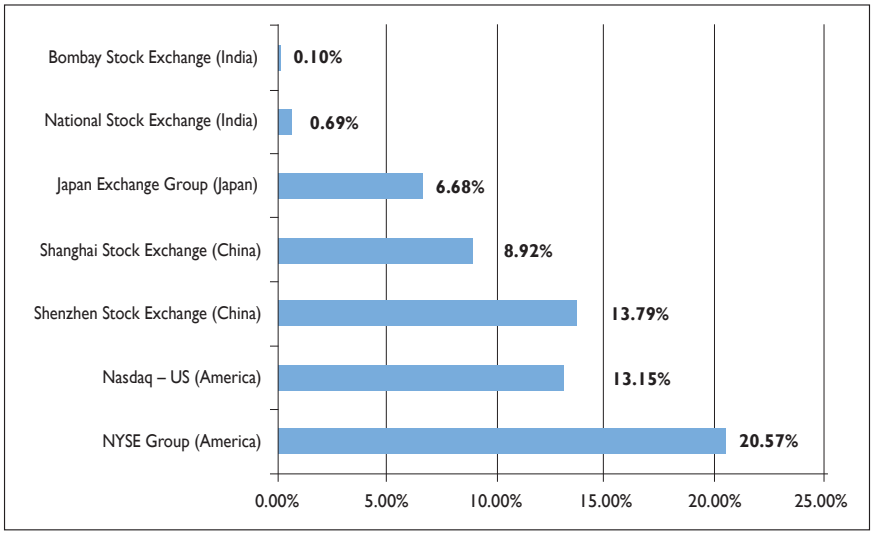
Table-2 and Figure-2 show the seven Stock Exchanges (NYSE Group, Nasdaq – US, Shenzhen Stock Exchange, Shanghai Stock Exchange and Japan Exchange Group, National Stock Exchange and Bombay Stock Exchange) cover 64.06% ($53.91 trillion) of total Value of Share Trading (Electronic Order Book)which is $84.18 trillion from the 57 Stock Exchanges who are the members of World Federation of Exchanges.

As per the Speech of CFTC Commissioner J. Christopher Giancarlo to the American Enterprise Institute, Percentage of Algorithmic / High Frequency Trading/Automated Trading in Total Volume in United States is 80%[9] and 70%[10] in Japan as per the Agenda for Financial Markets and Exchanges in Japan, Financial Markets Division, and Financial Service Agency, Japan.

9 Speech of CFTC Commissioner J. Christopher Giancarlo to the American Enterprise Institute dated 21st September, 2016 at http://www.cftc.gov/PressRoom/SpeechesTestimony/opagiancarlo-17

10 Agenda for Financial Markets and Exchanges in Japan, Financial Markets Division, Financial Service Agency, Japan, Page No. 04 at http://www.fsa.go.jp/en/news/2016/20160513-1/01.pdf

Figure-2: Per cent (%) Contribution in total Value of Share Trading (Electronic Order Book) by America, China, Japan and India



Mechanism and Management of Order to Trade Ratio in Global Markets

Typical HFT Traders / Algo Traders include hedge funds, mutual and pension funds, and other class of sophisticated investors.

It has been observed that Algorithmic Trading / High Frequency Trading activity is shifting to Emerging Financial Markets like China, Brazil, Russia, India and Taiwan because of getting space from the Government and market infrastructure intuitions like Regulator and Stock Exchanges of those markets and these financial markets are playing a leading role in Algorithmic Trading / High Frequency Trading.

As per the 'Global Algorithmic Trading Market 2016-2020' report published by Research and Markets in 2016, the global algorithmic trading market is expected to grow at a CAGR of 10.3% during the period 2016-2020[11].

As per the International Organization of Securities Commissions (IOSCO), these are following characterises to identify High Frequency Trading[12]:

- It involves the use of sophisticated technological tools for pursuing a number of different strategies, ranging from market making to arbitrage.
- It is a highly quantitative tool that employs algorithms along the whole investment chain: analysis of market data, deployment of appropriate trading strategies, minimisation of trading costs and execution of trades.

11 https://www.quantinsti.com/blog/making-career-algorithmic-trading/

12 IOSCO Final Report (2011), 'Regulatory Issues Raised by the Impact of Technological Changes on Market Integrity and Efficiency', FR09/11

- *It is characterized by a high daily portfolio turnover and order to trade ratio (i.e. a large number of orders are cancelled in comparison to trades executed).*
- It usually involves flat or near flat positions at the end of the trading day, meaning that little or no risk is carried overnight, with obvious savings on the cost of capital associated with margined positions. Positions are often held for as little as seconds or even fractions of a second.
- It is mostly employed by proprietary trading firms or desks and
- It is latency sensitive. 'The implementation and execution of successful high frequency trading strategies depend crucially on the ability to be faster than competitors and to take advantage of services such as Direct Electronic Access and Co-location.'

It is clear that 'Order to Trade Ratio' is one of the important features of High Frequency Trading / Algorithmic Trading. This ratio elaborates the number of times amendment or cancellation of orders relative to the number of trades. A ratio of 1:1 states that every new order or amended order results in a trade one it is submitted in the market.

Matrix of Order to Trade Ratio

Measure	Metric Used	Rationale for Measure
Order-to-trade ratio	Number of orders submitted to market (new orders, amendments and deletions) divided by the number of trades executed	High-frequency trading typically involves placing many orders for short periods over various price levels. High order-to-order ratios suggest automation, agility, and lower risk tolerance. High-frequency traders tend to have a high order-to-trade ratio

High **'Order to Trade Ratio'** decreases the quality of operational and supervisory functions and results in additional costs for supervisors, brokers and clients. Market Infrastructure Institutions like regulators/exchanges have considered charging a fee for **'High Order to Trade Ratio'** to control the harmful High Frequency Trading Activities and determine an appropriate Order to Trade Ratio to develop and maintain effective Order Management system including amendments and cancelations of orders by an algorithm.

It has been recognized that some market infrastructure institutions like regulators/ exchanges around the world have framed the guidelines/mechanism for effective management of High Order to Trade Ratio by levying financial transaction taxes, fees based on excessive order-to-trade ratios (or similarly, order cancellation fees), and minimum resting time, among others for improving the market integrity.

Australian Securities Exchange

In ASIC Report 331, it is estimated that HFT accounts for 46 percent of orders and 32 percent of trades in the Australian equities market[13]. ASX Operating Rule

13 https://www.waterstechnology.com/waters/feature/2475706/speeding-out-of-india-the-hft-algo-trading-debate-quickens-in-india

4025(a) of Australian Securities Exchange frame the underlying policy of 'Order to Trade Ratio' which states that Trading Participants cannot enter the excessive orders in the trading platform. A ratio of orders entered to trades executed that equals or exceeds 50:1 is considered by ASX to be excessive[14]. However, relief has been given to the market maker from this restriction[15].

Italian Stock Exchange

Borsa Italiana (Part of London Stock Exchange Group) – Italian Stock Exchange implemented the mechanism of 'Order to Trade Ratio' in April 2012. As per the Price list of trading services of the Exchange enforce as of 3rd July 2017[16], the following mechanism is adopted by the Exchange for charging the fees on high Order to Trade Ratio:

Table-3: Fees / Charges on High Order to Trade Ratio on Mid and Large Size Companies (MTA – Italian Equity Market)

Order to Trade Ratio	Unit fee charged for orders included in each range of the Order to Trade Ratio
Less than 100	0
100 to less than 500	€ 0.01
500 to less than 1000	€ 0.02
1000 or more than 1000	€ 0.025

Note: Fees are charged on monthly basis but calculated on daily basis during the previous month and Fees are computed daily with a maximum of 1000 Euros, so that traders cannot balance out their ratio across several days.

ESMA considers that trading venues should calculate the ratio of unexecuted orders to transactions in order to ensure effectively that the ratio does not lead to excessive volatility. London Stock Exchange Group trading venues will calculate order to trade ratios as required by the regulation[17].

Frankfurt Stock Exchange

High Frequency Trading in Germany is regulated under German High Frequency Trading Act since 15 May 2013. As per the act, exchanges are required to define Order to Trade Ratio for each specific instrument and trading firms are required to manage their own Order to Trade Ratio on monthly basis. Algorithmic Orders and Order to Trade Ratio are identified as per the exchange rule § 72a and § 72b[18]. Authorized trading participants are required to be bound by the § 72b of the Exchange Rules for Order to Trade Ratio.

14 ASX Operating Rules Procedures, Page No. 48 at www.asx.com.au/documents/rules/asx_or_procedures.pdf

15 http://www.asx.com.au/documents/rules/asx_24_section_06.pdf Page No. 05 and https://asxonline.com/content/asxonline/public/notices/2017/sep/0939.17.09.html

16 Price for Trading Services from Borsa Italiana (Part of London Stock Exchange Group) – Italian Stock Exchange, Page No. 24 at http://www.borsaitaliana.it/borsaitaliana/intermediari/guide-e-moduli/pricing3luglio2017.en_pdf.htm

17 MiFID II London Client Event dated 21st March 2017 by London Stock Exchange Group at http://www.londonstockexchange.com/products-and-services/technical-library/technical-user-group/mifid210317.pdf

18 System Training – Xetra and Börse Frankfurt (Frankfurt Stock Exchange) http://www.deutsche-boerse.com/dbg/dispatch/ru/binary/gdb_content_pool/imported_files/public_files/10_downloads/15_cma/27_FWB_Haendler/Xetra_Systemtraining.pdf

As per the Exchange Rule § 72 as of 26.06.2017, the Order to Trade Ratio (OTR) is adequate if it is less than or equal to 1 at the end of the last trading day of a calendar month and it is determined by dividing the volume of the order-entries of an admitted enterprise per marketplace[19]. If the value of an OTR is greater than one, then violation is being considered and sanctions may trigger against the participant. Stock exchange charges fees for excessive use of the trading systems for high number of order entries, modifications and deletions[20].

Moscow Exchange

Moscow Exchange, the Russian Stock Exchange has implemented surcharge to High Frequency Traders on the Moscow Exchange Securities Market. The surcharge is payable by the trading members who exceeded the threshold established for a number of orders submitted to the MICEX Stock Exchange trading system. Number of orders which is not surcharged is capped at 100,000 (one hundred thousand) orders per day. The maximum surcharge is capped at RUB 300,000 (three hundred thousand) per day including VAT[21].

Oslo Stock Exchange

Oslo Stock Exchange, Norway 'Oslo Børs' monitor ratio of unexecuted orders to transactions (Order to Trade Ratio) and also consider a maximum ratio and measures to take if maximum is exceeded. Exchange has implemented that Order to Executed Order Ratio or Unexecuted Orders to Transactions or Order to Trade Ratio above 70:1 would be chargeable of Norwegian Krone 0.05 per order[22].

NASDAQ Copenhagen or Copenhagen Stock Exchange

Copenhagen Stock Exchange, the stock exchange of Denmark has introduced charges for High Order to Trade Ratio and Danish Krone 0.07 would be charged, if the Order to Trade Ratio is above 100:1[23].

Euronext Brussels or Brussels Stock Exchange

As per the 'Trading Fee Guide for Cash Market Members' dated 11th May, 2017, daily Order to Trade Ratio above 100:1 are surcharged at €0.10 at Brussels Stock Exchange[24].

19 Exchange Rules for the Frankfurter Wertpapierbörse (FWB), Page No. 44 at http://www.deutsche-boerse-cash-market.com/blob/1187648/8d90fb5fa8ce971fda8b95d3102168ec/data/2017-06-26-Exchange-Rules-for-the-Frankfurter-Wertpapierboerse.pdf

20 Fees for excessive system usage on http://www.xetra.com/xetra-en/newsroom/current-regulatory-topics/high-frequency-trading

21 https://www.moex.com/s639

22 https://www.oslobors.no/ob_eng/obnewsletter/download/e4ed8c104a183dd253000ccc332dbdbf/file/file/Order to Executed Order Ratio (OEOR).pdf

23 Algorithmic Trading on the NASDAQ Copenhagen, The Dainish FSA, February 2016, Page No. 37 at https://www.finanstilsynet.dk/~/media/Nyhedscenter/2016/Algoritmehandel-paa-danske-handelspladser-eng-pdf.pdf?la=en

24 Order-to-trade ratio: calculation and monitoring by Euronext, at https://www.euronext.com/en/exchange-publications/derivatives/info-flashes

National Stock Exchange

As per the Circular Ref. No. 853/2013 dated 24th May, 2013, Investigation Department, National Stock Exchange, members are charged for high algo order to trade ratio[25]. The following mechanism has been adopted by the exchange:

Table-4: Fees/Charges on High Order to Trade Ratio at NSE

Order to Trade Ratio	Charges (Per Algo Order)
Less than 50	0
50 to less than 250 (on incremental basis)	2 Paise
250 to less than 500 (on incremental basis)	10 Paise
500 or more than 500 (on incremental basis)	10 Paise*

* In case the ratio is 500 or more than 500 during a trading day, the concerned member shall not be permitted to place any orders for the first 15 minutes on the next trading day(in the continuous trading session) as a cooling off action. However, the trading member shall be permitted to enter transactions in risk reducing mode in the respective segments during such a cooling off period.

Bombay Stock Exchange

As per the Notice No. 20141010-26 dated 10 Oct, 2014 by Compliance Department, the following mechanism has been adopted by the exchange:

Table-5: Fees / Charges on High Order to Trade Ratio at BSE

Order to Trade Ratio	Charges (Per Algo Order)
Less than 50	0
50 to less than 250 (on incremental basis)	2 Paise
250 to less than 500 (on incremental basis)	10 Paise
500 or more than 500 (on incremental basis)*	10 Paise

* In case the ratio is 500 or more during a trading day, the concerned member shall be placed in risk reduction mode for the first 15 minutes on the next trading day.(Member placed in the risk reduction mode can place orders only to reduce their existing position and not to increase their position).

Management of Order to Trade

Table-6: Comparison of Management of Order to Trade Ratio on Global Stock Exchanges

S. N.	Stock Exchange	Country	Order to Trade Ratio Exempted from charges	Minimum Charges (per order) on Order to Trade Ratio above the limit
1.	Australian Securities Exchange	Australia	49:1	Independent Action from Stock Exchange
2.	Italian Stock Exchange	Italy	99:1	€ 0.01
3.	Oslo Stock Exchange	Norway	70:1	Norwegian Krone 0.05
4.	Copenhagen Stock Exchange	Denmark	100:1	Danish Krone 0.07
5.	Brussels Stock Exchange	Belgium	100:1	€ 0.10
6.	National Stock Exchange	India	49:1	€ 0.02
7.	Bombay Stock Exchange	India	49:1	€ 0.02

25 https://www.nseindia.com/content/circulars/INVG23505.pdf

Table-7: Comparison of Mechanism of Order to Trade Ratio on Global Stock Exchanges

S. N.	Stock Exchange	Country	Order to Trade Ratio – Method of Calculation
1.	Australian Securities Exchange	Australia	The number of times orders submitted into an order book are amended or cancelled relative to the execution of a trade[26].
2.	Italian Stock Exchange	Italy	'Orders' include all orders entered and changes entered in advance of any execution, partial or total and 'trades' include all executions including buy and sell transaction of the same trade[27].
3.	Oslo Stock Exchange	Norway	Order entered or amended which deteriorates price, volume, or both before cancelation and belongs to less than one second in the trading system and executed orders that result in one or many transactions would be counted as one executed order (executed order value less than NOK 500 will not be counted for the calculation of Order to Trade Ratio)[28].
4.	Copenhagen Stock Exchange	Denmark	Number of orders divided by number of executed (wholly or partly) orders[29].
5.	Brussels Stock Exchange	Belgium	An order is counted when it is entered into the system, whether or not it is modified or cancelled afterwards. Modification of an order is equivalent to a cancellation followed by a newly entered order. The order is therefore counted twice, once at the first entry into the system and again at the new entry relative to execution of trade[30].
6.	National Stock Exchange	India	All algorithmic orders relating to order entry, order modifications and order cancellations shall be considered for calculation of daily Order-to-Trade ratio except those orders which are entered and/ or modified within 1% of the last traded price (LTP) of the respective security/ contract ((Absolute (Limit price – LTP)/LTP) <= 1%) and orders of the Members enlisted as market makers[31]
7.	Bombay Stock Exchange	India	All algorithmic orders relating to order entry, order modifications and order cancellations shall be considered for calculation of daily Order-to-Trade ratio except those orders which are entered and/ or modified within 1% of the last traded price (LTP) of the respective security/ contract ((Absolute (Limit price – LTP)/LTP) <= 1%) and orders of the Members enlisted as market makers[32].

26 REGULATORY GUIDE 241 – Electronic Trading by Australian Securities & Investments Commission at http://download.asic.gov.au/media/1247105/rg241-published-21-august-2013.pdf

27 Price for Trading Services from Borsa Italiana (Part of London Stock Exchange Group) – Italian Stock Exchange, Page No. 24 at http://www.borsaitaliana.it/borsaitaliana/intermediari/guide-e-moduli/pricing3luglio2017.en_pdf.htm

28 Kjell Jørgensen, Johannes Skjeltorp and Bernt Arne Ødegaard (2014), "Throttling hyperactive robots - Message to trade ratios at the Oslo Stock Exchange", Page No. 42 at http://cff.handels.gu.se/digitalAssets/1509/1509647_uis_wps_2014_3_jorgensen_skjeltorp_odegaard.pdf

29 Algorithmic Trading on the NASDAQ Copenhagen, The Dainish FSA, February 2016, Page No. 37 at https://www.finanstilsynet.dk/~/media/Nyhedscenter/2016/Algoritmehandel-paa-danske-handelspladser-eng-pdf.pdf?la=en

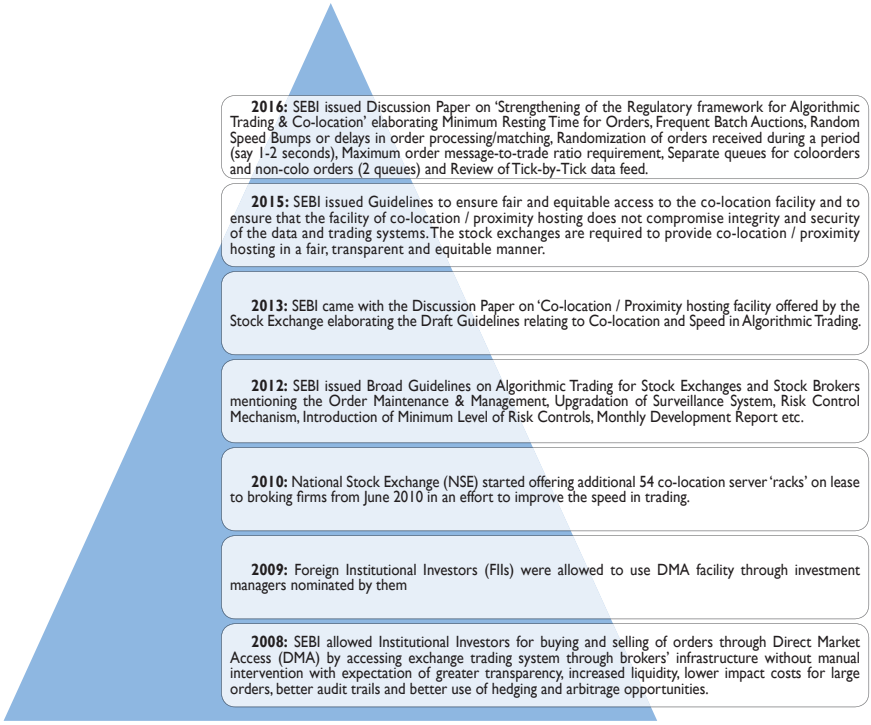
30 Trading Fee Guide for Cash Market Members, Page No. 03 at https://www.euronext.com/sites/www.euronext.com/files/euronext_cash_markets_trading_fee_guide__effective_01june2017_1.pdf

31 NSE Circular No. NSE/FA/21156 dated 29th June, 2012 'Levy of charges for High Order to Trade Ratio' at https://www.nseindia.com/content/circulars/FA21156.pdf

32 BSE Notice No. 20120629-23 dated 29th June, 2012 'Levy of charges for High Order to Trade ratio in Algorithmic Trading in Equity Derivatives Segment' at http://www.bseindia.com/markets/MarketInfo/DispNewNoticesCirculars.aspx?page=20120629-23

Structure of Algorithmic Trading in Indian Financial Markets

Figure-3: Regulatory Journey of Algorithmic Trading in Indian Financial Markets



As per the SEBI Discussion Paper on 'Strengthening of the Regulatory framework of Algorithmic Trading & Co-location' dated 5th August, 2016, *'Currently, more than 80% of the orders placed on most of the exchange traded products are generated by algorithms and such orders contribute to approximately 40% of the trades on the exchange'*[33].

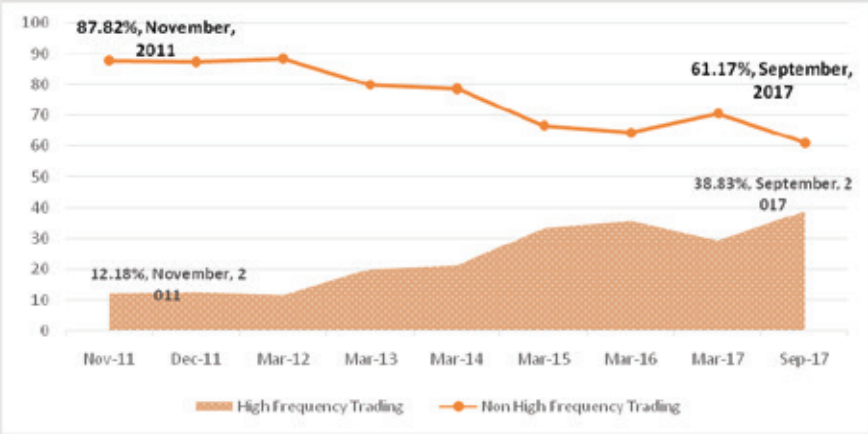
High Frequency Trading are routed/placed/done on the Stock Exchanges through the following various ways:

- Co-location
- ALGO
- Direct Market Access (DMA)

As per the NSE[34] and BSE[35], High Frequency Trading contributed 38.83% at BSE and 40.75% at NSE through Co-location, ALGO and Direct Market Access in Cash Market during the month of September, 2017.

33 http://www.sebi.gov.in/reports/reports/aug-2016/discussion-paper-on-strengthening-of-the-regulatory-framework-for-algorithmic-trading-and-co-location-_32940.html
34 https://www.nseindia.com/content/equities/cm_mode_of_trading.pdf
35 http://www.bseindia.com/markets/equity/EQReports/Cmmode.aspx?expandable=4

Figure-4: Trend of High Frequency Trading and Non High Frequency Trading in Cash Segment at BSE from 2011 to 2017



Source: http://www.bseindia.com/markets/equity/EQReports/Cmmode.aspx?expandable=4 and author calculation. Note: High Frequency Trading consists trading through Co-location, ALGO and Direct Market Access while Non High Frequency Trading consists trading through Non ALGO, Internet Based Trading, Smart Order Routing, FOW-NOW, and Mobile.

We can find (Figure 4) that High Frequency Trading in Cash Segment have increased from 12.18% (November, 2011) to 38.83% (September, 2017) while Non High Frequency Trading have decreased from 87.82% to 61.17% for the same period. It has also been observed that High Frequency Trading through Co-location has played an important role contributing 78% in the growth of High Frequency Trading in India which shows that market infrastructure, tools and technology and proper regulatory framework and guidelines from the Stock Exchanges and Regulators have played an important in the growth of High Frequency Trading in India.

As per the SEBI Discussion Paper (2013) on 'Co-location / Proximity hosting facility offered by the stock exchanges', Orders received from Co-location as percentage of the Total Orders received by the Stock Exchanges (NSE) in the Cash Segment in the month of February 2013 was 73.88% while 94.16% in Equity Derivatives and 26.05% in Currency Derivatives[36].

Gaps in the Management and Mechanism of Order to Trade Ratio in Indian Financial Markets as compared to other Global Markets

Order to Trade Ratio is a very important component in the Algorithmic Trading / High Frequency Trading which facilitates and gives space to the market participants to maintain the balance between their orders and trades as per market sentiment.

36 http://www.sebi.gov.in/sebi_data/attachdocs/1367581007462.pdf Page No. 04

It is a tool of management of orders and trades in Algorithmic Trading / High Frequency Trading.

Limit in Order to Trade Ratio

It has been observed (Table-6) that Order to Trade Ratio 49:1 means every one trade fill on every 49 orders has been considered as a limit in Algorithmic Trading by **Stock Exchanges in India** which is at par with the **Stock Exchange in Australia** while **Stock Exchange of Italy**, **Norway, Denmark and Belgium** are considering this limit more than 49:1. It has been noted that limit on Order to Trade Ratio in India was framed by the Indian Stock Exchanges in 2012 which is not meeting the global best practices in the current scenario.

Order to Trade Ratio – Method of Calculation

It is clear (Table-7) that **Oslo Stock Exchange, Norway** calculates the Order to Trade Ratio on the basis of Order placed or modified which makes a difference to price, volume, or both before cancellation within one second in the trading system and traded orders which result in one or many trades but counted as one executed order. The mechanism to calculate the Order to Trade Ratio of Norway relates to the speed factor of order placing in the Algorithmic Trading / High Frequency Trading.

In **Belgium,** Modification of an order is treated as a cancellation and it is called a newly entered order. The order would be counted twice, once at the first entry into the system and again at the new entry relative to execution of trade which reflects more transparent of order counting in terms of frequency of orders in the Algorithmic Trading / High Frequency Trading. In **India,** Order to Trade Ratio in Algorithmic Trading / High Frequency Trading is calculated on the basis of orders relating to order entry, order modifications and order cancellations which does not reflect the clear picture of speed and frequency of orders in the calculation mechanism.

Conclusion

Financial Markets infrastructure like exchanges and regulators focus on three important areas for the growth of liquidity in the financial markets in any economy. First, promotion and development of investor base which enhances the participation from institutional and retail investors, secondly, promote local or foreign listings and develop new financial products to create market linkages and thirdly, develop the technological environment of trading and Market Making Schemes.

It is clear that Algorithmic Trading / High Frequency Trading have grown because of larger interest from the global players/institutional investors in India. Financial Market Infrastructure Institutions, such as, Stock Exchanges and Regulators have played an important role for setting an open environment for market players. But it is also very important and challenging to meet the expectations of global market participants.

The success of Algorithmic Trading / High Frequency Trading depends upon the management of speed and frequency of orders placed on the Stock Exchange. It has been recognized that Limit in Order to Trade Ratio refers to the frequency of orders goes to the Stock Exchanges and Order to Trade Ratio Exempted from charges is more than 49:1 in the Stock Exchanges of Italy, Norway, Denmark and Belgium but Indian Stock Exchanges follow 49:1 which should be at par with global best practices to provide favourable market environment to the International Market Participants. It has also been identified that method of calculation of Order to Trade Ratio in the Indian Markets does not provide the clear picture of defining the parameters of 'Order Placed or Modified' which makes a difference to price and volume before cancellation within a specific time frame in the trading system and defining the parameters for 'Order Executed' which refers to counting of trades as executed orders which shows the speed factor of the trade. It is clear that Stock Exchange of Norway and Belgium follow more transparent system defining the 'Order Placed or Modified' and 'Order Executed'. As Indian Financial Markets are attraction for Global Institutional Investors and it is important to reframe structure of Order to Trade Ratio in terms of limit and method of calculation as per the global best practices to provide a better space to global players to maintain market quality in terms of volume or liquidity, market integrity in terms of setting regulatory framework or structure as per best global practices and fairness in terms of price, to reflect true picture of the market.

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ISSN 2249 - 9040 Volume 8, No 1, January-June 2018 pp. 17-35

Corporate Financial Performance and Corporate Social Responsibility: An Exploratory Study of Measurement Approaches

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Abstract

This article examines various approaches used in numbers of empirical studies for measuring corporate social responsibility (CSR) and corporate financial performance (CFP) to find out measurement challenges. The study also investigates alternative strategic approaches for measuring CSR and CFP. In this study, various empirical research articles intensively reviewed to investigate which measurement approach is appropriate to incorporate in future research. It was found that CSR is being strategically utilized in many ways such as uni-dimensional to multi-dimensional in the empirical literature. Besides, multi-dimensional CSR measurement approaches employed in different forms like reputation indices, questionnaire-based survey, content analysis etc. and different in uni-dimensional approach. While firm financial performance measurement includes accounting-based variables, market-based variables and both the types of variables. The findings also show that no CSR measurement approach is without limitations. In addition, most of the approaches face two problems namely researcher's subjectivity and biasness selection of it which may affect the nature of CSR and CFP relationship results. This study also suggests that potential measures should be taken to overcome these limitations.

Keywords: Corporate Social Responsibility, Corporate Financial Performance, Reputation Index, Content Analysis, Measurement Approaches

Introduction

Corporate social responsibility (CSR) and corporate financial performance (CFP) measurement issues have been discussing across the world over the period of time by academicians and business managers due to equivocal nature of empirical results. The prior studies found the positive, negative, neutral or even curvilinear (e.g. U-shaped/inverted U-shaped) relationship between CSR and CFP. Orlitzky, *et. al.,* (2003) and Margolis, *et. al.,* (2007) conducted studies separately based on meta-analysis. The authors found that positive relationship is more common among the findings of the empirical literature. Remaining studies reveal negative

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and mixed results. Now a rationale question arises here, based on these equivocal results, how the notion of CSR and CFP are operationalised and estimated. The basic answer to this question is an inappropriate incorporation of measurement approach in their estimation.

Generally, CFP is more importantly measured in terms of profitability ratios retrieved from financial statements of the firm which are easily accessible and relatively standardised. But the measurement of CSR notion is more difficult due to several reasons. One of the reason is disagreement on the conceptualisation of the CSR definition (Dahlsrud, 2008), while another is multiple approaches to its measurement. This is because of information related to the concept are non-financial in nature. Basically, these are very limited to retrieve and their standardisation is problematic if they are reported (Tschopp and Nastanski, 2014). The next difficulty is its disclosure because in many countries CSR reporting is not mandatory but is voluntary in nature. India is an exception in this regard because now CSR spending up to specific limit and to publish a separate CSR performance report has become mandatory with the inception of the Company Act 2013.

The main objective of this article is to review various approaches used for measuring CSR and CFP constructs deployed in empirical research studies to find out measurement challenges. In order to investigate the alternative appropriate approach for measurement of CSR notion and CFP. One of the most significant contributions of this article is the extant empirical literature deploys a systematic study of merits and demerits of alternative approaches. Besides, another important contribution is to provide a proper guideline for measuring CSR in future and suggestions to cope with the shortcomings. Mainly two drawbacks identified which are intrinsic in most of the measurement approaches. These are researcher subjectivity and biases in selection. The structure of this paper is as follows: along with the introduction, the article starts by discussing the concept of CSR in section 2. In section 3, the empirical findings discussed related to the relationship between CSR and CFP followed by a critical review of different approaches used to measure CSR and CFP in section 4. Finally, discussion and concluding remarks discussed in section 5.

Concept and Definition of Corporate Social Responsibility (CSR)

Since the inception of CSR notion, there is not any consensus related to its definition, constructs, principles and even on constituent dimensions (Crane, *et. al.,* 2008). Dahlsrud (2008) reviewed the comprehensive literature and recognized 37 different definitions of CSR. He found great variations in CSR definitions. For example, Friedman (1970) articulated that 'the only social responsibility of a company is to increase its profits within the rules of the game'. In contrast, Davis (1973) argued that CSR requires 'consideration of issues beyond the narrow economic, legal and technical requirements of the company' (Galant and Cadez, 2017). These two definitions have contrary views, one definition argues that the corporation is solely responsible to enhance the wealth of its shareholders. While other argues that corporation should take into consideration the interests of other stakeholder groups rather than its shareholders.

Stakeholders include 'individuals or groups who benefited from or harmed by corporate actions' (Mele, 2008). Therefore, these wide range definitions and perceptions of CSR are undoubtedly varied among managers, firms and even ordinary people (Lau, *et. al.,* 2007). But some definitions depict consensus over the concern such as managers should look after the welfare of multiple stakeholder groups rather than focusing only on the short-term myopic goal of shareholders' wealth maximisation (Becchetti and Trovato, 2011). While another key area of CSR study includes social, economic and environmental pillars (Galant and Cadez, 2017). Companies are engaged in various CSR activities for several reasons which extend from pure philanthropy to compliance with institutional pressure from the external environment and explicit advantages like financial growth and better reputation (Lee and Shin, 2010).

According to Barnett and Salomon (2006), firms avail many benefits on being socially responsible such as to mobilise resources easily, to obtain skilled and quality employees, to enhance marketability for their products and services, to create unforeseen opportunities, to avail opportunities of competitive advantages. Weber (2008) also recognised five most crucial benefits of CSR for companies namely positive impact on firm's image and reputation, positive impact on employees' motivation, retention and recruitment, to cash cost-saving benefits, increase revenue from higher sales and market share and reduce risk. Thus it has been evident from the above-recognised benefits that at firm level CSR has macro-level effects. Skare and Golja, (2014) found that better contribution of socially responsible firms in an economy is playing a crucial role in higher economic growth. Firms CSR activities are also playing the significant role in determining country's economic growth and overall sustainable development.

Empirical Evidence on Relationship between Corporate Financial Performance (CFP) and Corporate Social Responsibility (CSR)

The key issue of debate in the field of corporate governance and management is the impact of CSR on firm's financial performance. In this regard, the traditional view holds that CSR is an extra burden on the firms for carrying out socially responsible activities which include investment for environmental protection and pollution reduction, packages for employees welfare and benefits, donations, sponsorships and scholarships to the community welfare etc. But the traditional view holds that these expenses will decrease firm's profitability and lead to 'competitive disadvantages' (Alexander and Buchholz, 1978). On the contrary stakeholder theory was propounded by Freeman in 1984 which holds the view that any stakeholder group can potentially affect the firm's profitability and firm's future too if they are not satisfied (Clarkson, 1995). In the line with this theory, managers should take into account the interest of all individuals and groups which have a stake in or claim on the firm (Mele, 2008) rather than focusing only on the shareholder's value maximisation (Ruf, *et. al.,* 2001). If they managed properly then the firm can survive for longer period of time. As satisfied employees will be motivated and perform effectively and efficiently, satisfied customers will be attracted more and willing to make repeated purchases of the products and services.

They will recommend the products and services to others, satisfied suppliers will provide discounts etc. (Galant and Cadez, 2017). Thus CSR will not only increase the satisfaction level of these stakeholders but also lead to improving financial performance (Aver and Cadez, 2009).

It is evident from the above discussion that theoretical rationale suggests both potentially positive and negative relationship between CSR and CFP. Besides this, some studies found neutral or even curvilinear (e.g., U-shaped) relationships. The main findings of the empirical literature are summarised in Table-1 which shows that some studies recognize a positive relationship between CSR and CFP.

Table-1: Empirical Studies Show Different Types of Relationship Between CSR And CFP

S. No.	Author(s)	Year of Study	Title of Study	Relationship between CSR and CFP
1.	S.A. Al-Tuwaijri, T.E. Christensen, and K.E. Hughes II	2004	The relations among environmental disclosure, environmental performance, and economic performance: A simultaneous equations approach	Positive Relationship
2.	R. Burnett and D. Hansen	2008	Eco-efficiency: Defining a role for environmental cost management	Positive Relationship
3.	O. Erhemjamts, Q. Li, and A. Venkateswaran	2013	Corporate social responsibility and its impact on firms' investment policy, organizational structure, and performance	Positive Relationship
4.	W. Rodgers, H. L. Choy, and A. Guiral	2013	Do investors value a firm's commitment to social activities?	Positive Relationship
5.	G. J. Alexander and R. A. Buchholz	1978	Corporate social responsibility and stock market performance	Neutral (No relationship)
6.	K. E. Aupperle, A.B. Carroll and J.D. Hatfield	1985	An empirical examination of the relationship between corporate social responsibility and profitability	Neutral (No relationship)
7.	McWilliams and D. Seigel	2000	Corporate social responsibility and financial performance: Correlation or misspecification?	Neutral (No relationship)
8.	N. Sun, A. Salama, K. Hussainey, and M. Habbash	2010	Corporate environmental disclosure, corporate governance and earning management	Neutral (No relationship)
9.	M. G. Soana	2011	The relationship between corporate social performance and corporate financial performance in the banking sector	Neutral (No relationship)
10.	P. L. Baird, P. C. Geylani, and J. A. Roberts	2012	Corporate social and financial performance re-examined: Industry effects in a linear mixed model analysis	Negative Relationship

S. No.	Author(s)	Year of Study	Title of Study	Relationship between CSR and CFP
11.	C.W. Peng and M. L. Yang	2014	The effect of corporate social performance on financial performance: The moderating effect of ownership concentration	Negative Relationship
12.	E. H. Bowman and M. Haire	1975	A strategic posture toward corporate social responsibility	Curvillinear Relationship
13.	M. L. Barnett and R. M. Salomon	2012	Does it pay to be really good? Addressing the shape of the relationship between social and financial performance	Curvillinear Relationship

Source: Result Summary based on Literature Review by Author

These studies suggest that firms on being socially responsible improve financial performance in terms of profitability. In addition, if CSR has a positive impact on CFP then socially responsible investments have also a positive effect on shareholders wealth maximisation (Moser and Martin, 2012). Therefore CSR works in favour of shareholders' wealth maximisation and increases the market value of shares of the firms. In contrast, other studies show negative relationship consistent with the view that social responsibility incurs additional costs and reduces the profitability of the firms. This finding also supports the conventional view articulated by Milton Friedman (1970). Such sort of investment behaviour is socially irresponsible because of one and only responsibility of the business manager to earn profit for its shareholders. Thus, the negative association between CSR and CFP can not be ignored from socially responsible corporate actions. Several management gurus believe that it is very important to be good corporate citizens even when doing so is at the costs of shareholders (Moser and Martin, 2012). Mackey, *et. al.,* (2007) strongly argued that shareholders should be ethical and may require CSR initiatives even at the cost them and deteriorate financial performance (Mackey, *et. al.,* 2007).

This was also found during the review of empirical literature that some of the studies have neutral (no relationship) relationship between CSR and CFP. These studies suggest that on being socially responsible, firms neither improve its profitability nor deteriorate it. Therefore, the positive and negative impacts of CSR on firm's financial performance apparently cancel themselves out. Whilst, some studies were found the U-shaped (curvilinear) relationship, Barnett and Salomon, (2012) found that firms with low CSR performance have high CFP, and firms with moderate CSR performance have lower CFP, while firms with high CSR performance have highest CFP. Very interestingly a prior study conducted by Bowman and Haire (1975) articulated an inverted U-shaped relationship between CSR and CFP. This study shows that moderate CSR is related to the Highest financial performance whilst low and high CSR performance is related to lower financial performance.

Therefore, all results taken together from the overall empirical review of the literature, it does not provide conclusive results on the nature of nexus between

CSR and CFP. The remarkable explanations for such equivocal findings have been offered by several authors (Surroca, *et. al.,* 2010). Ruf *et. al.,* (2001) argued that the poor theoretical foundation of the CSR concept. The omission of relevant variables in model specifications (McWilliams and Seigel, 2000). The lack of clear direction of causality (Waddock and Graves, 1997). While some authors argued that these equivocal results are because of measurement issues (Davidson and Worrell, 1990; Griffin and Mahon, 1997), and sampling limitations (Van-Beurden and Gossling, 2008). Thus, empirical studies incorporated for review in this study focused mainly on operationalisation and measurement issues related to the existence of a relationship between CSR and CFP. Therefore these are explored in the following section in more detail.

Review of Methods for Measuring the Corporate Social Responsibility (CSR)

The measurement of CSR notion is very difficult because of lack unanimity on the meaning of its theoretical foundation and concept (Dahlsrud, 2008). Besides, CSR is multidimensional with relatively heterogeneous dimensions (Carroll, 1979). As a result of these difficulties such as lack of unanimity on the theoretical foundation as well as conceptualisation, several approaches and methods have been used to measure CSR performance in empirical literature. These approaches according to their frequency of use are as follows (a) reputation indices (b) content analysis (c) questionnaire based surveys and (d) one-dimensional measures. In the following sub-section, an attempt has been made to explore these measurement approaches in detail.

Reputation Indices

The most commonly used approach for measuring CSR is reputation indices. In this method, data is compiled by specialised rating agencies for measuring CSR performance. With this purpose major indices have been incorporated in several studies such as Dow Jones Sustainability Index (Skare and Golja, 2012), Fortune Magazine Reputation Index (Preston & O'Bannon, 1997), MSCI KLD 400 Social Index (Erhemjamts, *et. al.,* 2013), and Vigeo Index (Gired-Potin, *et. al.,* 2014). Besides these major indices, there are many national indices which have been used in different studies such as CFIE-French Corporate Information Centre for French Companies (Ducassy, 2013) and Respect Index for Polish Companies (Lech, 2013).

Reputation Indices include the multi-dimensional nature of CSR. These dimensions have been identified and shown in Table-2 given below. In these identified dimensions, key themes are common across all indices such as employees welfare, natural environment, social welfare etc. In the words of Griffin and Mahon (1997), Fortune indices and MSCI KLD indices are revealed similar attributes. Among many used indices for measuring CSR, MSCI KLD is more reliable because of its comprehensive and prominent data on stakeholder management (Coombs and Gilley, 2005), and public data availability (Deckop

et. al., 2006). While other authors claim that Fortune is the most estimable, comprehensive and comparable index (Johnson and Houston, 2000; McGuire, *et. al.,* 1988). In addition, the Vigeo Index is also mostly used when authors study European countries (Gired-Potin, *et. al.,* 2014; Van de Velde, *et. al.,* 2005).

Table-2: Corporate Social Responsibility Dimensions Incorporated by Major Indices

Dow Jones Sustainability Index	MSCI KLD 400 Social Index	Fortune Magazine Reputation Index	Vigeo Index
Social Dimensions	Community and Society	Social Responsibility	Community involvement
Social Reporting	Customers	Use of corporate assets	Human resources
Corporate Citizenship / philanthropy	Employees and supply chain	People Management	Corporate Governance
Human-capital Development	Governance and Ethics	Innovation	Business Behaviour
Industry-specific criteria	Environment	Quality of Management	Human Rights
Labour practice indicators		Quality of products/ services	Environment
Talent attraction and retention		Long term investment value	
Economic Dimensions		Financial Soundness	
Code of conducts/compliance/anti-corruption and bribery		Global competitiveness	
Corporate governance			
Risk and Crisis management			
Industry specific criteria			
Environmental Dimensions			
Environmental Reporting			
Industry specific criteria			

Source: Compiled by Author

Dow Jones Sustainability Index is the most healthy index in terms of underlying dimensions such as risk and crisis management and geographical area covered in the Index shown in Table-3. Artiach, *et. al.,* (2010) also recognised Dow Jones Sustainability Index is one of the best as it includes all industrial sectors. But it is the matter of discussion which index is the best corporate social responsibility measure. The most important benefits of indices are easily availability of data and comparability of firms in a systematic manner. The number of scholars critically analysed the various indices and they found many shortcomings in them. As they are generally compiled by private firms and they have their own procedures and methods of the index creation. They do not apply necessarily scientific methods (Graafland, *et. al.,* 2004; Unerman, 2000).

Further, rating agencies merely provide an aggregated score of CSR. They may create problems for researchers as sometimes they are interested only in specific CSR dimensions. Another important shortcoming is rating agencies incorporate a limited number of firms. In addition, many indices simply cover a particular region or country in terms of geographical area. Table-3 depicts information pertaining to the geographical area of the indices expressed in Table-2. Additionally, coverage of firms is also limited in terms of a number of rated firms. Basically, reputed indices concentrate on large and publicly listed firms.

Table-3: Corporate Social Responsibility Indices based on Geographical Location

Index	Geographical Location (Index Coverage)
Dow Jones Sustainability Index (DJSI)	1. Dow Jones Sustainability Index (DJSI) World • Dow Jones Sustainability World • Dow Jones Sustainability World Enlarged • Dow Jones Sustainability Emerging Markets 2. Dow Jones Sustainability Index (DJSI) Regions • Dow Jones Sustainability Asia/Pacific • Dow Jones Sustainability Europe • Dow Jones Sustainability North America 3. Dow Jones Sustainability Countries • Dow Jones Sustainability Australia • Dow Jones Sustainability Canada Select 25 • Dow Jones Sustainability Korea • Dow Jones Sustainability Korea Capped 25 percent • Dow Jones Sustainability Chilli
MSCI KLD 400	4. United States of America only
Fortune Magazine Most Admirable	5. United States of America's most admirable firms 6. World's most admirable firms
Vigeo Ratings	7. The Euronext Vigeo Indices. • Euronext Vigeo World 120, Euronext Vigeo Europe 120, Euronext Vigeo Eurozone 120, Euronext Vigeo EM 70, Euronext Vigeo US 50, Euronext, Vigeo France 20, Euronext Vigeo United Kingdom 20 and Euronext Vigeo Benelux 20
Ethibel Sustainability Indices (ESI)	8. The Ethibel Sustainability Indices (ESI) • ESI Excellence Global and ESI Excellence Europe

Source: MSCI ESG Indexes (n.d.); RebecoSam Sustainability investing, 2016; Vigeo Eiris Rating (n.d.); Fortune, The World's Most Admired Companies (n.d.)

While, some of the reputed indices like MSCI KLD index and the Dow Johnes Sustainability index exclude firms operating in an unsustainable manner such as alcohol, firearms, porn entertainment, tobacco etc. Even though many socially and environmentally responsible firms may not include due to their geographical location, industry affiliation and firm size (Adam and Shavit, 2008).

Content Analysis

The second most commonly used index for measuring CSR performance is content analysis. 'Content analysis normally include information determined construct of interest and codifying qualitative information to derive quantitative scales that can be used in subsequent statistical analyses' (Galant and Cadez, 2017). Content analysis is different from other indices with respect to many dimensions appraised and coding sophistication. The simplest way of coding is the count of sentences and words (Aras, *et. al.,* 2010), within annual reports and other communication publications on the specific CSR dimensions under consideration with assigning binary variables ('0' and '1'). Several dimensions of CSR are being appraised, a binary score then assigns to each dimension then after an integrated score can be determined to calculate a composite index (Abbott and Monsen, 1979). A more sophisticated way of coding is pre-specification of CSR dimensions of interest and assign interval scores just like Likert Scale for each CSR dimension in terms of Social Involvement Disclosure Scale (SIDS). Based on this method, Abbott

and Monsen (1979) create an index with twenty-four CSR indicators divided into six categories such as equal opportunities, environment, personnel, community involvement, product and others.

Recently, Yang *et. al.,* (2009) ranked firms on the basis of five different CSR dimensions namely environment, employee relations, product quality, shareholders relations, customers relations and community relations on a 0-5 ranking scale (where 0 = fulfilment of no criteria and 5 = fulfilment of all criteria). Karagiorgos (2010) and Chen, *et. al.,* (2015) in their study did content analysis based on GRI reports. More specifically, Karagiorgos (2010) incorporated twenty-six indicators derived from GRI reports which were divided into two groups i.e. social and environmental indicators respectively and rated them on 0-3 rating scale such that 0 if the indicator is not taken into account while 3 if the indicator is fully taken into account. In the same way, Chen, *et. al.,* (2015) incorporated forty-five indicators of GRI reports. They scored these indicators on 1-5 rating scale as 1 if indicator not reported while 5 if indicator fully reported by multiple raters. The most important benefit of this methodological approach is flexibility for the researcher who can choose CSR dimensions of his/her interest. They can collect data accordingly to their dimensional interest and also do coding of their collected data numerically for the purpose of statistical analysis. Whilst, this method also has some limitations as the researcher's subjectivity embedded at all levels of the research process. Another disadvantage is window dressing in collecting information. Actually, CSR reporting are largely voluntary in nature in most of the developing countries but in India, it has been mandatory with the inception of the Companies Act 2013. Therefore most of the business organisations fail to disclose reports on their CSR activities even if they do engage in them.

Survey Method based on Questionnaire

Survey method based on questionnaire is basically used where a firm not rated by any of rating agency. This method is also used where firms annual reports are not available for doing content analysis. In these cases researchers need to collect primary data about CSR by sending questionnaires to corporate managers, CEOs, directors of CSR or conduct interview with them personally. At the earlist a survey method for collecting information by questionaires related to CSR was used by Aupperle, *et. al.,* (1985). The components of Carroll's (1979) three dimensional model of CSR namely economic, legal, ethical and discretionary were used with eighty indicators in 20 sets of statements (each set include four statements such that one for each component of CSR) for calculating CSR performance. During survey method, respondents were asked questions to established the relationship between CSR and CFP. Rettab, *et. al.,* (2009) is associated with different constructs for collecting data on CSR and CFP with the help of questionnaire.

Recently, a study conducted by Gallardo-Vazquez and Sanchez-Hernandez (2014) developed a CSR measurement scale anticipated to appraise socio-economic and environmental dimension of CSR. Consistent with the content analysis method, this method also have some advantages and disadvantages. This method also provide great flexibility for researchers like content analysis in terms of dimensional interest and choice of collecting data for these dimensions. Similarly, this method also have limitation like bias responses from the respondents.

Generally, the biasness occurs at two levels, first more socially responsible firms are more likely to respond than firms those are less socially responsible (Cadez and Czerny, 2016). Second, respondents show attitude biasness which is reflected from them as they may provide socially desirable answers while their actual behaviour may differ (Epstein and Rejc-Buhovac, 2014). An alternative approach for overcoming this drawback may be to collect data not only from enterprises but also from their stakeholders.

One dimensional Measures

One dimensional measure approach focus only on one dimension of CSR such as environment management or philanthropy. Environmental activities include pollution control investment data (Peng and Yang, 2014), use of carbon reduction strategy (Lee, 2012; Liu, 2012; Cadez and Czerny, 2016; Liu and Liu, 2016), adoption of world environmental standards (Dowell, *et. al.,* 2000), eco-control usage (Henri & Journeault, 2010), environmental proactivity (Primc and Cater, 2015), the ratio between toxic waste recycled and generated (Al-Tuwaijri, *et. al.,* 2004), implementation of environmental management accounting (Mokhtar, *et. al.,* 2016) and environmental sustainability policies (Naranjo-Gil, 2016) etc.

Many studies have been conducted related to philanthropic activities such that donations (Lin, *et. al.,* 2009), public health policies (Naranjo-Gil, *et. al.,* 2016) and growth in charitable contributions (Lev, *et. al.,* 2010). This construct also have some advantages and disadvantages like others, one of the most important advantages is data availability in one dimensional measure of indices along with minimum data collection efforts and easily firms' comparison. Albeit the use of one dimensional construct is theoretical problematic as prior studies have shown that CSR is multidimensional concept (Carroll, 1979). Whilst one firm focus on one dimension such as employees welfare and neglect the other such as environmental protection then it is tollay unjustified. Therefore a multidimensional operationalisation will consider CSR as mediocre while one dimensional operationalisation will detect either a low or high CSR and both are unjustified in each aspect of business organisation.

Review of Constructs Incorporated for Measuring Corporate Financial Performance

Infact, Corporate financial performance generally measures with market based and accounting based indicators. The most frequently used indicators for measuring corporate financial performance are given in Table-4.

Table-4: The Most Commonly Used Measures of Corporate Financial Performance

S. No.	Market based Indicators	Accounting based Indicators	Both accounting and market based Indicators
1.	Stock Returns	Return on Assets (ROA)	Tobin's Q
2.	Change in Stock Returns	Return on Equity (ROE)	Market Value Added (MVA)
3.	Market Value of Firm	Return on Sales (ROS)	-
4.	-	Net Income	-
5.	-	Net Operating Income	-
6.	-	Return of Capital Employed (ROCE)	-

Source: Indicators identified by Author during literature review

Albeit, each indicator of measuring financial performance have both positive and negative characteristics. One of the common benefit of accounting based measure is they are easily available and are also comparable across the firms.

While the most important advantage of market based measures is their contemporariness meaning of this is they reflect changes in CSR performance faster than that of accounting based measures. Like other measures both the type of measures have advantages and dis-advantages such that accounting based indicators are historical while total categories of these indicators fail to take firm size into account e.g. net income (Al-Tuwaijri, *et. al.,* 2004).

Similarly, accounting indicator like return of assets (ROA) may be proved biased if sample includes firms from different industries due to varying age and structure of size of assets across industries. In the same way the most important disadvantage of market based indicators is they are available only for public listed companies. Further market based measures inevitably incorporate systematic market characteristics such as recession etc. they are not firm specific while accounting based measures of financial performance are more sensitive to firm specific perceptions of CSR (McGuire, *et. al.,* 1988). It has been evident from literature review that some researchers have incorporated both the type of measures of financial performance such as the ratio between market value to total assets (Tobin's Q) or market to book value of assets (Garcia-Castro, *et. al.,* 2010; Rodgers, *et. al.,* 2013). While others have also tried to derive a comprehensive measure of corporate financial performance with the help of combining some of existing measures to form composite index. Peng and Yang (2014) employed factor analysis to integrate existing financial measures such as return on assets and return on equity, earning per share, cash flow to assets to form a composite single index. Likewise, financial health of the firm (measured by Zmijewski Score – a construct based on firm's profitability, liquidity and leverage ratio) was another measure used as proxy for accounting based measure of profitability of the firm. (Rodgers, *et. al.,* 2013). It is noteworthy here that in recent there has been a tendency to use more than one sort of measure of corporate financial performance.

Discussion and Conclusion

The impact of corporate social responsibility on corporate financial performance has long been a debatable issue for corporate personnel (Cochran and Wood, 1984), researchers and academicians. Despite myriad empirical investigation on the nature of relationship literature be unsuccessful to provide conclusive results.

The research study focus on operationalisation and measurement aspect of research designs in the existing literature concerned with the relationship between corporate social responsibility and corporate financial performance (Griffin and Mahon, 1997). The literature reviewed in this present study recognised a number of approaches applied to establish the relationship between CSR and CFP and ascertain their merits and demerits. The main merits and demerits of these approaches are given in Table 5.

Table-5: Merits and Demerits of Alternative Corporate Social Responsibility and Corporate
Financial Performance Measurement Approaches

Measurement Approaches	Merits	Demerits
For Corporate Social Responsibility Measurement		
Reputation Indices	• Data availability • Firms' comparability • Multidimensionality	• Not scientific • Compiled by private agencies • Limited firms coverage • Dissimilarities in geographical location, firm size, industry type etc.
Content Analysis	• Flexibility of Choice • Dimensions as per interest	• Research subjectivity • Data not disclosed • Impression management • Window dressing of information
Survey Method (Questionnaire)	• Flexibility of Choice • Dimensions as per interest	• Research subjectivity • Measurement error • Not proper response • Hide important information by respondents
One Dimensional Measurement	• Easy data availability • Comparability of firms	• Theoretical invalidity • Biased
For Corporate Financial Performance Measurement		
Accounting-based financial Indicators	• Data availability • Comparability of firms	• Historical data • Window dressing of information
Market-based financial Indicators	• Data Contemporariness	• Availability of data only large and listed firms • Coverage of systematic factors

Source: Compiled by Authors based on literature review

It is depicted from the Table 5 that there is no perfect measure to estimate CSR and CFP. While the measurement issues are more pertinent to CSR because financial reports has a long history and also standardised.

Albeit, CSR disclosure or reporting is a more recent development where few standardisation has been achieved so far (Tschopp and Nastanski, 2014). Several reputation indices carry merits of availability of data and comparability across firms because of their standardized methods to compile them. Therefore, they are intensively used in empirical enquiry concerned with the nature of CSR and CFP relationship (Soana, 2011). However, these indices are far away from ideal measures of CSR. One of the most important demerits of them is that they are generally compiled by private firms and they have their own agendas. They do not necessarily use rigorous methods that are usually expected in scientific research (Graafland, *et. al.,* 2004). In addition another major drawback is an appraisal of limited coverage of firms. Agencies which are compiling and calculating indices usually focus on large, listed and well-known firms. This construct in selection of firms is bias in terms of great social pressure to be socially responsible.

Thus they are likely to perform better in this regard as less visible firms (Henriques and Sadorsky, 1999). Content analysis has the advantages of more flexibility to the

researcher who can select himself/herself the dimension of CSR according to his/her interest, collect information related to the dimension and code them in order to create quantitative scores for analysis. But the main problem of this constructs is researcher's subjectivity that may compromised the reliability and validity of the findings. Albeit subjectivity is important at all levels of research process, another problem embedded to non-disclosure of data. In addition the issue related to this approach is management impressions (Weber, 2008) which mean manipulation in reported information, meaning that what is reported may be different from as what they are actually being done. Survey method through questionnaire is same as content analysis in terms of advantages even it is more advance in order to collect information from those companies they do not disclose their data by their reports publicly. Nonetheless the same approach faced the problem of subjectivity for researchers. As if questionnaire is not well designed in order to get valid and reliable results due to measurement error (Turker, 2009). In this approach the data collection is so sensitive as the answers of some questions are more socially acceptable rather than other answers (Epstein and Rejc-Buhovac, 2014). In the last but not least the problem of biasness in responses from respondents. It is well stable finding of survey method that better performing firms are more likely to respond rather than poor performing firms (Cadez and Czerny, 2016).

Finally, the method of one dimensional measure is often used because they are voluntarily available and comparable across the firms whereas this method of measuring CSR performance is theoretically invalid because of CSR is multidimensional phenomenon (Carroll, 1979). In fact one dimensional measure may also provide false conclusions as a particular firm may perform better in one CSR dimension and poor in another dimension, yet this construct is also failure to detect such incidences. Therefore, it is noteworthy in above discussion the incorporation of any measurement approach for CSR performance is not without disadvantages. They may influence potentially the association between CSR and CFP. But the two problems recognise to be inherent in all approaches, first the problem of researchers' subjectivity as this is researcher who selects variable, models and statistical tests to examine the association between the CSR and CFP. Hence, findings can be invalid even if the data is retrieve from reliable and archival sources. The next one is biasness in selection of indices because of reputation indices normally include only those firms which are operationalising under greater pressure to be socially responsible (Epstein and Rejc-Buhovac, 2014; Henriques and Sadorsky, 1999). Whilst, firms which more socially responsible are disclosed their information publicly which prerequisite for conducting content analysis. (Abbott & Monsen, 1979). Similarly, more socially responsible firms also responsd to questionnaires of survey method related to CSR (Cadez and Czerny 2016).

Thus all the approaches of CSR performance measures found to be biased to investigate positive relationship between CSR and CFP. These problems and shortcomings can be overcome through precautions as researchers subjectivity can be overcome by retrieving data from standardised CSR reports. Ramanathan (1976) articulated that corporate social accounting should be implemented with the aim of providing required information about firm's social performance

systematically, even though we are today fail to iron out the problem of accepted CSR reporting standard. However, many standardisation initiatives are in progession world wide e.g. Global Reporting Initiative (GRI), United Nation's Global Compact Communication of Progress, Accounting Ability's AA1000 and ISO 26000 etc. The potential solution of the problem of biasness in responsed by the respondents is mandatory disclosure of information like India. Albeit, many firms are publishing stand-alone CSR reports has increased drastically (Dhaliwal, *et. al.,* 2012), in most of the countries CSR disclosure is not mandatory (Tschopp and Nastanski, 2014). In the European Union, the new directives on disclosure of non financial and diversify information has been mandated which into effect in 2017 (European Parliamentary Council, 2014), whereas in 2013, India has already made enactment of mandatory disclosure under the Companies Act, 2013 (GOI, 2013).

The review of operationalization and measurement approaches for the CSR concept reveals that all the methods deployed in empirical literature suffer from some shortcomings that may potentially influence the investigation of have an effect on the examination of CFP-CSR relationship. It was found in the literature that the problems inherent in most of the approaches are researchers subjectivity and selection bias. Researchers argue that potential solution of former is standardisation of CSR reporting whereas laters' mandatory disclosure of CSR information. In this way standardisation and disclosure will not only be beneficial for testing validity of CSR-CFP relationship but also for taking decisions and making policies by policy makers and various stakeholder groups(Galant and Cadez, 2017; Henriques and Sadorsky, 1999 Hillman and Keim, 2001).

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Acknowledgements

I pay heartfelt thanks from the bottom of my heart to my supervisor, Prof. (Dr.) Indira Dutta, Dean School of Social Sciences, Central University of Gujarat for her insightful comments and suggestions in completion of this research article.

ISSN 2249 - 9040 Volume 8, No 1, January-June 2018 pp. 36-56

Economic Analysis of Municipal Solid Waste Management in Kalimpong Town, West Bengal

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Abstract

Waste is no longer treated as a burden but a resource with many countries converting its waste into energy, raw materials and composts. This study is an attempt to estimate the economic prospects of the municipal solid waste management in Kalimpong Town. A random sampling technique was used to select 170 households from the 23 wards under the Kalimpong Municipality. With the aid of structured questionnaire information on level of public awareness and participation for solid waste management was obtained. Simple descriptive statistics like mean and percentage was used to analyze the obtained data. The findings of the study suggests that waste management can be used to generate revenues in the study area with compost worth estimated Rs 3 Lakhs being generated and almost 153 new jobs being created.

Keywords: Municipal Solid Waste, Cost, Revenue, Public Participation, Kalimpong

Introduction

Rapid growth in developing countries and increase in population in recent times has led to acceleration in the pace of urbanization (Ahmad, Khan, & Naeem Ur Rehman, 2009). Increasing quality of life and high rates of urbanization has had an unintended and negative impact on the urban environment, one of which is generation of wastes far beyond the handling capacities of urban government and agencies (Adedipe, Sridhar, Baker, Verma, Faruqui, & Wagner, 2005), leading to insufficient or improper waste management. Moreover the problem of waste management is more aggravated in developing countries where the conditions, issues and problems of waste management are different to that of the developed countries. Even though the volume of waste generated by the developed countries are much larger in comparison to the developing countries, most of the developed countries have developed or are in the process of developing adequate facilities,

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infrastructures, competent government institutions and bureaucracies to manage their wastes. Developing countries on the other hand are still in the transition towards better waste management and therefore have insufficient and improper waste management system (Chopra, Prasad, & Rajput, 2009).

Solid wastes maybe sub-divided into five categories based on the source of their generation as follows:

- Household waste or Municipal waste which consists of waste generated as a consequence of household activities.
- Biomedical waste or Hospital waste which includes pathological, anatomical and infectious wastes, which are produced from health care facilities and medical labs.
- Hazardous waste or Industrial waste, include those from industrial processes, mining extraction; from pesticide based agricultural practices etc.
- Agricultural waste which is composed of organic wastes (animal excreta in the form of slurries and farmyard manures, spent mushroom compost, soiled water and silage effluent) and waste such as plastic, scrap machinery, fencing, pesticides, waste oils and veterinary medicines.

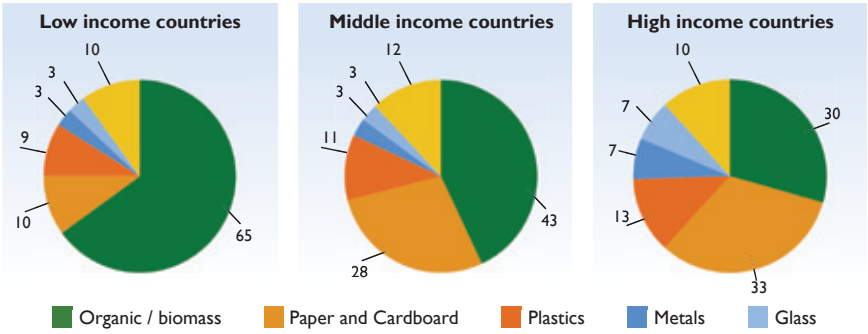
Radioactive waste which mainly arises from nuclear power plants, nuclear testing labs, industrial establishment etc. (Chopra, Prasad, & Rajput, 2009)

This study shall particularly deal with MSW of Kalimpong town and the issues surrounding its management, since off lately the town has been facing the brunt of the growing volumes of MSW. The World Bank has expressed alarm over the growing piles of municipal garbage across cities of the world and the problems related to its disposal (Moyna, 2012). In definition as per the Indian Municipal Solid Waste Management and Handling Rule 2000 (NSWAI), MSW is defined as waste which includes commercial and residential wastes generated in municipal or notified areas in either solid or semi-solid form, excluding industrial hazardous wastes but including treated bio-medical wastes. According to (USEPA, 2013), MSW consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances which comes from our home.

Though the term MSW is universal, it has different concern depending upon the location and living standard of the people (Sahu, 2007). In case of developing countries like India biodegradable waste takes up the higher share of the total MSW generated. As per the NSWAI 51 per cent of the total MSW generated in India consists of bio degradable waste, whereas in developed countries like the United States of America the non bio degradable take up the larger share (65 per cent) according to (USEPA, 2013).

Figure 1 below shows the composition of MSW according to the National Income of a country. From the figure it can be seen that, more a country moves towards higher National Income or in other words more economic growth, lesser is the percentage of organic waste and higher the share of inorganic waste in the MSW composition.

Figure-1: Composition of MSW (in percentage) by National Income



Source: http://www.unep.org/greeneconomy/Portals/88/documents/ger/8.0_Waste.pdf.

The volume of MSW generated in a region is largely determined by factors such as population in any given area, rate of urbanization and Goss Domestic Product per capita. Population is undoubtedly the most important factor as people are the major creators of waste, especially MSW. According to a report published by the UN, between now and 2025, the world population will increase by 20 per cent to reach 8 billion inhabitants (from 6.5 billion) out of which 97 per cent of the growth will happen in Asia and Africa which includes some of the poorest countries who are not equipped to deal with the problems of population explosion one of which is increase in waste generation (Mavropoulos, 2011) (Bhada-Tata & Hoornweg, 2012). This figure has at present increased to about 3 billion residents generating 1.2 per kg of MSW per person per day i.e., 1.3 billion tonnes a year (UNEP, 2011). In a little over a decade, the global MSW generation is projected to further increase by 70 per cent from the current 1.3 billion tonnes per year to 2.2 billion tonnes in 2025 (UNEP, 2011).

Besides over population and urbanization, a remarkable increase in GDP/c especially in developing countries has been an important factor leading to generation of large volumes of waste. A correlation between the amount of municipal waste and the GDP of the country has been found to exist. Higher the GDP of a country, higher is the quantity of waste produced (Chopra, Prasad, & Rajput, 2009). Using the macroeconomic data from 30 OECD countries it has been estimated that a 1 per cent increase in National Income leads to a 0.69 per cent increase in MSW amount (Mavropoulos, 2011). In 2025, world production will have doubled in relation to the present times and by 2050 the world production may again have doubled compared to 2025. The global average GDP/c around 2025 will be more or less one and a half times the current one (Chabukdhara, Kaushal, & Varghese, 2012) meaning that waste generation will also increase more than the current times.

In India too, with a population of over 1.21 billion (Census of India, 2011) waste management has become a matter of great concern to most Municipal Corporations. Besides increase in population, a remarkable increase in GDP has further led to increased waste problems (Mavropoulos, 2011). Over the decades, the socioeconomic conditions in India have been increasing. For example, per

capita income of India has increased from US$ 17.22 to US$ 1165.00 and Gross Domestic Product from US$ 9382.67 million to US$ 1876.8 billion during 1971–2014 (Trading Economics, u.d). Studies have indicated that for every ruppess 1000 increase in income the solid waste generation increases by one kilogram per month. (Chabukdhara, Kaushal, & Varghese, 2012).

There are various negative impacts that are caused due to improper waste management. It leads to various environmental and health problems and also adversely affects the economy of a nation. Each year an estimated 11.2 billion tonnes of MSW are collected worldwide of which the organic fraction of the municipal waste contributes to about 5 per cent of the total GHG's emissions, known to be responsible for climate change (UNEP, 2011). The non biodegradable substances present in the MSW like polythene bags, block drain pipes as well as contaminate the water supply (Jhingan & Sharma, 2011). Unsanitary landfills also contaminate ground and surface resources when the leachate percolates to the water table or is washed as runoff during rains (Annepu, 2012).

Management of solid waste also poses economic problems as it requires users to make choices and to resolve conflicts of interests (Jhingan & Sharma, 2011). Further it can lead to depreciation of the value of property nearer to dumping sites or incinerators, as no one wants to live near a landfill (Hosetti & Kumar., 1998). As regions urbanize, it becomes more difficult to find land that is suitable for dumping and amenable to the surrounding population (CMAP, 2008). It means that pollution is a problem of scarcity in terms of waste disposal capacity. The main problem of choice is how to utilize the scarce resources in relation to society's needs. This problem is solved through the market forces which can act as a helpful tool in determining the value of these scarce resources in the most rational manner (Jhingan & Sharma, 2011). All these above stated factors make proper, efficient and immediate management of MSW a major issue both in the developing and developed nations as it is essential not only for the economy of a nation, but for its ecology and environment as well as well-being of its population.

and agencies (Adedipe, Sridhar, Baker, Verma, Faruqui, & Wagner, 2005), leading to insufficient or improper waste management. For example per capita income of India has changed from US$ 17.22 to US$ 1165.00 and GDP from US$ 9382.67 million to US$ 1876.8 billion during 1971–2014 (Trading Economics, u.d). Studies have indicated that for every Rs 1000 increase in income the solid waste generation increases by one kilogram per month. (Chabukdhara, Kaushal, & Varghese, 2012). In most of the developing countries like India practices of waste management are mostly non prevalent and open dumping or burning of waste are the most common practices followed. Collection rates are lower than 70 per cent, with more than 50 per cent of the collected waste disposed through uncontrolled land filling and about 15 per cent processed through unsafe and informal recycling (UNEP, 2011). Very limited funds being provided to the SWM sector by the government(He, Kamata, Kim, & Wang, 2011). Lack of financial resources and infrastructure to deal with waste creates a vicious cycle of waste mismanagement.

Financing waste management programs bears burden to the municipalities or the urban local bodies as waste management still at large is a non market activity. There is an estimated global shortfall of US$ 40 billion in financing for the MSW

sector (World Bank, 2014). Lack of proper waste management leads to loss of value, the world market for municipal waste from collection to recycling is worth an estimated US$ 410 billion a year, but however only a quarter of the total municipal waste produced worldwide each year are recovered and recycled (UNEP, 2011).

Proper waste management can act as a source of revenue for the people, local governments and the country as a whole. Thus it is imperative that countries start treating waste as a resource and tapping in on its value. In countries like the United States of America, waste management is a $43 billion industry employing 202,937 Americans (Delta Institute, 2014). However in India, it still at large a non market activity with problems arising from collection of refuse, as household waste is thrown indiscriminately in the open to its disposal.

Public participation at large is crucial for effective working of a waste management system. However intensive public participation and involvement would only be made possible if the households were aware of the underlying concerns on proper SWM (Ebreo, Hershey, & Vinning, 1999). Absence of segregation at the source in Indian households makes it very hard to recycle the collected waste and gain value from it. At present mixed waste composting is done in India which generates only 6 to 7 per cent of compost form the total materials with the remaining percent again land filled (Annepu, 2012). Indian loses a total of 9.6 Million Tonnes i.e., approximately Rs 48,000 million[1] of compost generation due to lack of source segregation and 6.7 Million Tonnes per year of recyclable material which could have been used as secondary raw materials and used to earn revenue (Annepu, 2012).

It should be noted here that the composition of waste in India is such that the organic share is higher than the inorganic and therefore has a great potential of being converted into compost. Various projects are being undertaken all around the world to recover value from waste, like SEMASS, a waste-to-energy facility in Massachusetts, in the US, which uses 1 million tonnes of MSW to generate 600 million kilowatt-hours of electricity every year and recycles 40,000 tonnes of metals (Kaushal 2012). Likewise in India too many compost plants which have been set-up but have encountered initial failures leading to various plants being shut down. Ten aerobic composting (MBT) projects in 1970s, a Waste to energy project in 1980s, a large scale biomethanation project, and two RDF projects in 2003 have failed. Aerobic composting is the most widely employed SWM technology in India as Anaerobic digestion of MSW on a large scale does not work in India due to the absence of source separation of waste. It is estimated that up to 6% of MSW collected is composted in various MBT facilities. Even though composting of mixed wastes is a better solution compared to landfilling or openly burning those wastes, compost obtained from such MBT facilities was found to be of low quality and to contain toxic heavy metals (Annepu, 2012)

Thus a comprehensive approach is required for undertaking a sustainable SWM policy or program which undertakes all these factors that is leading to the failure of SWM at the current system. SWM has many benefits some of which are environmental, economical, and land use related. Proper waste management

1 Taking the value of 5000 per tonne or 5 per kg.

can help control the problems of environmental hazards. Recycling allows post-consumption materials to replace virgin resources in manufacturing, thus reducing the need for more trees or oil needed to produce paper products and plastics. Recycling and composting also provides a more environmentally friendly alternative to dumping of yard leading to reduction in landfill space consumed. Scarcity of lands for landfills is one of the major problems for many municipalities and waste disposing authorities around the world as with the ever growing population in the world; demand for lands is steadily increasing (CMAP, 2008).

Economic benefits ranges from consuming the recycled materials which may lead to reduction of production costs, depending on the reuse of the materials as well as creation of a sustainable supply of raw materials (CMAP, 2008). It leads to increase in capital formation as reuse and recycling leads to revenue generation since, value is generated form products otherwise considered to have no value. Employment generation is another benefit that can be generated form waste management. Also when waste management becomes a market activity and is seen as a profit generating option, it will start attracting various investors who can take the pressure of waste management from the local governments and invest the needed capital for waste management activities.

Methodology

The study, which provided the basis for this paper, covered Kalimpong town located at an in the Northern region of the state of West Bengal with an area of 8.6 Sq. Km comprising of 23 municipal wards and a population of 46138 (Census of India 2011). The rationale behind the selection was due to the fact that MSWM has emerged as one of the major problems in the town of Kalimpong for the past few years.

Data were collected using both the primary and secondary source. A total of 170 households from the selected 10 wards out of the total 23 wards under the Kalimpong Municipality were randomly selected for the household survey. The information regarding the amount of organic and inorganic waste generated, revenue generated and operational cost incurred for waste management by the Kalimpong Municipality was obtained from the Kalimpong Municipality Annual Report 2013. Primary data was collected by conducting interviews with the waste pickers and scavengers by visiting various scrap dealers in the town of Kalimpong. The principle component of this study is to understand the monetary benefits that can be generated from waste management activities that could be undertaken in the study area. Simple descriptive statistics like mean and percentage was used.

An Overview of the Study Area

Introduction of the Study Area

Kalimpong town is located at an elevation of 4,091 ft (1,350m) along the ridge of one of the foot hills of the Himalayan Range, in the Northern region of the state of West Bengal. The main town or bazaar is situated at 3,933 feet above sea level flanked on either side by higher grounds, on the south by the hill of Durpin, about

4,500 feet above mean sea level and on the north-east by Deolo Mountain 5,590 feet above mean sea level (Dash, 1947). The hill range is surrounded by Teesta River on the West and by River Relli on the South-Eastern side. It is home to the ethnic Nepalese, indigenous ethnic group and non-native migrants from other parts of India. The town also is a religious centre of Buddhism (Biswas, 2013). Figure-2 below, shows the location of Kalimpong Town on the Indian map.

Figure-2: Location Map of Kalimpong Town

Source: http://commons.wikimedia.org/wiki/File:Kalimponglocation.png (accessed on 24th of May 2014).

Kalimpong town is the Sub divisional Headquarters of Kalimpong Subdivision of Darjeeling District and covers an area of 8.6 Sq. Km comprising of 23 municipal wards. The wards are further sub-divided into four zones namely zone A, B, C and D (Kalimpong Municipality Annual Report, 2013). Fig. 3 below, shows the map of Kalimpong town along with its 23 municipal wards.

Figure-3: Map of Kalimpong Town Along with its 23 Wards under the Kalimpong Municipality

Source: Kalimpong Municipality

Kalimpong Municipality – Composition, Powers and Functions

Kalimpong Municipality was established in 1945 which extended over the Development Area, the bazaar and the Mission Compound covering 3.35 sq. miles or 8.68 sq. km. The Municipality comprised of 10 municipal wards at that time which was raised to 15 during 1954 (Majumadar, 2006). Later in the year 1999 due to de-limitation the number of wards was increased to 23 and remains so till date though the area under the municipal limits remained unchanged (Kalimpong Municipality Annual Report, 2013).

Under The West Bengal Municipal Act (1993), the authorities charged with municipal area administration are as follows:

- The Municipality
- The Chairman-in-council
- The Chairman
- The Vice Chairman

Overview of Kalimpong Town's Municipality Solid Waste Management

MSWM has been one of the major problems in the town of Kalimpong for the past few years resulting in piles of unsightly and decaying waste being littered all over the town from streets, market centers, to residential areas. Waste management remains a massive task for the Kalimpong Municipality as it has not been able to deal with waste problem at the current level of its generation. Therefore MSWM is one of the crucial civic services required at present in this town. In the wake of fast growing environment consciousness and increasing public health problems, the concern of inefficient MSWM is being realized. Further more if these wastes are not stored, collected, hauled and disposed off safely and timely, the same causes aesthetic problems and severe impact upon the public health, plus air and soil pollution, and natural water contamination.

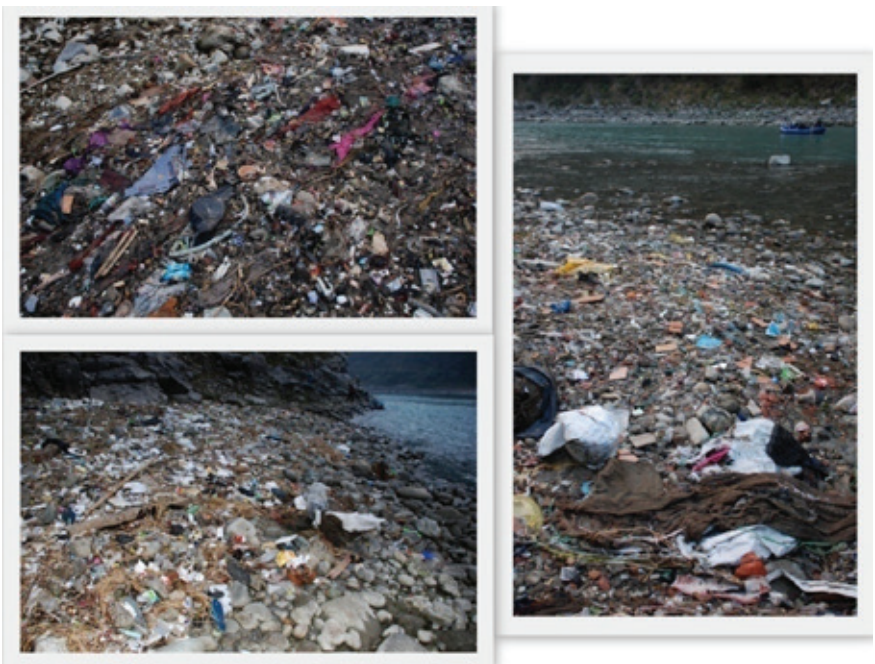
Kalimpong town has not had a proper waste management system till date. The system of open dumping without further treatment of waste has been the practice followed by the municipality till date. The disposal site was located at a distance of 0.5 km from the main town in a place known as Bhalukhop. The system of collecting waste and dumping it on open landfills was being followed until the forced closure of the old dump yard at Bhalukhop on June 5, 2008. People living in and around Bhalukhop stopped the civic body from using the dump yard after landslides had started taking place rather too frequently in the area. The Bhalukhop protests sent the civic body looking for an alternative suitable dumping ground (Ravidas, 2010).

Kalimpong Municipality got permission from the army to use a plot of land in Durpin, 2km from Kalimpong town. But there too, the residents of two adjacent villages of Chalisay and Chibo Busty protested and the municipality had to stop dumping at the site in December, 2008 even though the army had granted permission for use of the site till 31st January, 2009. The municipality since then

had been storing the waste at a vacant garage space under the municipality building due to lack of dumping area (Ravidas, 2010).

With no solution for the problem the municipality had to take the desperate measure of loading the waste into trucks and dumping it in the Teesta River causing great environmental problems to the people living in and around the banks of the river. Kalimpong Municipality has since then been struggling to find a suitable place to dump the trash generated in the town. Thus the absence of a proper dumping site has led to accumulation of huge piles of waste all over the town, with small vacant area along the roadsides serving as the dumpsites.

Figure-4: Wastes being dumped in River Teesta



Source: Chinlop Fudong Lepcha

At present waste is disposed of in an uncontrolled procedure by open dumping at places wherever low lands are available, turning the whole town into a dumping yard with waste piles being found in every open space. Garbage collection by the municipality came to a standstill due to lack of proper dumping areas. House-to-house collection of waste though prevalent some years back has become almost non-existent at present. The method of garbage collection and disposal that was being followed was found to be extremely inadequate and containing critical deficiencies. The methods consisted of street sweeping, collection of road side garbage heaps using wheel barrows from which it is transferred into bigger garbage vats[2]. At present there are 15 vats in and around the major market place. The garbage was then manually transferred into bamboo baskets and loaded into

2 Big fixed cemented dustbins

conservancy trucks. None of the municipality conservancy workers were given protective clothing and footwear. Such method of waste disposal imposes a great health risk to the workers and public at large. More than 90 per cent of the collected solid wastes were being disposed by filling up low lands scattered within the municipal areas in uncontrolled, haphazard and un-sanitary manner.

Figure-5: Waste dumped indiscriminately in lanes and roads

Source: Primary Source

Figure-6: Waste littered in different parts of Kalimpong Town

Source: Chinlop Fudong Lepcha

Whatever little sorting of recyclable materials is done is done manually by the informal sector consisting of waste pickers (*kabadiwalas*) and scavengers. The

informal sector is indirectly playing an extremely important role for their own monetary benefits by helping the town of Kalimpong curb at least a part of the problem. They go around collecting waste from households and other dumping sites and sell it to the scrap dealers for some amount of money. The scrap largely consists of plastic items, cardboard paper, iron goods, old electronic goods, papers and bottles. There is a total of 10 scrap dealers in the Kalimpong town and around 50-60 waste pickers and around 50 scavengers. Approximately 20 quintals of plastic, 20 quintals of card board paper and 20 quintals of iron goods are brought in by the waste pickers and the scavengers on a daily basis. The iron materials are bought by the waste pickers at Rs 14 per kg, plastics at Rs. 10.00, Rs. 6.00 and Rs.5.00 per kg depending on the quality of the plastic and paper and cardboard at around Rs 6.00 to Rs 7.00 per kg. The waste pickers are mostly migratory labourers and mostly come from the neighboring states of West Bengal. The scrap dealers then pack the waste and transport the packages to Siliguri by truck to resell the collected material to a handful of recycling companies in Siliguri.

Therefore proper waste management in Kalimpong town in the recent years has become a necessity for the betterment of the town as well as for maintenance of environmental quality. The municipality as well as the people should play active part to overcome this problem and to maintain the ecological, environmental and aesthetic value of the town

Results and Discussions

Level of Public Awareness and Participation for Solid Waste Management

Public participation and awareness regarding waste management is one of the most pivotal elements in determining successful working of a MSWM program. In the conducted survey, questions which helped in understanding the level of public participation and awareness regarding waste generation and management were asked to the respondents.

Table-1, shows the distribution of participating households on the basis of their level of awareness that they have about the current waste disposal practices undertaken by Kalimpong Municipality. Around 1/4th of the respondents were aware of the waste disposal practices undertaken by Kalimpong Municipality while 3/4th of the respondents surveyed had no idea.

Table-1: Distribution of Respondents on the Level of Awareness about Waste Disposal Practices Undertaken by Kalimpong Municipality

Particulars	Number of Households	Percentage
Aware about the current waste disposal practices undertaken by the Kalimpong municipality	35	20.59
Having no idea regarding waste disposal practices undertaken by the Kalimpong Municipality	135	79.41

Source: Survey Data

Fig. 7 and 8 below représents the distribution of respondents on the basis of their knowledge and practice of waste segregation. Segregation means simply the process of separating waste into bio-degradable and non-bio degradable. Questions regarding segregation were made in order to understand the awareness of people about the basic tools of waste management like segregation. Also while interviewing the Kalimpong Municipality officials; they informed that waste segregation at source would solve almost 75 per cent of the waste management problem which the town was facing. Segregation would automatically reduce waste generation as the organic waste could be composted and the dry inorganic waste could be given up for recycling.

Figure-7 Distribution of Respondents on the Basis of their Knowledge of Segregation

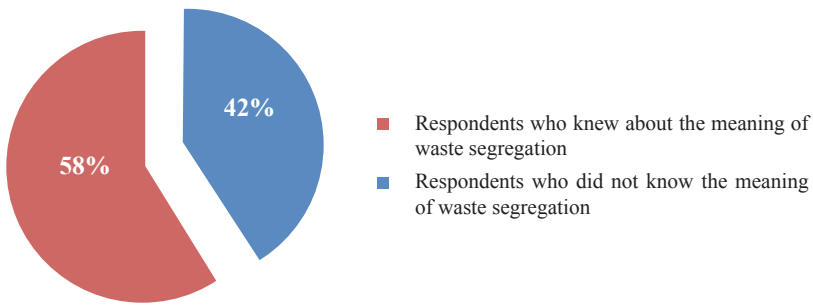
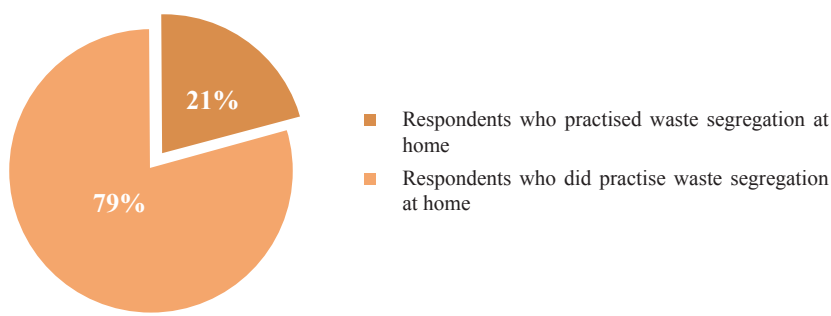


Figure-8 Distribution of Respondents on the Basis of their Practice of Segregation



Source: Primary Data

The figures above represent the distribution of the respondents on the basis of their knowledge and practice of segregation. On conducting the survey it was found that 41.77 per cent of the surveyed respondents knew the meaning of segregation while 58.23 per cent of the respondents had no idea or had never heard about segregation before. Twenty percent of the total interviewed respondents practiced segregation at their houses. It was found that even respondents who knew the concept of household waste segregation did not practice it. Out of 71 households who knew about segregation only 49.30 per cent practiced it. Each household

surveyed had proper sanitation at their homes and each owned at least one dustbin. Average number of dustbins per household was calculated to be approximately 2.

Methods of Solid Waste Disposal

Household solid waste disposal methods were also examined as shown in the Table-2 Questions regarding waste disposal methods were asked to the respondents in order to understand the waste disposal methods respondents were practicing in absence of house-to-house collection or ward wise collection of waste by Kalimpong Municipality.

Table-2: Distribution of Participating Households by the Waste Disposal Methods they Followed

Waste Disposal Practices	Number of Households	Percentage
Composting	30	17.65
Open Burning	94	52.94
Throwing in dumpsite, Municipal Vats	30	17.67
Open dumping	72	42.35
Total	226	

Source: Survey, 2014

Table-2, shows that open burning of waste is the most common practice with 52.94 per cent of the surveyed households following this method of waste disposal. The method of open burning causes great environmental pollution due to emission of harmful gases which causes health problems to people living in and around the area. The second most common practice followed by the répondants was open dumping with 42.35 per cent using this method of disposal. Some of the répondants used both open burning and open dumping as the waste disposal method. Composting of their organic waste was followed by 17.65 per cent of the total surveyed households. Composting was done by these households on their own personal initiative and interest. No support was provided till date by Kalimpong Municipality for urging the people to practice composting as a method for organic waste disposal and hence a large share of the interviewed households remained unacquainted rather than ignorant about this alternative method of waste disposal.

Respondents were surveyed on the basis of the areas or places they used to dispose their waste as shown in Table-3.

Table-3: Distribution of Households by the Waste Disposal Sites

Mediums used for Waste Disposal	Number Households	Percentage
Municipality Vats	21	12.35
Roadside	52	30.59
Nearby lane	24	14.12
Inside their own premises	45	26.47
Jhora	25	14.71
Barren lands or forest area	36	21.18

Source: Survey Data

The primary area that the surveyed households used to dump their waste was the roadside with 30.59 per cent out of the total interviewed households following this method. On further questioning about the reasons behind roadside dumping it was found that they had no alternative to this method. Roadside dumping was more prevalent in wards which were the main market area as there was no barren land or other secluded area, where they could dispose off their waste. The second most common method followed was burning or dumping the waste inside their own premises with 26.47 per cent (45) disposing their waste in such fashion. Dumping of waste in barren lands or forest area where there was not much human habitation was carried on by 21.18 per cent (36) of the surveyed households. Though this method kept the vicinity clean, it had an externality effect as the dumped waste caused environmental pollution in the forests area disturbing the natural habitats of many birds and animals as well as leading to loss of aesthetic appeal of the forests. Disposing waste on barren lands leads to loss of the lands productivity as the chemicals secreted form the waste leads to soil pollution, thus rendering the soil unproductive for further use.

Revenue Earned and Cost Incurred By Kalimpong Municipality for Waste Management

Kalimpong Municipality of lately has been facing the burden of the ever growing population and urbanization as it has not been able to provide the waste collection and disposal facility they had been providing during the past years due to insufficient funds. The indiscriminate dumping of waste with no post handling has led to the overuse of landfills which have run out of its capacity leading to landslides and air pollution thus leading to public protests. The lack of funds available for post handling of waste has been the reason for the situation. Even if the Kalimpong Municipality wants to it cannot set up a proper waste disposal facility because proper disposal of waste requires huge amount of investment, which the municipality lacks.

Kalimpong Municipality is responsible for funding waste management in each ward from its revenue source. Revenue is collected through levying various taxes and other service charges as shown in Table below. Kalimpong Municipality generated approximately Rs 26 lakhs as revenue from various sources for the year 2013. On interviewing the Vice Chairman of Kalimpong Municipality he pointed out that revenue collection was extremely difficult, low and insufficient as the people at large did not pay the specified amount on time and also the payment was prone to fluctuation on a year to year basis. They also highlighted the fact that insufficient revenue collection is what has stopped the municipality form initiating any proper waste management program. The rates at which the municipality charged the taxes were found to be very low as it had yet to be upgraded from the rates that were fixed during 1990's, i.e., almost more than two decades ago resulting in low volume of revenue collection.

Providing any kind of service requires the provider to incur some form of cost, and the benefactor in turn to pay some amount for acquiring those services. In case of environmental good too there is some cost that needs to be incurred be it in

monetary terms, environmental quality or loss of aesthetic value; likewise there is a cost that needs to be incurred for providing SWM in an area.

Table-4: Revenue Earned from Various Sources by Kalimpong Municipality

Revenue Sources	Revenue Generated per Year (Rs.)
Different Forms*	100920
Building Application Forms	57000
Rent of Municipal Buildings	575898
Levy Fees	602436
Development Fees	576120
Mutation	36000
Site Plan Fees	90906
Integrated Housing and Slum Development Program.	466200
Meat and Fish Shop owned by the Municipality	92700
Total	2598180

Source: Kalimpong Municipality, 2013

*Death Certificates, Residential Certificate, Birth Certificate, Drivers License etc.

SWM is considered by the public at large as the duty of their respective municipalities and therefore little or no cost is incurred by the service getter. The cost for SWM makes up the largest share in any Indian Municipality budget, of which the collection services alone makes up 60 to 70 per cent of the total budget allocated for SWM, 20 to 30 per cent being spent on transportation leading to little or no finance for scientific or proper disposal of waste which is the most important aspect of proper waste management (Annepu, 2012). Likewise in case of Kalimpong Municipality too SWM services makes up the largest portion of the municipality budget, with collection and transportation of waste saturating the entire budget allocated for waste management leaving no budget for scientific or proper waste disposal. SWM is the single largest item of expenditure in the municipal budget in Kalimpong and this service suffers from critical deficiencies (Kalimpong Municipality Annual Report, 2013).

Table-5 below, shows the operational cost that the Kalimpong Municipality is going to incur for providing waste collection services from ward 1-12 wards which is covered under the first phase of the Kalimpong Municipalities waste management program. The monthly operational charge is calculated to be at Rs 6, 04,500 and comprises of the working staffs salary, telephone charges of the same, vehicle charges which include the petrol cost and the driver's salary and other miscellaneous expenses. The total operational cost for 23 municipal wards was calculated to be Rs 11,58,625 per month or Rs1,39,03,500 per year with an average cost for 1 ward being calculated at Rs 50375 per month and each household cost coming at Rs 111.78 i.e., around 00.96 per cent of the total cost.

Table-5: Operational Cost undertaken by Kalimpong Municipality

Particulars	N	Per month* (Rs)	Cost for 1 ward (Rs)	Cost for 23 wards (Rs) per month
Labour wages	61	244000	20333.33	467666.67
Supervisor	15	75000	6250	143750
Senior Super Visor	2	14000	1166.67	26833.33
Co-ordinator	1	12000	1000	23000
Executive Director	1	30000	2500	57500
Telephone Charges		4500	375	8625
Vehicle Charges		200000	16666.67	383333.3
Other Expenses		80000	6666.67	153333.3
Total		604500	54958.34	1264042

Source: Kalimpong Municipality, 2014

*of 12 wards

Comparing the per year operational cost to the revenue earned per year by the municipality, we can calculate the total profit earned or loss incurred using the formula:

Profit or Deficit = Revenue – Cost

=2598180 - 15168504

Revenue Deficit = -12570324

The above calculation shows that at the present amount of revenue that is collected, the revenue deficit is calculated to be more than 80 per cent of the total amount needed to finance only the operational cost for providing waste collection services in the town, due to which the Kalimpong Municipality is not being able to initiate any waste management program. To overcome this situation a well defined structure for collection of revenue should be planned by the Kalimpong Municipality in order to overcome such deficiencies and also the rates at which the taxes and other service fees are being charged needs to be increased taking into account the inflation rate of the past 2 decades and current value of the money.

From the Table-5 we can see that no fee is charged for SWM services solely, leading to overuse and over exploitation of the resource as people consider it free and have no sense of responsibility. The municipality must implement user charges for the services in order to reduce the gap between the revenue earned and cost incurred, also it must charge each households, commercial centers, market places, shops and hotels accordingly so that these charges can at least cover the operational cost and hence the municipality can use their revenue source for proper disposal of waste rather than using it up just for waste collection.

Economic Prospects of Waste Management Activities

Waste is no longer treated as a burden but a resource. There are tremendous economic values that can be extracted from different waste management activities be it in the form of public participation to make financial contribution for proper

waste management or activities like composting that helps in revenue generation as well as employment generation.

Composting can act as a source of revenue that the municipality can use. Lots of developed countries are turning towards recycling and in case of developing countries where the organic fraction in the total MSW generated is more composting; bio gas plant to extract methane is seen as a viable option. In case of Kalimpong Town too biodegradable waste accounts for more than 50 per cent of the total waste generated. Various methods are being adopted according to the waste type and composition, all around the world, to divert waste from being dumped in landfills. In case of Kalimpong Town with more than 50 per cent of the waste being bio degradable composting of waste comes as the most feasible solution to divert it from being land filled. The compost generated can be used as a source of revenue by the Kalimpong Municipality through selling the compost.

Table-6: Amount of Waste Generated (Biodegradable and Non-Biodegradable) in Different Locations of Kalimpong Municipality

Generation Points	Total (in Kg)	Quantity of Waste (in Kg) Waste Type	
		Biodegradable	Non-Biodegradable
Domestic	11535	6921	4614
Daily and Wholesale Market	20900	16720	4180
Hotels	499	200	299
Agricultural / Garden	825	825	0
Sub-Total	33759	24666	9093
Commercial Centers	2000		2000
Bus Stand	50		50
Sub-Total	2050		2050
Street Sweepings	300		300
Drain Cleanings	200		200
Sub-Total	500		500
Cess pool	300	300	
Clinical	660		660
Total	37268	24966	12303

Table represents the amount of biodegradable waste generated in Kalimpong Town and the estimated figures of compost generation and revenue generation from the compost. It is estimated that for every 100 tonnes of MSW around 20 tonnes of compost is generated i.e., 20 per cent of the total intake and sold at approximately Rs 5 per kg (Damodaran, 2011) this study will be using the above given figure for estimating the compost production and revenue generation in Kalimpong town.

Table-7: Estimated Value of revenue generation through composting in Kalimpong Kalimpong Town

Bio degradable waste generated (Metrric Tonnes)	Total Compost Generation (20 per cent) (tonnes)	Selling Price (Rs)	Total revenue generated (Rs)	Per Year
24.97	5	5 per kg	25000	300000

Source: SurveyData

Kalimpong Municipality can therefore generate an estimated revenue of at least Rs 3 lakhs per annum from its biodegradable waste that was otherwise being dumped and generating no value, leading to environment degradation. Composting also has other benefits as it diverts a large volume of waste from being land filled and hence reducing the pressure from the lands and thus the need for Kalimpong Municipality to spend their funds on purchasing land for landfills. Since the municipality does not have many funds for setting up large waste management projects, aerobic composting can be considered as the best way to manage waste in the area. Anaerobic pertains to organisms, such as bacteria, that can live in the absence of atmospheric oxygen. Anaerobic composting' is terminology often used to refer to such organisms living in a compost bin and influencing the quality of its decomposition; it also refers to the conditions under which such organisms thrive in the bin (Beaulieu, u.d).

There is also no problem regarding finding a market for the generated compost as it has a ready market in Kalimpong with flower nurseries, vegetable growers and other agricultural groups and nearby tea gardens. Lastly community participation can play a key role is this aspect as waste segregation is absolutely crucial in order to generate a quality compost that can be sold at a higher price (compost are sold in different prices according to the quality, different priced compost are available according to the quality in Kalimpong). Kalimpong town can produce quality compost which will be an added advantage over other compost producers as in India a large share of compost that is produced from mixed waste which does not produce quality compost and has little or no value. Also the recent trends of organic farming and organic products becoming more popular and consumers demanding items free of chemical fertilizers and pesticides, the use of compost has become increasingly important and the demand for it has risen. For waste to safely and completely compost, it must be organic. Unless the waste is thoroughly sorted at its source, workers at the compost site would be required to do this, much of it by hand (CMAP, 2008). The key to success of generation of good quality compost is segregation of waste at the source of the generation i.e., the household.

Whatever little sorting of recyclable materials is done is done manually by the informal sector consisting of waste pickers *(kabadiwalas*) and scavengers. The informal sector is indirectly playing an extremely important role for their own monetary benefits by helping the town of Kalimpong curb at least a part of the problem. They go around collecting waste from households and other dumping sites and sell it to the scrap dealers for some amount of money. The scrap largely consists of plastic items, cardboard paper, iron goods, old electronic goods, papers

and bottles. There is a total of 10 scrap dealers in the Kalimpong town and around 50-60 waste pickers and around 50 scavengers. Approximately 20 quintals of plastic, 20 quintals of card board paper and 20 quintals of iron goods are brought in by the waste pickers and the scavengers on a daily basis. The iron materials are bought by the waste pickers at Rs 14 per kg, plastics at Rs. 10.00, Rs.6.00 and Rs.5.00 per kg depending on the quality of the plastic and paper and cardboard at around Rs 6.00 to Rs 7.00 per kg. The waste pickers are mostly migratory labourers and mostly come from the neighboring states of West Bengal. The scrap dealers then pack the waste and transport the packages to Siliguri by truck to resell the collected material to a handful of recycling companies in Siliguri.

The total quantity of different waste products procured by the waste pickers in a day was estimated after doing interviews with them and visiting different scrap dealer's form that information an approximate value was obtained. Considering primary data that was collected regarding amount of waste that is being procured by the informal sector and the amount at which it is bought from the households, Table-8 below, shows the total estimated value in rupees terms of waste that is generated on a daily basis, on a monthly and yearly basis.

Table-8: Quantity of Waste Procured by the Waste Pickers and the Estimated Rates at which they are Bought

Materials	Quantity (Quintals)	Rs/Kg Revenue	Revenue Generated** (in Rs.)	Per Month***	Per Year
Plastics	20	10, 6, 5*	6853	205590	2467080
Cardboards	20	06-Jul	6853	205590	2467080
Iron Products	20	14	13706	411180	4934160
Total			27412	822360	9868320

Source: Primary Data

*Depending on the quality of the plastic, **Taking an approximate figure of Rs 7 for 1 and 2, *** considering 30 days in each month

From the Table-5 above, it can be seen that there is almost a market of worth Rs 1crore per annum in the small town of Kalimpong given the fact that much of the waste is indiscriminately dumped by the people and only a very small share of waste is being procured by the informal sector. Thus the Kalimpong Municipality as well as the public at large should understand that waste can be a source of revenue generation if managed properly rather than treating it as a burden.

Another important and positive impact of undertaking a waste management program is the creation of employment opportunities. Waste management requires employment of labourers in order to get the task done thus creating employment opportunities for the local people. Estimated employment generation from the waste management program going to be undertaken by the Kalimpong Municipality is shown in Table-6. The data obtained from Kalimpong Municipality, regarding the number of officials and labourers needed for waste management activities in the 12 wards was used to estimate the employment that would be generated in the total 23 wards.

Table-9: Estimated Employment Generation from the Waste Management Program Going to be Undertaken by the Kalimpong Municipality

Particulars	N (12 wards)	Total Wards
Labour wages	61	117
Supervisor	15	30
Senior Super Visor	2	4
Co-ordinator	1	1
Executive Director	1	1
Total	80	153

Source: Kalimpong Municipality, 2014

From Table-9 it can be seen that a total of 80 new employments are going to be generated when the municipality will start the first phase of its waste management program going to be undertaken by the Kalimpong Municipality for the 12 wards. Using this data obtained from the municipality to estimate the employment generation in the whole of the 23 wards. The estimated figures give us a total of 153 new employment opportunities that would be generated from the waste management activity in the town of Kalimpong.

Conclusion and Recommendations

It may be concluded from the present study that MSWM services at present are not up to the mark in Kalimpong town and Kalimpong. Municipality suffers from financial as well as infrastructural shortcomings. No waste management activities of any kind is undertaken in the town of Kalimpong at present. The share of bio degradable waste was larger in total waste generated. Therefore composting of waste was a viable option for the municipality to manage its waste as well as earn revenue from selling the compost. The public at large were unaware of the waste management activities undertaken by the Kalimpong Municipality. Segregation was practiced by very few households.

Firstly, Kalimpong Municipality must start treating waste as a source of resource and start tapping in on its value rather than treating it as a burden. Secondly, Kalimpong Municipality must develop a strong administrative set up and a waste management system taking into consideration the various factors specifically unique to this region. Lastly an intensive education program for the public at large, regarding waste management practice and methods should be undertaken by the municipality to promote SWM practices in the town

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ISSN 2249 - 9040 Volume 8, No 1, January-June 2018 pp. 57-64

A Seismic Shift in the Leverage of 'Extended Workforce' to Navigate Growth Driven Competitive Success of Indian Inc: Impact on HR

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Abstract

To compete in the future, organizations will need to push talent management beyond the confines of the enterprise wall to include the new extended workforce: a global network of outside contractors, outsourcing partners, vendors, strategic partners and other nontraditional workers. By maximizing the potential of both an extended workforce and permanent employees, companies can gain critical advantages – including agility and access to valuable talent. There are a growing number of people who temporarily lend companies their skills and knowledge in an ever-expanding network of freelancers, consultants, outsourcing partners, vendors and other types of nontraditional talent. Many of these individuals are jobless, but not workless. Others have jobs in one organization but perform work for another, existing in a complex and intricate web of cross-organizational relationships that form a new "supply chain" of talent. As guardians of their organization's talent strategies, HR will need to redefine its mission and activities – and perhaps create new roles and organizational structures to maximize the extended workforce's strategic value. It will have to create new strategies that reflect new realities

Keywords: Extended Work Force, Workforce of One, Talent Management, HR Strategies

Introduction

An Ever changing competitive Global Business landscape offering exponentially Expanding Opportunities to the Indian companies which lead to an exciting evolution in the usage of 'Extended Workforce' in the Indian Industry to seize marketplace opportunities faster, with more agility. Besides, grasping today's workforce realities and using them to their advantage, Indian Companies are employing 'Extended Workforce' as they have high-level skills, deliver top performance and are deeply engaged in their work. The term 'extended workforce'

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to describe the many types of workers companies use. This definition includes internal employees, vendors, consultants, alliance partners as well as contingent workers who work for the organization on a project basis.

The Extended Workforce are Critical to Competitive Success in Indian Inc

With the increase of specialization in the workplace and the heavy reliance on project work in knowledge-based organizations, highly educated specialists and professionals are serving as contingent workers in positions as varied as engineer, information technologist, healthcare worker and accounting and finance professional and quickly grown into a major faction of today's India's working population. As much as 60 percent of freelancers in India have a professional degree, and their assignments can last as long as several months, reflecting the shift to knowledge and project work.

Using external, project-based workers has often been seen as primarily a cost-cutting initiative. However, on Research with Indian companies indicates that using such talent is now seen as critical to achieving two important competitive capabilities: access to specialized skills for particular needs, and agility in the face of a turbulent business environment. Indeed, such talent may be highly skilled, in-demand knowledge workers, performing at even the top levels of an organization. Thus, an extended workforce strategy is an essential aspect of helping Indian companies competes in today's volatile, knowledge-based economy, providing essential skills for projects and enabling organizations to be more agile from a talent perspective.

Often, Most of the Indian Professionals have consciously chosen this type of work over permanent employment. Their reasons include flexibility, the chance to work on a variety of interesting projects, the opportunity to build and exercise skills more quickly than permanent employees can and superior financial rewards. For instance, many retiring baby boomers have joined the extended workforce because they want the stimulation and income from working as well as the benefits of flexibility. Contractors who are Millennials or working parents in two-income households cite the chance to quickly develop new skills or to better balance work and family life.

In today's Indian organizations, people are often pulled onto teams because of their formally defined role in the organization. In this Context, enterprises could radically boost their performance by sourcing talent for each task from anywhere inside or outside the organization on one criterion: who is the best person to perform the task. Moreover, using an extended workforce in can foster innovation-an essential part of any growth-driven competitive strategy. Bringing in new thinking and talent from the outside can help open an organization's eyes to new ideas and fresh, counter intuitive ways of thinking. Consider the rise of crowd sourcing-use of the general public to perform work ranging from product design to the creation of ad campaigns. This form of sourcing has garnered much attention for its power to harness collective intelligence and spark innovation.

The shift towards using the extended workforce as a strategic asset can help push a company ahead of the competition. Today, Indian companies are no longer using outsourcing just for augmenting staff who perform administrative processes. In addition, they're using it strategically, to gain staff who can handle higher-level, knowledge-related processes and fully leveraging the unique skills of Extended Workforce to achieve corporate goals. By drawing on extended workers, organizations may be able to unleash the full potential of their human assets by more fluidly matching task to talent. In addition, Indian companies could gain access to a much wider range of expertise and skills that may not be readily available in their existing talent pools. This can be particularly important for small organizations, because accessing an extended workforce helps them access the same level of talent and services as large enterprises.

How Business Can Benefit from the Extended Workforce

Extended workers choose to find work independently because they enjoy the flexibility, the level of compensation, and the freedom to choose their work. These added benefits contribute to effects of higher employee morale. Extended workers not only experience high levels of morale and fulfilment, they play a part in contributing to improved morale for permanent job holders. As businesses adapt to the factors of a post-recession economy, and scramble to maintain production levels and profitability, extended workers can come in and support the necessary workload so that permanent job holders don't burn out. Employing extended workers not only alleviates the workload for permanent jobholders, but it can also serve as a cost saver for you as an employer. Extended workers, who work for contracted lengths of time, are less expensive to employ than permanent workers. Benefits costs and employment taxes are eliminated. Moreover, when a Extended worker is employed through a staffing or recruiting firm, the third party provider assumes the costs.

The Extended Workforce: Old and New Realities in Indian Context

Dimension	Old Reality	New Reality
Extended workers as a percentage of the workforce	Small percentage	Large percentage
Type of work performed by the extended worker	Primarily low-skilled, low-value	Increasingly high-skilled, high-value knowledge work
Location of work performed by the extended worker	Local; workers live close to the organization	Anywhere; workers are globally accessible and can perform tasks remotely
Personal profile of the extended worker	Not well educated; younger, non-professional	Increasingly well educated, all age ranges, professional
Engagement level of the extended worker	Low	High
Reasons for becoming an extended worker	Involuntary reasons – Difficulty finding a job	Voluntary reasons – Attraction to flexible work schedules and roles, ability to quickly develop skills, and access to interesting and varied work
Reasons companies use extended workers	Address an immediate need	Gain agility and access to top talent

Dimension	Old Reality	New Reality
How work is configured	Hierarchical, permanent jobs	Dynamically configured project teams comprising employees and non-employees
Who manages the extended worker	Procurement with a cost orientation, or line managers individually	HR, with a strategic orientation and with input from the functions
Corporate perception of the extended workforce	Assets to be managed at cost	Individuals to be managed for value
How the extended workforce is found	Through temp agencies	Through a variety of sources – including cloud-based platforms of freelance workers, online social networks, alumni/retiree networks, outsourcing providers, business partners and crowd sourcing platforms
Talent management practices	Applied only to permanent employees	Applied to permanent employees and the extended workforce

In terms of productivity, the combination of a higher employee morale plus a lower cost is indication enough of a probable boost in productivity. For one thing, extended workers equipped with specialized skill sets, often work doubly as hard to prove their capabilities within a permanently employed team. Plus, when there is an opportunity for extended employment, extended workers will work to show they deserve a permanent spot on the team.

Impact on HR

As guardians of their organization's talent strategies, HR will need to redefine its mission and activities – and perhaps create new roles and organizational structures to maximize the extended workforce's strategic value. It will have to create new strategies that reflect new realities. In particular, HR could benefit by taking the following actions:

Redefine HR's customers: Traditionally, HR's 'customers' have been employees. Now, they should also include members of the extended workforce. To serve all of these customers, HR professionals need to develop a broader perspective on talent management and create a permanent strategy for extended workers. This means establishing a seamless approach to everything from recruiting to performance management to learning. The goal is to balance the needs and expectations of each type of talent with the strategic goals of the business.

Integrate processes and systems: Instead of using vastly different processes and systems to acquire and manage talent, leading organizations will develop a unified strategy and set of processes and information systems that span all talent segments, including the extended workforce. Technology advancements like the development of SaaS (software as a service) will make it easier for companies, for example, to capture data on contingent workers and manage it in the same system that they use for employees. Although this may add additional costs to licensing agreements from HR information system vendors, benefits can far outweigh the costs. Understanding all the talent that performs work for an organization can help managers make better decisions regarding whether to 'buy' vs. 'build' vs. 'borrow' talent in specific geographic areas or specific talent pools, as well as

help an organization better manage risk through tracking certifications or training, or through establishing standard security access and provisioning processes. In addition, skill gaps in the entire workforce can more easily be tracked, as well as performance levels that can help a hiring manager decide whether to rehire a contingent worker, convert them to permanent employee status, or even consider them in an organization's succession plans. Creating an integrated talent management system will be a critical responsibility for HR in the future, and will enable organizations to gain greater agility and maximize the performance of their entire workforce.

Managing Your People as a Workforce of One

Customization is poised to revolutionize the way organizations manage their people. They will no longer treat their workforce as a single entity but instead, treat each employee as a 'workforce of one,' offering customized HR and talent management solutions.

HR Strategies to Manage Extended Work Force

To compete in the future, organizations will need to push talent management beyond the confines of the enterprise wall to include the new extended workforce: a global network of outside contractors, outsourcing partners, vendors, strategic partners and other non traditional workers. By maximizing the potential of both an extended workforce and permanent employees, companies can gain critical advantages – including agility and access to valuable talent. HR will reshape itself so that the function becomes the critical driver of agility.

Create new organizational structures or roles that cross boundaries and disciplines: Everyone from procurement to finance to legal to line managers could conceivably take responsibility for the extended workforce. But HR should play a central role. To do so, HR will need to collaborate with other functions that also have a stake in the extended workforce or create roles that integrate a diverse array of skills typically found in different functions. At NMDC Limited, A premier Indian Public Sector Undertaking, for example, a steering committee comprising representatives from procurement, human resources and enterprise operations is responsible for managing the company's extended workforce. Other organizations are designating new extended workforce manager roles staffed with people who have skills not typically found in any one job description. Such skills include knowledge of employment law; contract negotiation; and project, talent and organizational management. Companies can even set up an extended workforce talent management office that reports directly to the executive level.

Use analytics to become an expert advisor on the talent landscape: Deciding when to use which talent pools, for which tasks, today and in the future will become an increasingly critical HR capability. HR professionals will need to perform fact-based analyses to make staffing decisions across their talent pool. They will have to use data from a variety of sources to identify labor trends for different talent pools and geographic markets and to anticipate risks of sourcing from particular talent pools. Having a strong analytics capability can also help an

organization develop closer relationships with talent suppliers. These suppliers can better anticipate an organization's needs, prepare the talent pipeline and provide just-in-time resources.

Become a talent broker: HR practitioners will need to become talent brokers – facilitating matches between specific workers (extended or permanent) to specific tasks or teams. To serve in this role effectively, HR professionals or hiring managers will have to evaluate the talent coming from other organizations (such as outsourcing providers or consulting organizations) and select the right talent for each project/assignment. HR also will need to mine and analyze the vast array of highly predictive data (beyond workers' skills and experience profiles) that is now available on online labor platforms such as Elance, Inno360, Behance, Guru and Empire Avenue. Consider a few types of data that HR could analyze to find the right worker for a task:

- Performance on key indicators from previous assignments
- Peer/team feedback, perhaps signaled by badges in a game-like format
- Feedback, reviews, recommendations and referrals
- Cultural fit assessments
- Competency, skill and knowledge assessments
- Willingness to work in particular geographies
- Training transcripts
- Test scores in massively open online courses
- Samples of previous work performed
- Individual work preferences (type of work, hours willing to work, location, etc.)
- Expertise and knowledge as indicated in people's journal entries, blog postings and social media contributions

Forge new relationships with partner organizations: Increasingly, work is getting accomplished through a network of organizations. For this reason, companies may have to redefine the nature of their relationships with one another. Today, organizations often identify specific key performance indicators for partners such as outsourcing providers or consultants. But they leave it up to partners to determine which talent can deliver on those indicators and how best to motivate and develop that talent. In the future, HR organizations may need to evaluate their partner organizations' talent management practices and write talent management practices into service agreements.

Apply Talent Management Practices to the Extended Workforce

The rise of the extended workforce will require HR organizations to rethink talent management practices and determine how each practice can be extended to include workers other than employees in order to best maximize their potential. For example:

- **On boarding and collaboration:** Extended workers should be able to quickly join teams, orient themselves and collaborate on tasks. HR – as well as recent technology advancements – will be instrumental in facilitating this process. For example, technology can now help all workers understand how each is contributing to the organization's goals. It can also help workers

understand their relationships with one another through the creation of a dynamic organizational chart based on analysis of e-mail and other electronic communications that reflects how work is really being accomplished and by whom. In addition, workers can use technology to find one another, collaborate, explain and track tasks, and look up previous work samples or related work in knowledge repositories. All of this knowledge helps them to hit the ground running on a new assignment.

- **Performance feedback, rewards and incentives:** HR will need to facilitate performance feedback for extended workers and motivate them with the right rewards and incentives. To do so, HR will increasingly use tools, which enables workers to provide real-time feedback and recognition to one another, track projects and set goals. HR professionals may also need to tap into extended workers' intrinsic motivation.
- **Learning:** Most organizations seek extended workers who already bring the requisite skills to the table. Managers may wonder why they would invest in learning for such workers when they can easily take newly learned skills to other companies, including competitors. But the best HR organizations of the future will offer learning opportunities to extended workers. Why? Doing so improves their value to the organization. It also helps the company attract the best of the extended workforce. In fact, learning can go both ways; organizations themselves may also learn valuable insights from extended workers by capturing the knowledge extended workers have developed by working at a variety of organizations. To gain these advantages, HR might extend e-learning and social media learning platforms to extended workers as well as provide opportunities for informal learning. HR can also facilitate knowledge transfer from extended workers to regular employees and provide incentives for knowledge sharing. This is especially important at the project level, where new online, collaborative tools can capture knowledge and conversations, email chains, document versions and other information related to a project. When an extended worker leaves, the project keeps running smoothly, because everyone who remains has access to all the essential information.
- **Advancement and career development:** HR will also need to provide opportunities for extended workers to advance and grow. Providing such opportunities will enhance these workers' value and help the company attract and retain the best of this workforce. Leading companies may track the performance, skills and career aspirations of their extended workers just as they do for permanent employees. This approach can help companies source top talent. A company might also want to include high-performing members of the extended workforce in its succession planning, regardless of whether workers will convert to permanent employment or continue on to other assignments in the organization. To support effective succession management, HR could use technology to access a global pool of free agents. The technology lets users advertise themselves as free agents, enables companies to search for available free agents and helps employees nominate free agents to succeed them.

Segment the extended workforce: Like permanent employees, extended workers are a highly diverse lot. What motivates a worker in an Indian outsourced

call centre will likely differ markedly from what motivates a scientist participating in a crowd sourcing competition to develop a new product. Leading companies are tailoring their people practices to meet the needs of a highly diverse employee base. Companies must apply this same approach to extract maximum value from extended workers as well. For instance, they can customize their talent management strategies to extended workers' performance, potential, geographic location or any other meaningful criteria. But an organization should always think carefully as to whether a specific initiative will work with all or only some segments of the extended workforce. An organization may open its knowledge management and learning systems to temporary professional employees, for example, but not to people participating in crowd sourcing competitions. Or an organization may extend learning and career development to individual contractors, but not to employees of an outsourcing provider. To be successful, an organization will want to create targeted talent strategies for various segments of its extended workforce based on their unique needs and requirements.

Conclusion

Yesterday, work was organized in hierarchies according to jobs and roles. Tomorrow, it will be characterized by dynamically configured teams of workers who may not be an organization's permanent employees. Instead of a single enterprise with full-time employees and a recognizable, enduring hierarchy, companies will increasingly be comprised of formal employees and an ever-shifting global network of contractors, temporary staff, business partners, outsourcing providers and members of the general public. As talent supplies span regional, national and organizational boundaries, HR professionals will need new talent practices to ensure that their organizations are performing at the top of their game. Quickly bringing together globally dispersed, blended work forces to achieve an organization's goals will require no less than a management revolution. And that revolution is only just beginning. HR practitioners who can capitalize on and harness the power of the new extended workforce will position their companies to gain unique advantages and outperform the competition.

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ISSN 2249 - 9040 Volume 8, No 1, January-June 2018 pp. 65-80

Evolving Circular Economy Operations Models for Business Sustainability

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Abstract

The business environment of volatility, uncertainty, complexity, and ambiguity (VUCA), along with rapid population growth, resource constraints, urbanization, changing consumer preferences and expectations are likely to put unparalleled challenges in meeting the demand of products and services in near future. Collective action across different industries, stakeholders, and geographies is required for business sustainability. The 'linear take-make-waste industrial model' will not be viable any more. There is dire need of new business models that require less consumption of material input and primary energy and still can generate wealth sustainably. This will give way to the circular economy, which attempts to achieve more effective flow of materials through newer business models, cross-sector collaborations, reverse logistics and new design thinking. System-wide perspective, of the circular economy holds latent possibilities in helping in improved decision making, optimum utilization of resources, and waste management, which in turn will lead to sustainable future. The paper discusses various circular economy models which can tackle environmental priorities in a better way and can result in higher economic growth and development. These models aim at helping businesses to shift from the system of 'waste' to 'endless resourcefulness', resulting in better performance, higher competitiveness and productive innovation.

Keywords: Business Sustainability, Circular Economy, Competitiveness, Design Thinking, Innovation

Introduction

Rapid population growth, resource constraints, the business environment of volatility, uncertainty, complexity, and ambiguity (VUCA), urbanization, water scarcity, changing consumer preferences and expectations, etc. would put unparalleled challenges in meeting the demand of products and services in near future. The world population is likely to increase to about 9 billion by the year 2030, and the major increase is likely to be from cities in developing nations. In addition, the increase in commodity prices in last decade or so has erased the

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average decline in the prices of the last century. Under these circumstances, the 'linear take-make-waste industrial model' may not be sustainable.

Circular economy holds great potential in improving business decision making and in optimum utilization of resources, and waste management. It provides greater value for business and paves way for sustained business growth and better opportunities for generations to come. The paper describes various circular economy operations models which are tackling environmental priorities in a better way so as to result in higher economic growth and sustained development. These models aim at helping businesses to shift from the system of 'waste' to 'endless resourcefulness', resulting in better performance, higher competitiveness and productive innovation. The impact of technology and requirement of new leadership skills are also discussed, which are necessary to gain the 'circular advantage', a term coined by Accenture (Accenture 2014).A circular economy approach attempts to retain materials in a high value state within productive use for maximum possible time. Circular economy holds great potential in use of design thinking to make better decisions in use of waste and utilization of resources.

Sustainability

Sustainability has become an agenda of primary discussion for both corporate strategists as well as policymakers. The origin of the word 'sustainability' is from the Latin word 'sustinere' (tenere, to hold; sub, up). 'Sustain' means 'maintain', 'support', or 'endure'. Environmental issues of current and future generations are primarily addressed through sustainability. (Hopewood *et. al.,* 2005, WCED 1987). The term 'Sustainability' relates to a firm's optimum use of natural resources like land, water, minerals, fossil fuels etc. and its relationship with environment. Since most of the natural resources are finite, it is very important that the consumption of the resources is done judiciously. Business being the biggest user of natural resources, it is in the long-term interest of the business itself to conserve natural resources. Literature on sustainability has primarily focused on environmental issues e.g. (Atkinson 2000, Rees 2002; Costanza 1991), while a good number of authors have highlighted on balancing economic, environmental, and social sustainability (Eklington 1998).

Johnston *et. al.,* (2007) had rough estimation that close to 300 definitions of sustainability are available in literature. To cite a few, we can simply say that sustainability is a situation where human activities are performed in such a way that it helps in conserving the ecosystem. In a layman's word it is a transformation of human living conditions which support security, well-being, health, and maintenance of non-replaceable goods and services. (McDonough W. 2002).

Rising environmental risks, climate change, ozone depletion, biodiversity loss have actually given acceptance to the concept of sustainability. Researchers have been investigating on these risks since 1960's and doubting on the prosperity trends and its existence in future and revealing tensions we are surrounded with (Cropper *et. al.,* 1992). Environmentalist Ehrlich and Commoner stated that population, consumption, and technology leads to greater environmental impact and they have interrelation of varied degree between them as described by various

researchers. (Cooper T. 1999). From emphasis on demographic control to reduction in consumption levels, to use of science and tech in fuelling social inclusion were highlighted by scholars and they challenged framework and its assumptions of economic growth.

Sustainable Business

A business may be called a 'sustainable business' if it results in minimum detrimental impact on environment. Such business would ensure meeting requirements of the 'triple bottom line approach' viz. People, Planet, and Profit'. Business sustainability strategies include actions to protect the planet by taking care of environment, natural resources, and creation of support systems for ecology. The strategies should perform favourably with respect to the 'triple bottom line'. Society and economy are sub-set of environment. Figure-1 shows relationship between the 'Three Pillars of sustainability'.

Three sustainable development goals viz. social goals, environmental protection, and economic goals, were identified in the 2005 World Summit on Social Development. Figure 2 shows that the sustainability lies on three primary pillars and they are interdependent and are reciprocally reinforcing. The interaction of society and environment should be such that restrictions put on society for various environment protection measures should be bearable for people (society). The interaction between economic and social factors should be equitable, i.e. it should not affect greatly profitability of the firm and at the same time, profit motive should not result in deterioration of environment. Similarly, the restriction imposed for protection of environment should not unduly affect economic position of a firm.

Linkage between Circular Economy and Sustainable Business

Environment is significantly burdened with rising population, increased global warming, resource scarcity, and environmental degradation in last few decades and it is a major area of concern around the globe. With rising demand of growth from economy, balancing of economic, social and environmental development is a greater challenge in addressing these issues, which actually gave birth to the concept of sustainable development.

The proposed approach for gaining sustainable development is aimed at closing the loop and losing the reliance on nature and environment for resources. Research suggests embedding of 3R principles of Reduce, Reuse, and Recycle strongly implemented in production and consumption process (Zhu 2007, Heck 2006). This kind of model considers the low demand and consumption, low emissions of greenhouse gasses, efficient use of water and energy in production, and maximal utilization of renewable resources as the most important and it will improve the unsustainable pattern of production and consumption.

'Sustainability' is the 'common mass of bearability, equitability, and viability of the interaction between social, economic, and environmental factors. This will give way to the 'circular economy' with emphasis on efficient and effective flow

of materials through various stages viz. product design, manufacturing, reverse logistics, and reuse. The *Circular Economy* represents attempt to conceptualize the integration of economic activity and environmental wellbeing in a sustainable way.

Linear Economy Model

Conversion of natural resources ultimately into waste via production process is the outcome of linear economy model. Please refer Figure 3. The production happening in the linear way leads to detrimental impact on environment mainly by removing natural resources from the environment and by causing pollution in external environment and reducing value of natural resources. At the stage of acquiring raw material / resources also, pollution can occur. *Boulding (1966*) describes such one-way system of economy as cowboy economy.

Over the past 220 years, this planet has thrived with a linear economy model where mineral, fuel, timber all resources were extracted from nature and used to make a commodity. Produced commodity was sold, and at the end of its life, the same commodity was deposited as trash. This process created job, economic growth, wealth, and improved quality of life.

Two basic premises of linear economy model are that there will always be resources available to extract and discarded material can always be sent away. These principles saw good times, but today we realize it doesn't stand the test of the time as world's population is growing, demand is rising, resources are depleting. The assumptions for our economic system are turning out to be false, and we are increasingly facing resource constraints. To close the loop, there is a dire need for creation of more circular economy which can incorporate, redistribute, ruse, remanufacture the resources.

Circular Economy Model

The term circular economy carries both descriptive as well as semantic meaning. We may call semantically that circular economy is opposite of linear economy. Circular economy simply states that there is no negative impact on environment. It repairs any damages that might have happened during the resource acquisition stage. It also aims that there is little or no waste generated during life cycle of a product. The concept of circular economy has become one of the latest facades to address issues of environmental sustainability. It takes care of environmental growth, at the same time it duly takes care of raw material and energy shortage (Murray *et. al.,* 2015)

European commission report 2014 states that to achieve resource efficiency, it is required to have eco - design, substitution, efficiency, concept of renting / leasing, and industrial symbiosis. This will help in achieving the innovation at organizational level value chain, which will, in turn, help in connecting production and consumption.

The word 'circular' includes 'product recycling' and 'biogeochemical cycle'. Basic atoms and molecules on the planet go through a specific cycle. Time to complete the cycle varies and every cycle gets altered by human activity. Circular economy restores flux in economy in an efficient manner. Recycling has been

an integral part of sustainability for many years and its central part of circular economic system. By improving manufacturing and maintenance process of products, longevity is increased which leads to reduction in replacement and less use of resources. Please refer Figure 4.

Circular Economy Term Origin

Literature debates the origin of the term 'circular economy' variedly. Definitely it has been in practice for a long period of time. Greyson (2008) in his paper claimed that Boulding had thought up this term when he wrote 'Man must find his place in a cyclical ecological system, which is capable of continuous reproduction of material form even though it cannot escape having inputs of energy'. Liu(2009) claims it to be a concept from China and Yuan (2006) also supports the same and believes that it was first referred in China. Zhang (2010) claims that indication of use of circular economy was found in 1980s in western literature, which typically describes it as a closed system of environment and economy interaction.

Pearce and Turner (1990) have claimed use of the term 'circular economy' in the western literature for the first time in the year 1980, where closed system of environment - economy interactions was described. Robèrt (1991, p. 1) made another interesting claim that there is a systematic error in most of the environmental problems, which leads to most of the time processing of material linearly. If by means of biochemical process, or by society, the resources were not processed in cycle's economy, health of public will continue to deteriorate. Mathews and Tan (2011, p. 436) recommended establishing a 'closed-loop' economy'.

The term has been used differently at different times in various places and described differently by various authors, but concept of 'closed cyclical loop' seems to be common across the nations.

Circular economy business models can provide benefits like opening avenues for new business opportunities, can aid to achieve sustainability and growth of businesses, can create more revenue avenues for businesses, can lead to business transformation, and can build close relationship with its customers. They can also help in protecting economy by adequate utilization of resources, and reduce/eliminate resource depletion which would help further in achieving business sustainability.

Circular Business Models

Accenture (2014) in its report on Sustainable Business 'Circular Advantage', outlined five key circular business models briefly described below:

Circular Supplies Model: Relevant for companies dealing in scarce commodities. Fully recycled or Bio-based resources have substituted single-lifecycle inputs. It can lead to generating renewable energy also.

Resource Recovery Model: With the enhanced capacity and techno innovation it has become possible to reuse and recover material output that maximizes economic value. E.g. processing of waste material into new usable resources, which is called closed loop recycling happens in cradle-to-cradle designs.

Product Life Extension/Asset Management Model: Working lifecycle of Product is extended through remanufacturing, repairing, upgrading or reselling. Reduced new purchases by tracking assets within the company and capitalizing on product lifetime vale, and also adopting design approach to identify what can be repaired, reutilized, and redeployed at some other place in the organization. On return of used products lucrative incentives can be offered and such products can be revamped or re-sold in the market.

Sharing Platforms/ Collaborative Consumption Model: Products or assets having low usage rate are shared to increase their utilization rate resulting in higher productivity and higher value creation. Peer-to-peer networks are encouraged to move towards sharing system both for business or public use of products.

Product as a Service / Hire and Leasing Model: Traditional 'buy-to-own approach' is replaced by using products through a 'lease' or 'pay-for-use' arrangement. Companies with higher operating cost can find this model sustainable, if they can manage product maintenance and increase the product lifetime value. In this model, manufacturer retains the ownership, and therefore he holds more interest in manufacturing a product with greater lifetime value.

Some new technological developments can help in accelerating the process of achieving circular economy. Some examples are:

- Digital Technologies: Mobile, Machine to Machine, Big Data Analytics, Cloud, Social;
- Hybrid Technologies: Trace and Return System, 3-D printing; and
- Engineering Technologies: Modular Design Technology, Advanced Recycling Technology, and Life and Material Sciences.

Figure 5 shows that EUR 250-500 Billion cost can be saved for European economy through circular models. The graph gives sector wise indication of potential savings, the biggest sectors being motor vehicles, machinery and equipment, and electrical machinery and apparatus.

Today business success, and success of business models is primarily dependent on adopting new technological innovation, design thinking approach and also finding new ways of running businesses.

The governments will have their share of responsibilities to promote and support such changes by formulating conducive policies.

Literature Review

Gro Harlem Brundtland headed a Commission in the year 1983,to explore 'a global agenda for change' with the intention of formulating 'long-term environmental strategies for achieving sustainable development by the year 2000 and beyond' (WCED 1987).The report submitted by the Commission called for reduced consumption of natural resources. However, some developments like liberalization, privatization, globalization of capital markets, banking deregulation, technological enhancement, off-shoring production, etc. directed towards increased consumption in consumer goods, clothing, and electronics segment that brought lengthiest time of continuous growth with low inflation until the year 2007-08.

At two UN conferences, the 2011 Climate Change Conference (COP17) at Durban in November 2011 and Rio +20 in Rio de Janeiro in June 2012, consensus was made that time is running fast, and it is important to make quick changes, as otherwise we would lose out on sustainability. Observation was made, that the government was finding it difficult to initiate changes, because of non-cooperation from the corporates, since corporates thought the changes will have negative impact on business environment, (Banerjee 2012).

Some of the quotes stressing on exploiting the concept of circular economy models for business sustainability are reproduced below:

"The smart rebound of the European economy will require game-changing strategies, breaking the paradigms prevailing since the industrial revolution. Priority is to go beyond the linear economy, where stakeholders are in traditional silos. In addition to preserving natural resources, shifting to a circular economy offers an opportunity to create new sources of wealth. The emergence of innovative models leads to collaborative dynamics across industries, cities, and communities that reveal new fields of sustainable value creation, such as selling services instead of products, recovering resources from waste, sharing assets, and producing green supplies. Europe offers the perfect ground for a circular economy to truly take shape and for launching disruptive models. It represents a unique opportunity but will require true vision and leadership."

- Laurent Auguste, Senior EVP Innovation & Markets, Veolia

"On a planet of finite resources, the circular economy is not optional, it is inevitable. Its implementation will provide world economies with unprecedented opportunities, through the creation of reverse logistics networks, new processes, and new industries using the recovered resources. Resource efficiency will allow us to rethink the concept of urban mining. Countries will be able to create industries in fields that were previously not viable. Relatively simple changes to existing legislation can enable this shift in mindset on short timescales. Restructuring economies to become circular will moreover bring with it enormous environmental benefits."

- Hermann Erdmann, CEO, REDISA

"We might be recycling in Europe but we certainly aren't optimising – that's the key outtake for me from this 'Growth Within' report. From a business perspective, that presents an enormous opportunity for Europe. As one of the world's largest home improvement companies with a restorative ambition and a founder partner to the Ellen MacArthur Foundation, Kingfisher believes there's much merit in circular principles that move us from wasteful resource use towards keeping products and materials at their highest value as long as possible. We know this is not something any one business can do on its own – it requires collaboration throughout entire value chains. A transition requires investment in macro infrastructure. 'Growth Within' sets out the European opportunity presented by a circular economy with policy makers the enablers to a transition – it starts by agreeing a common circular economy definition and then ensuring all polices align with other European regulations to achieve the vision."

- Richard Gillies, Sustainability Director, Kingfisher

The three pillars of sustainability (Social, environment and economical) openly cover dimension of social welfare, which includes stakeholders' rights and societal well-being at large. On certain occasions there is a rift in societal stakeholders with regard to environmental concerns. (R. Gray *et. al.,* 2014; M. R. Mathews 1995). Moreover, sustainability concept is defined as meeting present needs without having compromise on future generations' need to meet the resources. (WCED 1987, p. 43), throws the notion that equity can be prevailed by emphasizing on developmental needs driving towards the sustainable direction. It raises the concerns on issue of resource utilization between present and future generation, inter-generational equity. Social justice and equity are the focal point of sustainability concept. (Haynes and Murray 2015).

Research Gap

Business literature does not carry much concrete thoughts on circular economy. The Chinese Govt. included the concept of circular economy in its 'Five Year Plans' (Zhijun and Nailing 2007). They are operationalizing it in China. Circular economy concept is now well researched in other parts of the world, and western countries are applying it heavily. It is also being supported by a number of NGOs. Consultants and 'think tanks' presented positional papers on the circular economy (Ellen MacArthur Foundation 2012; Preston 2012). With limited concept clarity, implementation of circular economy is in its nascent stage and there are gaps naturally in its application.

Achieving business sustainability is easier said than done. There are not many business models, which have been tried and tested. A business model should be robust enough to lead the transition to sustainable future. There is dire need to identify sustainable alternatives. Circular economy concept is becoming relevant and series of debates in academia and industrial circle have been happening on the theme, where deliberations on responsible business practices, and sustainable business were carried out (Russo and Tencati 2009; Junior *et. al.,* 2014; Dossa and Kaeufer 2014). Most of the deliberations were of preferential thought towards economic sustainability of business (Schneider 2014) over social and environment sustainability followed by ethical and moral values. (Besio and Pronzini 2014). However, there is not much research about different operations models, which could achieve business sustainability. Out of various alternatives, circular economy business models seem to be promising models to achieve business sustainability. The paper tries to reduce this vacuum in the literature.

Objectives

The paper examines 'Circular Economy' business approach towards business sustainability. Present paper aims to critically evaluate the role of circular economy operations models to achieve business sustainability. Following research questions are addressed in the paper:

- How the circular economy is being operationalized for sustainable business?
- Which operations models are being developed and are being used to achieve business sustainability?

- What is the role of new technologies in accelerating implementation of the approach of circular economy?
- What are the constraints and competence requirements in application of the Circular Economy?

Methodology

As mentioned earlier, there is hardly any academic literature available in Indian context on 'circular economy operations models'. For the purpose of this study, the authors selected case study and secondary data approach. The secondary data was derived from various reports, published material, summit proceedings and published records of informal discussion and interviews. The paper is basically based on studying business practices to achieve sustainability of businesses. The existing research and practices in the field have been analysed. An extensive literature review was carried out by the authors.

Evolving Circular Economy Operations Models For Business Sustainability

In circular economy, companies shift its focus to lean design, resource utilization, and reduced consumption which is driven by better pricing, product availability, and improved quality rather than focusing on cost reduction through supply chain, and more volume sales. Efforts are made to decouple growth from the use of depleting resources by use of business model innovation and disruptive technologies. The degree of involvement of companies is increased in use and disposal of products, greater emphasis on providing access to the products rather than just selling, and optimizing performance of the products along the whole value chain.

The broad areas of value creation in a circular economy are liquid markets, lasting resources, linked value chains, and long life cycles. Business Models are being developed based on these areas. 'Lasting resources' means regeneration of resources for better and productive use. The 'liquid market' means temporary customers who may have requirement for limited time, thereby increasing the customer base for the same level of goods. 'Long Life Cycles' means increasing the product life cycle by various methods. 'Linked value Chain' means recycling, reclaiming of resources.

Circular Economy Business Models

Based on the study of 120 companies, Accenture proposed five types of business models to achieve sustainability. Please refer Figure 6. Various examples from industry have been included in the paper regarding using these business models to gain circular advantage.

Circular Supplies: The model concentrates on providing recyclable or bio based inputs, renewable energy, which can substitute single life cycle inputs. Relevant for companies with a major environmental footprint or using scarce commodities. E.g. Cellulosic bio-ethanol developed by Royal DSM, in which

agricultural residue is converted into renewable fuel reducing emissions, creating jobs and also creating more revenue for the organization.

Resource Recovery: The model recovers and reuses resource outputs through technological innovations and capabilities. E.g. Walt Disney World Resort's organic wastes like food waste, cooking oils etc. are converted into renewable biogas to generate electricity good enough to power its own hotels and theme parks and the balance being supplied to Central Florida (US).

Product Life Extension: The model extends the product's life cycle and resources by way of repair, upgrade, or remanufacturing. E.g. Caterpillar has focused on returning components at end of life in the same fashion as they have been focusing on new or quality components. This has not only reduced the input cost, but has also resulted in waste reduction, emission of greenhouse gas and requirement for raw inputs. Google through its project 'Ara' is reinventing smart phone by breaking it down to replaceable modules to produce new ones as per customer requirements.

Sharing Platforms: The model facilitates sharing of low use resources and assets to increase their use resulting in enhanced productivity. e.g. lodging (Airbnb), which has the highest business volume in the hotel industry by connecting the people or hotels who are ready to provide accommodation, with customers who need accommodation, without owning any properties.

Product as a Service: The model promotes leasing out or pay-for-use system as compared to buy-to-own system. e.g. Philips selling lighting as a service.

Transformational Technologies

There has been big role of some transformational technologies to make the circular economy models. Table-1 gives the relationship between the disruptive technologies and Business Models. Some such technologies are:

- Digital Technologies like Mobile, Machine to machine, Cloud, Social, and Big Data Analytics are useful in 'Sharing Platforms', and 'Product as a Service' Models.
- Hybrid technologies like Trace and Return Systems, and 3D Printing help in 'Resource Recovery' and 'Product life Extension' models.
- Engineering Technologies like 'Modular Design Technology', 'Advanced Recycling Technology', and 'Life and Material Sciences' help in Circular Supplies and Resource Recovery Models.

Capabilities for Success of Circular Business Models

Successful adoption of circular business models requires new approach towards various functional areas and capabilities as mentioned below:

- **Business Planning and Strategy:** To boost business revenue business houses are becoming co-partners in product and service improvement loops rather than just keeping their focus on improving production, and higher sales margins.
- **Innovation and Product Development:** Collaboration and customer-focused design thinking will definitely pave the way for improved and innovative products.

- **Insourcing and Manufacturing**: Greater use of renewable materials with minimum environmental adverse impact.
- **Sales and Marketing**: Increasing revenue through greater use of products and services by more customers rather than by customers owning them.
- **Reverse Logistics and Return Chains**: Reducing logistics cost and holding the entire loop together including disposal and collection.

Some key aspects for successful implementation are identification of opportunities, Value to be delivered to customer, capabilities, technology and timing.

Limitations within the Circular Economy

Sustainable development of human kind involves three pillars viz. economy, society, and environment. The circular economy models till now have been putting more emphasis on economy and environment through redesigning of production and service systems. There is not much discussion on the societal concerns. Though some models talk of increase in employment, there is neither literature nor results to show how the evolving circular economy operations models will address the societal issues. The fear is that these models may not lead to social equality. Hence the operations models need to include societal needs into the basic formulation and conceptual framework.

While adopting a particular circular economy model, care needs to be taken to ensure that some positive sustainable activities do not lead to negative environmental outcomes. e.g. Ethanol production requires more fossil fuel than it produces, and this is causing loss of tropical forest in favour of soya fields for production of bio-fuel. Design of longer-lasting products would definitely lead to conservation of natural resources, but care needs to be taken that it does not lead to greater running and maintenance cost, and greater damage to the environment. e.g. Motor Vehicles may consume more fuel and may emit greater emission as the engines become older. A judicial trade-off between longevity and the running and maintenance cost including impact on environment is must.

Customer centric design thinking, and collaboration with cross functional teams can help organizations to create more value from the resources they use, as products are designed and produced as per needs of the customers, and features not required by the customers are removed at the stage of proto-type itself or when the test marketing is done before launching of full-fledged production. There is big scope of research in the areas of collaborative and design thinking approach for product development.

Conclusion

Circular economy brings in a vital and noteworthy school of thought in the direction of sustainable development, which is being implemented by country like China, as its primary framework for developmental economy, achieving economies of scale, and environmental change in the coming years. Circular economy, in terms of its usage, is still in its nascent stage and the authors suggest that it requires careful

definition, so that appropriate meaning can be provided to both the environment and society at large along with economic gains for business sustainability.

The objectives of the paper were to discuss the role of circular economy operations models in attaining business sustainability under the complex, changing and uncertain environment. Various prevalent and evolving operations models were discussed along with development of ten major disruptive technologies (Refer Table1), which have greatly facilitated more effective application of the various evolving models. Various managerial and organizational capability requirements to exploit the new framework were also identified.

Path to circular economy is not a cake walk. However, in view of inevitable scarcity of resources, organizations will have to develop suitable operations models to survive. They need to look for opportunities to adopt circular economy approach so that they are able to achieve enhanced productivity, reduce costs and risks, and gain differentiation. The product development path will need to be changed to one of design thinking, where the products and services are produced or provided to satisfy the need of customers resulting in higher value for customers and higher revenue and market shares for manufacturers/ service providers. The organizations will have to continuously look for trends in technology and decide whether to go for in-house development of capabilities or to go for mergers and acquisitions. In any case, they will need to continuously update their technological capabilities. This will also decide when to shift from linear model to circular model or to any other relevant model and what would be the pace of change. The key decision will be whether one would like to be the first mover with its advantages like technology leadership, loyal customers and supplier base, creating switching cost etc. but with risk of failure or would like to take a safer route as follower.

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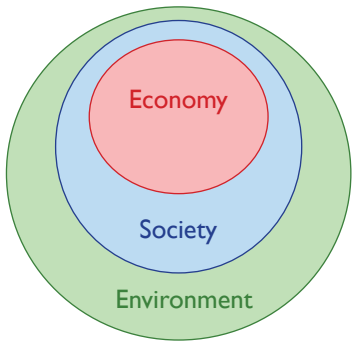
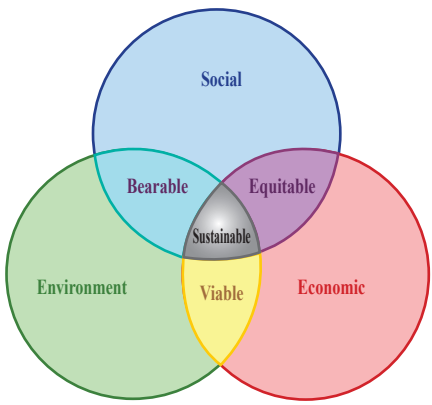
Figures & Tables

Figure 1: Three Pillars of Sustainability



Source: Scott Cato, M. (2009). Green Economics. London: Earthscan, pp. 36–37. ISBN 978-1-84407-571-3

Figure 2: Venn Diagram of Sustainable Development: at the Confluence of Three Constituent Parts



(Source: Adams, W.M. (2006). 'The Future of Sustainability: Re-thinking Environment and Development in the Twenty-first Century.' Report of the IUCN Renowned Thinkers Meeting, 29–31 January 2006

Figure 3: Linear Economy Model

Figure 4: Circular Economy Model

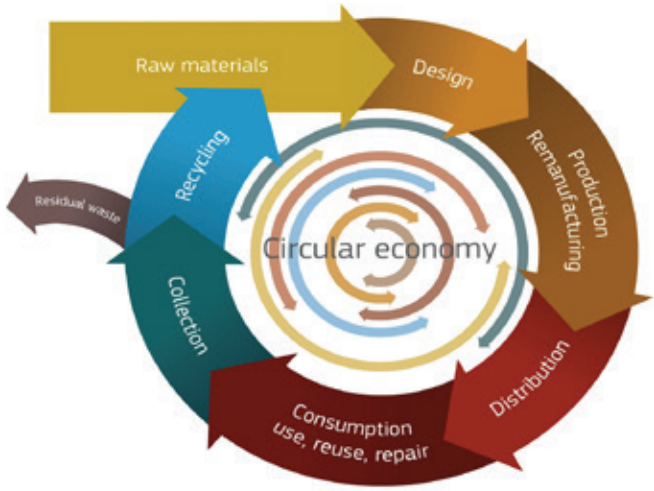
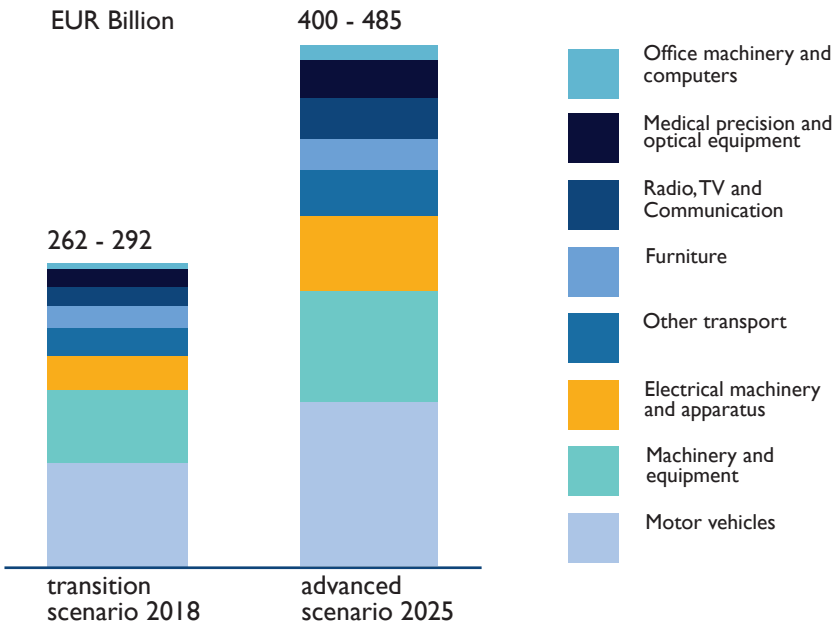
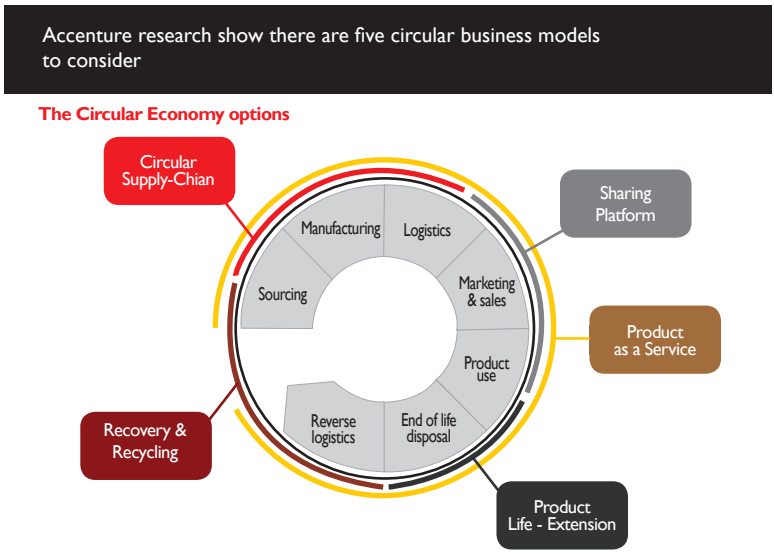


Figure 5: Economic and Ecological Value Creation through Circular Economy Model



Source: Ellen MacArthur Foundation, 2013, Towards the Circular Economy

Figure 6: Five Circular Business Models



Source: Circular Advantage-Accenture Report 2014

Table-1: Relationship between Technologies and Circular Business Models

Type of Technology	Business Models	Circular Supplies	Resource Recovery	Product Life Extension	Sharing Platforms	Product as a Service
Digital Tech.	Mobile			X	X	
	Machine to Machine				X	X
	Cloud				X	X
	Social			X	X	X
	Big Data Analytics	X			X	X
Hybrid Tech.	Trace and Return Systems		X	X	X	
	3 D Printing	X		X		
Engineering Tech.	Modular Design Tech.		X	X		X
	Advanced Recycling Technology	X	X			
	Life and material Sciences	X	X			

Note: 'x' indicates relationship

Source: Circular Advantage-Accenture Report 2014

ISSN 2249 - 9040 Volume 8, No 1, January-June 2018 pp. 81-96

Role of Green Marketing Awareness on Purchase Intention of Eco-Friendly Products

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Abstract

The green industry has become popular in recent years. With an increase in the public's environmental awareness, the trend of green consumption is moving into the market mainstream. Most people in developed countries regard environmental protection as an important factor in purchase decisions. With the increase in awareness of green marketing, consumers tend to buy more green products to protect environment. Companies tend to produce green products to create a public image and to attract more customers. Companies also see it as an opportunity to protect the environmental resources. The study aims at finding the impact of green marketing awareness and perceived innovation on purchase intention for green products. Convenience sampling technique was used to identify 210 respondents who use green products in Cochin. Data was collected using online and offline questionnaire. The data was collected between November 2014 and January 2015. The data collected was analyzed using SEM PLS. The study finds that green marketing awareness and perceived innovation has positive relationships with purchase intention. Perceived quality and perceived value also have positive relationship with purchase intention. These findings from the study will help companies to formulate better marketing strategies to sell their eco-friendly green products.

Keywords: Green Marketing Awareness, Purchase Intention, Perceived Innovation, Perceived Price, Perceived Risk, Perceived Quality

Introduction

Green marketing has become very popular in the past decade. With the increase in awareness of green marketing, consumers tend to buy more green products to protect environment. Companies tend to produce green products to create a public image and to attract more customers. Companies also see it as an opportunity to protect the environmental resources.

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When a company performs green marketing it can increase consumers' perception of high quality, purchase intention, and environmental perception of the products The goals of green marketing are as follows: (1) products should be developed to satisfy consumers in quality, function, price, and convenience as well as influence the environment the least; (2) products should establish a high-quality image (Ottman, 1999). Hence, one of the fundamental reason for consumers to purchase green products lies in the expectation of high quality in green products. Simon (1992) proposed that the quality of a green product is better than others. Thus, consumers will perceive the quality positively if they feel a product has green marketing characteristics.

The government in Kerala has been trying various measures to induce customers to buy eco-friendly products. One such measure was by the Kerala State Electricity Board which took an initiative to distribute 10 lakhs Chloro Fluorescent Lamps (CFL) to promote energy conservation. These lamps were given free to BPL and SC/ST consumers and at half price to APL consumers. In this context, this study is undertaken to find out whether green marketing awareness has any impact on purchase intention of green products. By the time this study was carried out better alternatives had emerged like the LED lamps and government distributed LED lamps also in a similar way.

Literature Review

Most people in developed countries regard environmental protection as an important factor in purchase decisions. With environment and environmental problems gaining importance for people, companies have started to change their production, goods or service generation, and hence marketing strategies accordingly. They have started to produce environment-friendly products and have tried to teach `Green Marketing` concept to the consumers.

Therefore, most companies offer green products to meet and satisfy consumer requirements and conduct green marketing initiatives to drive green consumption. Green marketing suggests that the entire lifecycle of a product, from materials acquisition, production, sale, and consumption, to the disposal of waste, has a minimum impact on the environment. It is a marketing model that puts the environmental protection concept into the product design, production, and service process. Green marketing is an indispensable strategy for companies involved in market competition. Meanwhile, consumers are actively trying to reduce their impact on the environment; however, this is not widespread and is still evolving. Therefore, the question of whether consumers are aware of green marketing performed by companies and whether this will increase consumer's purchase intention requires an in-depth discussion.

Perusal of studies conducted in this area helps to know that the variables that influence the purchase intention of eco-friendly products along with green marketing awareness is perceived innovation (Horn and Salvendy, 2006), perceived quality (Chaudhari, 2002), perceived value (Kaufman, 1998), perceived price (Suter & Hardesty, 2005) and perceived risk (Agarwal &Teas, 2001).

Perceived Quality is defined as a consumer's opinion of a product's (or a brand's) ability to fulfill his or her expectations. It may have little or nothing

to do with the actual excellence of the product, and is based on the firm's (or brand's) current public image, consumer's experience with the firm's other products, and the influence of the opinion leaders, consumer's peer group, and others. Perceived service quality is determined by the difference between expected services and perceived services (Parasuraman, Zeithmal &Berry, 1985). The different manifestations of perceived quality has been presented as an important factor for customers' satisfaction and that higher perceived quality will lead to higher purchase intention (Chaudhari, 2002), perceived value was found to be derived from perceived quality which in turn determined purchase intention (Zeithaml, 1988, Dodds *et. al.,* 1991, Petrick 2004, Tsiotsou, 2006).

While introducing an innovative product, many companies keep the price high, so the prices of innovative products are usually higher (Kotler & Armstrong, 2008). Furthermore, most consumers think that innovative products have new functions or better utility, so their prices will be relatively higher. Since consumers interested in an innovative product tend to like exciting and novel things, they are willing to take risks and pay more. NPD (2010) investigated consumers' perception and attitudes about innovative products and also found that consumers thought innovative products were worth higher prices. Bruce and Abhijit (2002) indicated that when consumers perceive that a price is high, they feel what they paid is more than what they gained, so the perceived value decreases. Therefore, they proved that perceived price has a direct negative influence on perceived value. Previous research has also found that price has a direct negative influence on perceived value.

Tsai and Lee (1999) argued that perceived price indicates consumers' sensitivity to price variation: people with greater price perception were described as being less willing to purchase products. Suter and Hardesty (2005) pointed out that consumers' perceived price has significant influence on their purchase intention. When the price of a product is obviously high, consumers think they are treated unfairly, and the purchase intention decreases.

Kassarjian (1971) discovered that consumers' concern about environmental pollution was a crucial variable that made them willing to purchase green products on a higher price. The TNS Green Gauge's study discovered that 74% of consumers thought that green products were worth higher prices. Boston Consulting Group's investigation showed that 82% of consumers were willing to pay more for green products. It is thus obvious that most people in various countries are willing to spend extra money for green products. Thus, consumers tend to have higher price perception toward the green products.

Wood and Scheer (1996) regarded perceived risk as a necessary cost to obtain a product that influences the perceived value through overall trade evaluation. Agarwal and Teas (2001) suggested that a significantly negative relation exists between perceived risk and consumers' perceived value. For consumers, perceived risk is an invisible cost when purchasing products, and it has direct negative influence on perceived value. When consumers make purchase decisions, they evaluate risk, and when their perceived risk of a product is high, their perceived value of the product is lowered.

Taylor (1974) considered that before purchasing, consumers perceive the risk a product could generate; this type of risk reduces consumers' purchase impulse

because they want to avoid unpleasantness after the purchase. Shimp and Bearden (1982) and Garretson and Clow (1999) also found that when consumers have high-perceived risk, their purchase intention is reduced.

Sheth (1981) considered that innovation resistance mainly came from the consumer's behavioral habits and the perceived risk of adopting innovation. Ram (1989) brought up three factors of innovation resistance: risk, the necessity for more information, and the previous structure of faith. All these obstacles increase consumers' perceived risk of innovative products.

'Perceived value' is an important marketing concept. It lies at the heart of marketing and deals solely with the customer's perception of a product. Perceived value is a consolidated measure because it takes into account subjective perceptions with limits placed on it by price and other objective costs. 'Perceived value' becomes significant when the products are very similar to each other. The perception of value is the preceding factor of satisfaction level, whereas the satisfaction level acts as a resulting factor. That is, perceived value is the factor of satisfaction level. According to Ajzen (1991), 'intentions are assumed to capture the motivational factors that influence a behavior. They are indications of how hard people are willing to try, or how much of an effort they are planning to exert, in order to perform the behavior.' Further emphasis was put on the fact that 'when people have the strong intention to engage in the behaviour, they will be more likely to perform the behaviour'. Kaufman (1998) considered that perceived value could be used to discover customers' desire, demand, and exchange value for goods or services when deciding whether or not to purchase. Perceived value is consumers' subjective perception; it is relevant to consumers' emotional response and consumption experience and further influences consumer behavior (Dumana & Mattilab, 2005).

Rizwan *et. al.,* (2013) found that green perceived value is positively associated with green purchase intention. Since the value of a product in a consumer mind will establish a trust and therefore will also encourage the consumers' purchasing behavior. Thus, high-perceived value increases consumers' purchase intention.

The motive for consumers to purchase green products is that green products provide extra value, such as high security and environmental protection (Manget, 2009). If consumers perceive the functions and effects of green goods, their perceived value of green marketing will definitely improve (Yan & Chang, 2006). To take energy-saving lamps as an example, if consumers think that these lamps can save energy and reduce carbon emissions in ways that meet the principles of environmental protection, such as reducing, reusing, and recycling, they will think purchasing energy-saving lamps is valuable behavior. Thus, the greater is the consumers' perception of a product's green marketing, the higher the perceived value is. The positive purchase intention to buy eco-friendly products has been demonstrated in a number of studies (Balderjahn, 1988, Ottenbacher and Gnoth 2005). Burst Media's (2010) investigation showed that consumers believing in the green concept were willing to spend more money to purchase green organic products. Environmental advertisements and Ecological packaging are positively related with the green purchase intention.

Along with green consciousness, innovation is another important aspect that

influences consumers' purchase intention and market performance. Meanwhile, considering green marketing as an opportunity for innovation, Freeman (1982) suggested that 'not to innovate is to die'. Thus, a company must constantly innovate in order to survive in a competitive environment. Hurley and Hult (1998) found that almost all industries are engaged in innovative activities in a dynamic market. Many studies have found that product innovation brings positive value towards the product in the minds of customers (Rogers, 1995, Weerawardena, 2003, Tsai *et. al.,* 2010, Kwaku, 1995). Technological and service innovations are seen to improve customer value. Innovations in a product makes the customer to think that the product benefits are more than the previous versions of the product (Holak and Lehmann,1990). Horn and Salvendy (2006) found that if consumers were provided more detailed information on innovative products, their purchase intention would be positively stimulated. However, the question of how consumers perceive the companies' innovation strategies and how effective they are requires further exploration.

In addition to green marketing and innovation aspects, there are the between-antecedent mediator variables and consequence variables (such as purchase intention). Monroe and Krishnan (1985) proposed that consumer perception of product price is an indicator of perceived quality and perceived sacrifice, and perceived value can be obtained by comparing the perceived quality and perceived sacrifice. This perceived value affects purchase intention. On the other hand, higher perceived risk hinders consumers' purchase intention.

Hypothesis Formulation

This study aims to investigate the impact of green marketing awareness and perceived innovation of green products on purchase intention. From the literature review it was found that Green Marketing Awareness of a consumer has positive influence on perceived quality, perceived price, perceived value and purchase intention and has negative influence on perceived risk. Thus, hypotheses H1 to H5 is formulated on this basis.

H1: Green marketing awareness of a consumer towards a green product has a positive influence on consumer's perceived quality.

H2: Green marketing awareness of consumer towards a green product has a positive influence on consumer's perceived price.

H3: Green marketing awareness of consumer towards a green product has a negative influence on consumer's perceived risk.

H4: Green marketing awareness of consumer towards a green product has a positive influence on consumer's perceived value.

H5: Green marketing awareness of consumer towards a green product has a positive influence on consumer's purchase intention.

Furthermore, it is also hypothesized that Perceived innovation has positive influence on perceived quality, perceived price, perceived value, perceived risk and purchase intention (H6 to H10).

H6: Consumer's perceptions on product innovation will positively influence consumer's perceived quality.

H7: Consumer's perceptions on product innovation will positively influence consumer's perceived price.

H8: Consumer's perceptions on product innovation will positively influence consumer's perceived risk.

H9: Consumer's perceptions on product innovation will positively influence consumer's perceived value.

H10: Consumer's perceptions on product innovation will positively influence consumer's purchase intention.

Literature also supports relation between perceived quality, perceived price and perceived risk on perceived value and purchase intention on the basis of which H11 to H16 are formulated.

H11: Consumer's perceived quality towards a green product has a positive influence on consumer's perceived value.

H12: Consumer's perceived quality towards a green product has a positive influence on consumer's purchase intention.

H13: Consumer's perceived price towards a green product has a negative influence on consumer's perceived value.

H14: Consumer's perceived price towards a green product has a negative influence on consumer's purchase intention

H15: Consumer's perceived risk towards a green product has a negative influence on consumer's perceived value.

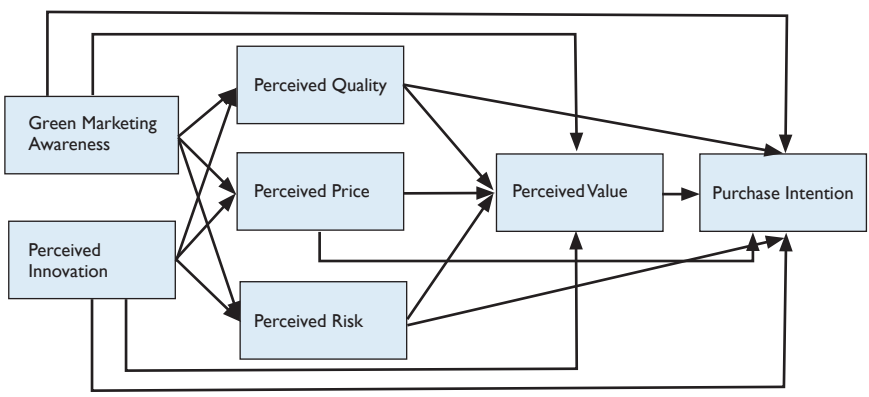
H16: Consumer's perceived risk towards a green product has a negative influence on consumer's purchase intention.

The effect of perceived value on purchase intention is formulated as H17.

H17: Consumer's perceived value towards a green product has a positive influence on consumer's purchase intention.

Thus, the following conceptual model, presented in Figure-1, is being tested in this study.

Figure-1: Conceptual Model



Research Methodology

The study is conducted with an objective to understand the relationship between green marketing awareness and purchase intention as well as to understand the relationship between perceived innovation and purchase intentions. A descriptive research design is followed. Through convenience sampling, 210 respondents, who have purchased green products like CFL bulbs were selected.

Data Collection

The respondents were from Cochin City. Convenience sampling technique was used. The questionnaire was administered through the social media. Data was collected between November 2014 and January 2015.

The research instrument/questionnaire is divided into eight sections: green marketing awareness (Chen and Kao (2005)), perceived innovation (Betz (2003)), perceived quality (Petrick (2002)), perceived price (Petrick (2002)), perceived risk (Kaplan (1974)), perceived value (Sweeney and Soutar (2001)), and purchase intention (Dodds, Monroe, and Grewal (1991) and Bei and Yu (2001)).

The questionnaire items were rated using a 7-point Likert Scale, ranging from (1) strongly agree to (7) strongly disagree. Data was analyzed using SEM in Warp PLS 3.0 to investigate the entire model.

Reliability of the Instrument

The Cronbach's α in each of the variables was greater than 0.7 (Table-1). Reliability was assessed in terms of composite reliability, which measures the degree to which items are free from random error and therefore yield consistent results. Composite reliabilities in our measurement model ranged from 0.78 to 0.90, above the recommended cutoff of 0.70 (Fornell & Larcker, 1981; Nunnally & Bernstein, 1994). The average variance extracted (AVE) for all the factors was greater than or equal to 0.5, which is acceptable (Fornell & Larcker, 1981).

Table-1: Reliability Measurements

	Green marketing awareness	Perceived innovation	Perceived quality	Perceived price	Perceived risk	Perceived value	Purchase intention
Composite reliability	0.785	0.839	0.849	0.731	0.693	0.792	0.802
Cronbach's alpha	0.787	0.783	0.773	0.735	0.739	0.871	0.788
AVE	0.518	0.570	0.543	0.517	0.668	0.634	0.665

Source: Primary Data

Data Analysis and Results

Demographic Characteristics

49% of the respondents of the respondents belong to age bracket of 20-30. This category has high knowledge about technological advancement in green products. They are highly conscious about environmental issues. 23% of respondents were aged between 30-40. 18% respondents belong to 40-50 age bracket and 10% were

aged between 50-60. 52% of the respondents are married. This implies that families give a great importance to green products since it's a major concern regarding their health. 57% of the respondents were females. They are the major purchase decision makers of Indian families. 31% of the respondents are post-graduates and 68% are graduates. Respondents are of different occupational background. 26% of the respondents are students. 11% are housewife; 15% are IT professionals, 11% are engaged in own business and 37% belong to various other categories.

Majority of the respondents purchase green products to reduce the impact on health. The other main reason for the purchase is to save natural resources. Society concern on nature and environment are increasing these days so that drives the customers to purchase green products. Other reason to purchase green product is societal image.

Majority of the consumers purchase green food and beverages products. This is because of the rise of awareness on health. Consumers tend to buy food products, which have less harm to the human body. Other main green products, which are purchased, are personal hygiene products. Products like green lighting, clothing and accessories are also sold in large numbers.

The source of awareness of green products is from friends and family for most of the respondents. Internet is another main source through which information has been passed. Events and newspaper articles on green products are other sources of information.

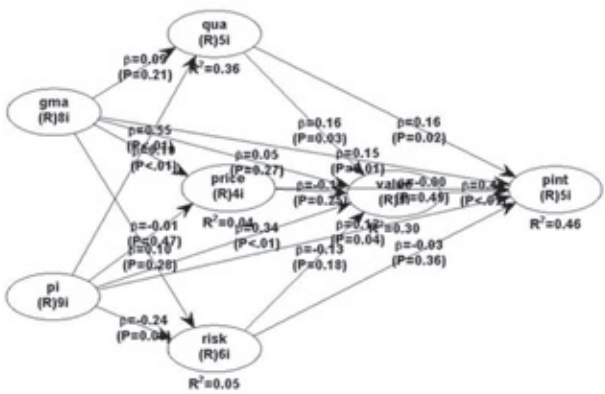
Model fit

The model fit can be evaluated by looking at the values of Average path coefficient (APC), Average R-squared (ARS) and Average variance inflation factor (AVIF).

The value of APC should be lesser than P<0.001 and AVIF should be lesser than 5.

From Table-2, it is clear that the Model Fit Indices are well within the accepted range. Figure-2 shows the model that was developed on the SEM-PLS in Warp PLS 4.0 for over all fit.

Figure-2: SEM Model



Source: Primary Data

Table-2: Model Fit

Model fit indices	
APC	0.166(P<0.001)
ARS	0.240 (P<0.001)
AVIF	1.461

Source: Primary Data

Table-3 shows the p values which helps in deciding which of the hypotheses can be accepted and which can be rejected.

Table-3: P value

	Green marketing awareness	Perceived innovation	Perceived quality	Perceived price	Perceived risk	Perceived value	Purchase intention
Green marketing awareness							
Perceived innovation							
Perceived quality	0.210	<0.001					
Perceived price	0.005	0.466					
Perceived risk	0.284	0.089					
Perceived value	0.271	<0.001	0.028	0.245	0.180		
Purchase intention	0.012	0.040	0.022	0.357	0.357	<0.001	

Source: Primary Data

Hypotheses reg. Green Marketing awareness and Perceived Price (H2), Green Marketing Awareness and Purchase Intention(H5), Perceived Innovation and Perceived Quality (H6),Perceived Innovation and Perceived Risk (H8),Perceived Innovation and Perceived Value (H9), Perceived Innovation and Purchase Intention (H10), Perceived Quality and Perceived Value (H11), Perceived Quality and Purchase Intention (H12), and Perceived Value and Purchase Intention (H17) is accepted since the P value is less than 0.1 for these hypotheses.

Path Coefficients

The path coefficients values are shown in Table-4. From the model we can see that the path coefficients are all positive which means they have a positive relationship. The structural model path coefficients can be interpreted relative to one another. If one path coefficient is larger than another, its effect on the endogenous latent variable is greater.

A unit standard deviation in Perceived innovation will lead to 0.55 standard deviation in perceived quality.

Table-4: Path Coefficients

	Green marketing awareness	Perceived innovation	Perceived quality	Perceived price	Perceived risk	Perceived value	Purchase intention
Green marketing awareness							
Perceived innovation							
Perceived quality	0.087	0.550					
Perceived price	0.193	-0.008					
Perceived risk	-0.101	-0.238					
Perceived value	0.050	0.340	0.160	-0.103	-0.130		
Purchase intention	0.150	0.120	0.157	-0.002	-0.031	0.402	

Source: Primary Data

Findings

Consumers' green marketing awareness has a positive impact on perceived price (H2). As the awareness of the green product increases consumers perception about the price will also increase. Green marketing awareness creates a positive impact on the product as to how it is manufactured, its positive impact on the environment etc. Also the impact on perceived value is increased and perceived risk decreases. When the awareness of a product increases, the perceived risk decreases. This will lead to increase in purchase intention. Since green products try to reduce the negative impact of the product in the environment or increase the positive impact of the product in the environment they're increasing the perceived value in the minds of the customer.

Green marketing awareness has a positive influence on consumer's purchase intention (H5). When the awareness about green products increases consumers tend to buy more green products. When the awareness about green products increase; consumer's awareness about environmental issues and the impact of non-green products on environment also increase. This leads to the purchase of green products.

Consumer's perception on product innovation will positively influence on consumer's perceived quality (H6). When a highly innovative product is introduced in the market, consumer's perception of the quality of the product also increases. Consumers perceive that highly innovative products are of superior quality and the risk associated with it is less.

Consumers' perceived innovation has a positive influence of perceived risk and perceived value (H8 & H9). This indicates that when consumers perceive the innovation of a green product, they will further perceive the quality changes, which strengthens their recognition of quality.

Consumers' perceptions on product innovation will positively influence on consumers purchase intention (H10). When the perceived product innovation of the product is high consumers will have a tendency to buy the product. Innovative product always attracts consumers. They always have a tendency to use the products and to achieve the benefits associated with the products.

Consumers' perceived quality has a significantly positive influence on perceived value and purchase intention (H11 & H12). This indicates that when consumers perceive higher product quality, they also perceive better value, which leads to stronger purchase intention.

Consumers' perceived value has significantly positive influence on the purchase intention (h17). The higher consumers' perceived value of green products is, the higher the tendency to have green consumption is. That is, consumers' purchase intention depends on the perceived value of products, and when the perceived value is high, the purchase intention will also be high.

Thus the study finds that green marketing awareness has a positive influence on perceived price and purchase intention. Consumer's product innovation has a positive influence on perceived quality, perceived risk, perceived value and purchase intention. Consumer's perceived quality has a positive impact on perceived value and purchase intention. Consumer's perceived value has a positive influence on purchase intention.

Discussion

A similar study was conducted by Wu and Chen in 2014 among Taiwanese consumers who were older than 20 years in age. Some of the results of this study were similar to the study conducted among the Taiwanese consumers. Hypotheses H5, H6, H8, H9, H11, H12 and H17 were supported in both the studies whereas H1, H3, H4, H7, H13 and H16 were supported in Taiwan but not supported in the present study. Hence, Taiwanese consumers thought there is a positive influence of green marketing awareness on perceived quality, perceived risk and perceived value, perceived product innovation has a positive influence on perceived price, perceived price has a negative influence on perceived value and perceived risk has a negative influence on purchase intention. Thus, cultural differences vary the consumers' responses towards green marketing initiatives of companies. In the Indian context there are a number of studies looking at the green marketing initiatives of companies and its benefits (Ramakrishna 2012, Tara, Kumar and Singh, 2015) but there are hardly any studies that examine the relationship between green marketing awareness and purchase intention.

Managerial Implication

The study showed that green marketing awareness has the maximum influence on purchase intention. This indicates that higher the consumer's perception about green products, higher is consumers purchase intention. Green marketing awareness has greater effect than perceived innovation. This means that managers should concentrate on green marketing awareness than on innovation to increase purchase intention. Manufacturers can bring innovative methods of promotion, production, technology etc.

Limitations of the Study and Scope for Further Research

Study is conducted by taking Compact Fluorescent Lamp as a green product.

Much advancement has been taken place since CFL lamps like LED bulbs that is more energy efficient. The results of the study cannot be generalized for all categories of green products. The perception, usage and technology associated with each of these products vary. So to understand purchase intention of consumers the study can be done on varied product range. Control variables like age, sex, and marital status can be added to the model. This will help in deeper understanding of the study.

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ANNEXURE

Questionnaire

- Name
- Age
- Occupation
- Gender
  - Male
  - Female
- Marital Status
  - Single
  - Married
- Education
  - Post Graduation
  - Graduation
  - Higher Secondary
- What are the reasons for buying green products?
  - Trendy
  - Save natural resources
  - Societal image
  - Health
  - Other
- Which are the green products that you're currently buying?
  - Food and Beverages
  - Cloths and Accessories
  - Lights
  - Personal hygiene products
  - Other
- What are the sources to know about green products?
  - Newspaper
  - Friends and family
  - Internet
  - Events
  - Other

1. Strongly Agree 2. Agree 3. Moderately Agree 4. Neutral
5. Moderately Disagree 6. Disagree 7. Strongly Disagree

Questions	1	2	3	4	5	6	7
Compact Fluorescent Lamp can reduce environmental pollution							
CFL is a green product							
The production of CFL can reduce the waste of resources							
CFL meets the concept of carbon reduction							
CFL comply with environmental protection concept							

Questions	1	2	3	4	5	6	7
CFL enable consumers to pay attention on environmental issues							
CFL can meet social responsibility							
Using CFL is right behavior							
CFL is an improved product							
CFL has innovation concept							
The function of CFL has great difference							
CFL has different design							
CFL can save more							
The energy saving effect of CFL is stronger							
CFL has a creative promotion method							
CFL can attract consumer							
The innovation idea of CFL is outstanding							
The quality of CFL is superior							
The quality of CFL is stable							
The quality of CFL is reliable							
The quality of CFL is high							
The quality of CFL is effective							
The price of CFL is expensive							
The price of CFL is costly							
The price of CFL is higher than the ordinary lamp							
The price of CFL is higher than my expectation							
I am afraid that CFL is unvalued							
I am afraid that CFL cannot meet the expectation							
I am afraid that CFL cannot ensure its safety							
I am afraid that CFL cannot protect my health							
I am afraid that CFL is useless							
I am afraid that CFL is ineffective							
CFL gives me extra value							
It's worth to pay more money for CFL							
CFL has high utility							
CFL can meet my requirement							
CFL gives me more benefits than the costs							
I like to purchase CFL							
I will pay more money on CFL							
I will take CFL as a first consideration							
I will repeat purchasing CFL							
I will recommend other people to purchase CFL							

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