



ISSN 2455-684X

TKM INTERNATIONAL JOURNAL FOR RESEARCH IN MANAGEMENT

QUARTERLY JOURNAL | Volume 1 | Issue 1 | 2016

City of Publication: Kollam

Annual Subscription Charges: ₹ 1000/-



TKM INSTITUTE
OF MANAGEMENT



The Legacy of TKM College Trust

The TKM College Trust was founded by Janab A.Thangal Kunju Musaliar, a successful industrialist, philanthropist and businessman. Born in a middle class family on 12th January 1897 at his ancestral home in Kollam. Janab Thangal Kunju Musaliar built up a vast business empire which dominated the cashew export trade in the 1940s and 50s. As a man of extra ordinary vision, he foresaw the tremendous importance of education and this led to the establishment of the TKM College Trust in the year 1956. T.K.M. College of Engineering, the first private Engineering College in Kerala, was set up by the Trust in 1958 followed by the T.K.M. College of Arts and Science in the year 1965. Janab Musaliar passed away on 19th February 1966 after an illustrious career that paved the way for advancement of professional education in Kerala.

True to the vision of its founder, the TKM College Trust has, over the years, added several other educational institutions to its fold - The TKM Institute of Management in 1995, The T.K.M. School of Communication & Information Technology in 1996, the T.K.M. Centenary Public School in 1997, the T.K.M. High School and T.K.M. Higher Secondary School in 2000, the T.K.M. Institute of Technology in 2002 and the T.K.M. School of Architecture in 2014.

Today, the dream of the late Janab A. Thangal Kunju Musaliar of uplifting society through education has to a large extent been fulfilled. His life exemplifies greatness in its true sense. Several of his initiatives, innovations and achievements are standing monuments in the changing national and global scenario. No wonder that the Government of India has thought it fit to issue a commemorative stamp in recognition of the services of this great man in 2001.

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**TKM INSTITUTE OF MANAGEMENT
Kollam, Kerala, India**

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Changing Perspective of Management Education in Kingdom of Saudi Arabia

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ABSTRACT

The model Potential Performance Programming (PPP) devised by Shamsudeen was put in to test among 100 students of Jazan University. Innovative pedagogues, group discussion and other educational audio-video Clippings were employed to the fullest extent for ensuring the maximum involvement of students during the process. The study was undertaken during August 2015 and October 2015. The output was measured in terms of their performance in the Midterm examination 2015 for the spring semester and their interest in other academic and non-academic assignments. The PPP model is designed based on Eastern philosophy of management giving due respect to Islamic culture, values and Saudi tradition. The findings of the study proved that intellectual, emotional and creativity of the students have enhanced through PPP and also they were able to secure high marks in the midterm examination. Out of seven dimensions that have been studied, in as many as four dimensions in-house students have shown consistency in their rigidity, except that of Intellectual, emotional and creative rigidities during Pre-midterm session. This shows that overall personality is rigid before attending the lecture sessions. However after attending 10 sessions, they have scored minimum coefficient of variation for intelligent emotional rigidity and creative rigidity. This shows that they have associated as business professional and have a flair for creativity. By tapping more on these dimensions will reduce the absenteeism and motivate the students more for pursuing higher goals in their career and life.

Keywords: *Potential Performance Programming, Intellectual rigidity, Emotional rigidity*

I. INTRODUCTION

THE Potential Performance Programming (PPP) model (Shamsudeen, 2000) is derived as an alternative approach to general systems theory as suggested by Bouldings (1956). This is based on the arrangement of theoretical systems and constructs in a hierarchy of complexities, roughly corresponding to the complexity of individuals in an organizational set up. The model comprised of seven levels based on every individual's present state of awareness regarding their directions (where do they want to go) and their positions (where are they now). The first level in the PPP model is static as they do not have much idea about their task or latest information on their domain of

knowledge. The second stage is pertained to dynamic nature as they slowly connect with outside world with predetermined notions like level of a clock works.

The third level in the PPP model is the control of mechanism or cybernetics like a thermostat. As they proceed further certain knowledge are convinced while some of these knowledge are not endorsed personally. The fourth level is open system as they explore further, all barriers are removed and started formulating their own theories or knowledge like that of a cell – a self sustaining one. The fifth level in the PPP model is that of a Plant where in growth is predetermined, blue printed but very slow and only organic but with little variations based on the situational and environmental context.

The sixth level in the PPP model is that of an animal where in they has acquired mobility, self awareness and possesses technological behavior as well. The apex level is human level wherein every individual is self conscious, concern about their content and meaning of messages and nature and dimensions of their value system. Hence PPP model convert the passive knowledge possess by every individuals into active one by streaming through a process of complexities and self realization.

II. GENESIS OF THE STUDY

The Kingdom of Saudi Arabia has been rated as the 22nd most economically competitive country in the world, according to the International Finance Corporation (IFC) -World Bank's annual "Doing Business" report issued for 2015. According to latest World Bank estimates, GDP of KSA has grown impressively during global meltdown from USD 214.573 billion in 2004 to USD 876.824 billion in 2015.

Saudi Arabia is currently enjoying a massive boom in its personal computer industry since the deregulation of 2002. PC per capita has exploded to nearly 43 per cent of the population in 2015 from just 13 per cent in 2002 leapfrogging over the rest of West Asia. Saudi Arabia Consumer Spending averaged SAR 295,970.39 Million from 2008 until 2015, reaching an all-time high of SAR 300,411 Million in May of 2015. The government has begun establishing six "economic cities" in different regions of the country to promote foreign investment and plans to spend \$473 billion on social development and infrastructure projects to advance Saudi Arabia's economic development.

Over five million foreign workers play an important role in the Saudi economy, particularly in the oil and service sectors. Riyadh has substantially boosted spending on job training and education, most recently with the opening of the King Abdullah University of Science and Technology - Saudi Arabia's first co-educational university. The mismatch between the job skills of Saudi graduates and the needs of the private job market at all levels remains the principal obstacle to economic diversification and development; about 4.6

million non-Saudis are employed in the economy. Further, Saudi Arabia is encouraging the growth of both private and public sectors in order to diversify its economy and to employ more Saudi nationals

It may be noted that Government Spending in Saudi Arabia has increased to SAR 255,108 Million in the second quarter of 2015 .In order to support the booming national economy, the Universities in KSA has to play an important role to supply the trained professionals to take the national agenda forward. Thus, the socio-economic scenario prevalent in this country clearly reflects that our educational service needs more impetus. At the turn of the 2015, Saudi Arabia has inherited a system of higher education which is rigorously intellectual, widely diversified and helpfully social and utilitarian. Nevertheless, it is geared to achieve material wealth rather than build human resources by following western style. The economic liberalization made many MNCs entering in KSA with greater business aspiration and is finding it difficult to recruit local and national talents to steer their business and join hands with national development. They are anxiously looking for Saudi Universities to supply quality professional to equip them with more business prosperity.

Meeting uncertainty by emphasizing a set of new basics world class quality and service, enhanced responsiveness and continuous short cycle innovation and improvement aimed at creating global market for both new and apparently mature educational courses/programs will be tune of the game in 2014-20. The role of University and Management Education has to be examined in the context of supporting booming economy and business in Jazan. For this purpose a model was put to test to measure the rigidity of students who undergo BBA currently in the Jazan University campus.

III. MANAGEMENT EDUCATION IN KSA

Kingdom of Saudi Arabia does not enjoy a fairly old history in terms of systematic management education. In the 21st century the management education faces following challenges:

- i. Diversity in Methodology, Curriculum and infrastructure available in different Saudi Universities.
- ii. Industry - Academic linkage
 - The extent of job and training assurance to management graduates.
 - The type of practical exposure.
 - The relevance of the curricula for the industry.
- iii. Faculty
 - Demand for trained faculty to impart education.
 - Heavy dependence on Migrant faculty.
- iv. Infrastructure
 - Imparting the courses mostly in traditional way.
 - Less adaptation of Smart board teaching, video conferencing and IT in teaching and learning
- v. Research & Development
 - Management and market Research and its relevance to the industry
 - Executive development Programs such as Accelerated Learning Programs (ALPs), Sectorial and Management Development Programs (MDPs)
 - In house trainings and workshop for the faculty and students
 - Consultancy to industry
- vi. Ethics and excellence
 - Ethics in dealing with faculty, students, staff, community, industry and accreditation.
 - Recognition of excellence in Islamic culture

The realization of goals and objectives of higher education have been limited in the present education systems. In general, it has been observed widely that the students' goal is to get a degree (without study) and a job (without difficulty); the teachers wish to teach less and give more marks. Vacant posts and unemployment co-exist indicating the mismatch between university products and country's needs.

The present science, technology and management education has produced very few right type of manpower who is having the local problem-solving capabilities. The educational institutions recruit TAs and launch them straightaway on the teaching career to face large

classes. Rarely the Selection Board would concern itself whether the candidate has a calling for the vocation. When that happens, the classroom environment will be transformed. The young Saudi recruit learns by trial and error, by which the performance in the classroom becomes staler and staler, with each passing year. Gradually it ends in apathy towards the profession, which is sufficient to kill the excitement on entering a lecture hall. The teacher has to keep before him his role as a dynamic information-processing model, which demands his own assessment of facts and figures that he uses during his lecture.

IV. EMPIRICAL STUDY

The economic liberalization has made many MNCs to enter KSA, searching for highly talented and result oriented Saudi nationals in the form of BBAs, but at an affordable cost to take over the complete responsibility of shaping new and existing business. With all this a random sampling of the BBAs Saudi universities revealed a stunning surprise. Out of the 1025 BBAs surveyed, 352 were jobless of which 123 had completed BBA two years ago. Of the 673 employed only 315 of them were in middle level executive position and others merely sticking on to their job mostly doing customer service job after completing BBA with Finance and Systems specialization.

Where and what are they lagging? The answer is simple. They are unable to sell themselves to the employer or they are unable to perform what is called 'the speed and the efficiency'. The reasons were analyzed as follows:

1. Poor knowledge and focus on the subject (28 per cent)
2. Lack of communication (29 per cent)
3. Failure to make impression at the first sight (19 per cent)
4. Lack of practical knowledge and exposure (24 per cent) and

In the light of these facts, the authors of the paper set the following objectives:

1. To identify and locate the existing level of intellectual, creative, emotional, behavioral, dispositional, social and perceptual rigidities among the in

house students of Jazan University College of Business Administration.

2. To undertake comparative analysis among in house students of Jazan University College of Business Administration vis-a-vis various dimensions, after the academic lecture deliveries assuming that the variables are predominantly a function of the potential performance programming learning process.

V. THE APPROACH

The model PPP devised by Shamsudeen (2000) conceived 'Nature' as a source of inspirations and activities. The PPP model is derived as an alternative approach to general systems theory as suggested by Bouldings (1956). This is based on the arrangement of theoretical systems and constructs in a hierarchy of complexities, roughly corresponding to the complexity of individuals in an organizational set up. The model comprised of seven levels based on every individual's present state of awareness regarding their directions (where do they want to go) and their positions (where are they now). The first level in the PPP model is static as they do not have much idea about their task or latest information on their domain of knowledge. The second stage is pertained to dynamic nature as they slowly connect with outside world with predetermined notions like level of a clock works.

The third level in the PPP model is the control of mechanism or cybernetics like a thermostat. As they proceed further certain knowledge are convinced while some of these knowledge are not endorsed personally. The fourth level is open system as they explore further, all barriers are removed and started formulating their own theories or knowledge like that of a cell – a self sustaining one. The fifth level in the PPP model is that of a Plant where in growth is predetermined, blue printed but very slow and only organic but with little variations based on the situational and environmental context.

The sixth level in the PPP model is that of an animal where in they has acquired mobility, self awareness and possesses technological behavior

as well. The apex level is human level wherein every individual is self conscious, concern about their content and meaning of messages and nature and dimensions of their value system (Prahallada, 1995). Hence PPP model convert the passive knowledge possess by every individuals into active one by streaming through a process of complexities and self realization.

The Innovation/Creation/ Creativity are viewed as a synergy of past, present and future on a 'Time' scale with positive and negative frame in the conceptual world of business. This can be viewed from a holistic principle based on the Holy QURAN (*Surath'al Yaseen*) and Preachings of Prophet Muhammed (Peace be Upon Him). Focus on the individual is given through 'vision' created through symbols and tree of life in all dimensions, based on Eastern Philosophy in line with Islamic principles. The concept of normality/limits is explained through the 'Struggle' associated with each and every activities of an employee including the process of giving birth and death.

The internationalization of business is explained with the help of price/production waves, global networks and market forces. The cyclical nature of waves flow is well explained to the future managers. However the emphasis is given more on tuning every participant's mind into 'happiness'.

The duality/illusions of life are explained with the help of common observations from everyone's daily life. The ways and means of achieving self-realization is purely exposed to the employees through 'Trinity' concept. The perfect co-ordination of 'mind', 'body' and 'spirit' through Salah and reciting the Holy QURAN (*Surath'al Yaseen*) and Preaching of Prophet Muhammed (Peace be Upon Him) is the real objective of this exercise. The proposed model helps the student's priorities and needs in harmony with organization objectives. This also provides ways and means to tackle frustrations in the learning environment and knowledge enrichment. This model helped many Asian companies to restructure themselves as proactive to enhance their corporate advantages during global financial meltdown in 2008-12. (Figure - I)

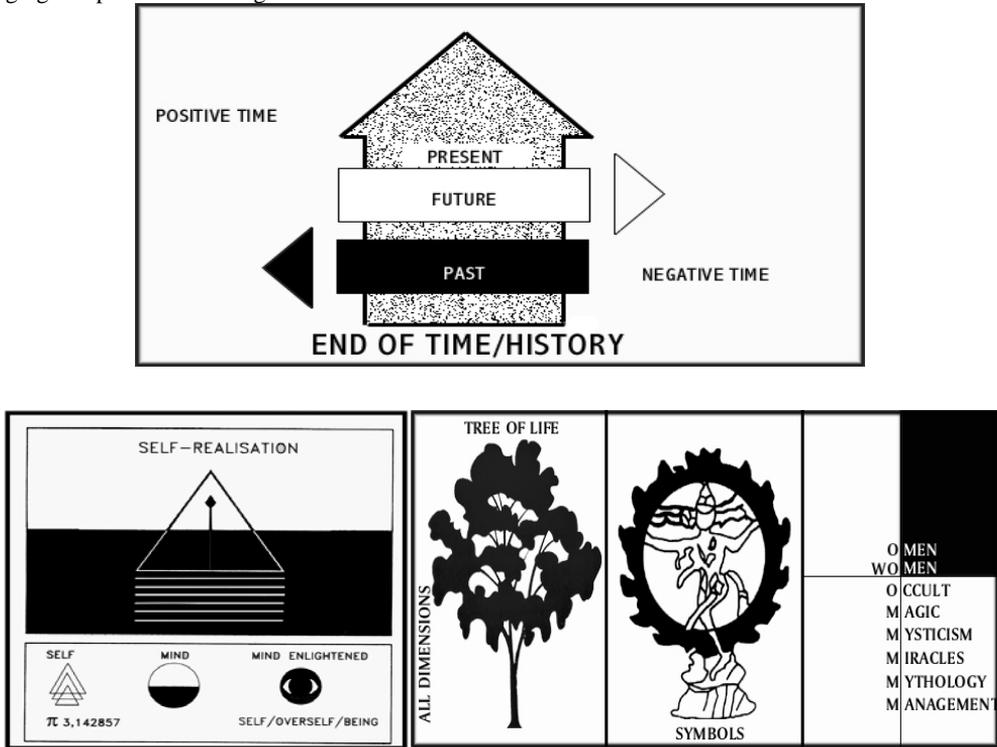


Figure 1 – Potential Performance Programing Models

VI. METHODOLOGY

The model was put to test in Jazan University Level 6 students in the Spring semester 2015. A well- structured 'Rigidity Scale' designed by Chadha (1986) had been used for the purpose of collecting primary data for the study. The various dimensions of Rigidity scale were as follows:

A. Intellectual Rigidity

- i. Not accepting anything (objects) or ideas without logical reasoning.
- ii. Believing in setting high standards for oneself and striving for the best in the learning environment.
- iii. To have an inclination towards positive thinking and discussing intellectual and philosophical matters in learning environment and socialization
- iv. To have definite ideas about things/Objects/Process/Outcome in the learning environment

B. Emotional Rigidity

- i. Lack of emotional reaction even when the situation demands it in the learning environment and social gathering.
- ii. To have definite ideas about what type of emotional reactions should be aroused in particular emotional situations.
- iii. Arousal of similar, unchanged emotional response to stimuli during learning environment
- iv. To exert strict control over one's emotions during personal and social interaction

C. Dispositional Rigidity (With respect to attitudes/Technology)

- i. To have very definite and rigid habits and/or ideas about habits of eating, sleeping, reading, dealing with examinations, assignments, project works etc. in the learning environment

- ii. (ii) To be inclined to commence works once planned in the learning environment
- iii. To hold extreme attitudes (positive or negative) regarding Technology, Lecture, Learning.

D. Social Rigidity (With respect to society)

- i. To find it very difficult to feel comfortable in a social gathering or a new situation.
- ii. Not developing too many new acquaintances in the learning environment
- iii. To have very well defined ideas about society and the social responsibilities of the people.
- iv. Giving too much importance to friendship in the learning environment

E. Behavioural Rigidity (With respect to traditions/ technology)

- i. To stick to traditional ways of learning and expanding knowledge
- ii. To have strict and definite attitude towards Technology, Class Lecture and Examinations in the learning environment

F. Perceptual Rigidity

- i. Not to accept or believe in anything without seeing a proof supporting it.
- ii. Generally misperceive something for some other things in the learning environment
- iii. Not able to perceive abstract relationships among things and a tendency to stick to obvious relationships

in the learning environment and social gathering

- iv. To perceive one's knowledge about things to be always correct in the learning environment and social gathering

G. Creative Rigidity

- i. To be able to think of a few diverse ideas at a time (lack of fluency) in the learning environment and social gathering
- ii. Not able to think about a thing or problem from many different angles in the learning environment and social gathering
- iii. To show stereo-type in ideas in learning environment and social gathering

VII. MAJOR FINDINGS AND INTERPRETATION

Rigidity is a tendency to preserve and resist conceptual change, to resist the acquisition of new patterns of behavior and to refuse to relinquish old and established patterns. Accordingly, higher the score higher would be the rigidity along that dimension. For the purpose of analysis Mean Scores, standard Deviation and Coefficient of Variation have been calculated. Table 1 depicts the position of various personality dimensions on Rigidity Scale.

Out of seven dimensions that have been studied, in as many as four dimensions in-house students have shown consistency in their rigidity, except that of intellectual, emotional and creative rigidities during Pre-Mid Term examination session of Spring 2015 semester.

Table 1: Position of Responses

Rigidity Scale Dimension	Pre-Midterm 1 Responses			Post- Midterm -Responses		
	Mean	S.D.	C.V.	Mean	S.D.	C.V.
Intellectual Rigidity (A)	7.000	0.291	24.06	8.000	0.110	18.44
Emotional Rigidity (B)	7.000	2.517	35.95	5.286	1.380	26.10
Dispositional Rigidity (C)	8.286	2.215	26.73	8.286	2.215	26.73
Social Rigidity (D)	7.143	1.345	18.83	7.143	1.345	18.83
Behavioral Rigidity (E)	4.571	1.718	37.58	4.571	1.718	37.58
Perceptual Rigidity (F)	5.429	2.225	40.98	5.429	2.225	40.98
Creative Rigidity (G)	4.857	1.864	38.37	5.443	1.069	20.78
Overall personality rigidity score	6.327			6.308		

This shows that overall personality is rigid before attending the Spring 2015 semester. However after attending the Spring 2015 semester lectures in the selected courses, they have scored minimum coefficient of variation for intellectual rigidity, emotional rigidity and creative rigidity. This shows that they have associated as business professional and have a flair for creativity and very powerful ambitions once they follow the holy path under PPP model.

VIII. RECOMMENDATIONS

The recommendations for the study include:

- i. More stress on case studies related to Arab and Saudi market conditions / scenario and BBA program not be treated like other college programs.
- ii. More interaction with industry people, with the program being made intensive with a thrust on practical training rather than on theoretical parts.
- iii. More focus on industrial assignments/interactions and problem solving skills through stimulated management games through Virtual labs.
- iv. Direct selling experience should be included.
- v. More stress should be given on Information Technology and smart Board teaching.

IX. CONCLUSION

The study clearly implies that the nature their education and training the students undergo exercise a significant influence in spawning the personality to cater to the requirements of their professions. The model only produces flexible adjusting personalities who respond well to the changing environments and situations while executing managerial functions.

However a lot more has to be done in terms of improvements and amendments in communication and value setting process, delivery mechanisms, and perhaps restructuring examination systems so as to successfully achieve the objective of producing dynamic, enterprising and responsible professionals, who are capable of handling and responding to socio-

economic pressures well-both at national and international levels from KSA and Jazan University. The result of the empirical studies proved the fact PPP would enable the students to perform to their fullest extent possible consistently and continuously during the period of the study. Besides, by administering such learning cum-teaching-exercise ensures a better output that matches National Developmental agenda of KSA.

The National Commission for Academic Accreditation & Assessment of KSA and also Jazan University QC cell are striving hard to meet the required criteria to put KSA on the top of global higher education. It may be noted that the educational system which fails to overcome these challenges would succumb to the severity of global pressure. Hence JCBA courses should meet the criteria of innovation, novelty, relevance and acceptance by students. PPP model once inducted in the on-going process of learning-teaching process in our educational system, will hope to meet these challenges effectively.

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Green Products Manufacturing: An Empirical Study among Micro Enterprises

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ABSTRACT

The idea on green productivity or green manufacturing evolved only in 1992 after Rio earth summit in 1992 that resulted in "Agenda 21 on sustainable Development". The goal was to bring about overall socio-economic development of the world in 21st country. In this context a study was undertaken to analyse production process, resource use and awareness about green product manufacturing among select micro enterprises. Descriptive methodology was adopted. Primary data was collected from the randomly selected 60 micro manufacturing enterprise respondents in Dindigul District Tamil Nadu. The data was collected from 10 types of enterprises (Coir, Welding, Carpentry, Rice Mill, Mushroom, Saw Mill, Bamboo basket making, Brick and Garments). The green manufacturing was assessed through the type of raw materials used, source of raw materials, percentage conversion of raw material into finished products, waste generated, re-use, recycle, machinery replacement, waste disposal, energy consumption etc. The study found that the coir enterprise and brick enterprise are using the raw material more efficiently than the other enterprises. These enterprises could able to convert 81 to 90 per cent of their raw materials into finished products. The waste generated from coir Industry, rice mill, saw mill and brick micro enterprises were recycled or reused as coir pith cake, which is 100% export oriented. Similarly, rice mill and oil industry waste are reused as cattle feed and rice brand oil manufacturing. The waste from saw mill and brick are used for hotel firewood purpose and construction purposes. Except garments, tailoring and welding entrepreneurs all other micro enterprises have adopted green manufacturing technology.

Keywords: *Green products manufacturing, Micro enterprises, Resource, Reduce, Re-use, Recycle and Green technology.*

I. INTRODUCTION

THE term "green manufacturing" can be looked at two ways. The first one is the manufacturing of "green" products, particularly those used in renewable energy systems and clean technology equipment of all kinds; and the second one the "greening" of manufacturing – reducing pollution and waste by minimising natural resource, recycling and reusing what was considered waste and reducing emissions.

Green products sustain the health of both people and the environment. Green products are becoming increasingly popular as consumers become more aware of the hazards of chemical and toxins in their food, their households and their outdoor environment. As the profit of ecologically sustainable products becomes more prominent in the economic world, there is more and more incentive for business to supply consumers with what they want (www.ehow.com). Green stand for ecological sustainability encompasses many different concerns, including but not limited to, air, water and land pollution, energy usage and efficiency and waste generation and recycling. Green initiatives are aimed to minimise the impact of

human activities on the environment. Thus, the non-green can be grouped into three broad categories, namely rising emissions and associated climate change, fast depletion of scarce natural resource, growing waste generation and pollution (Bhattacharya et.al: 2011).

Manufacturing companies can address these concerns by focusing on three areas, namely green energy, green products, green process in business operations. The idea on green productivity or green manufacturing evolved only in 1992 after Rio earth summit in 1992 that resulted in "Agenda 21 on sustainable Development" for overall socio-economic development of the world in the 21st country. In this context a study was undertaken to analyse the green products manufacturing among the select micro enterprises in Dindigul District of Tamil Nadu.

II. OBJECTIVE OF THE STUDY

The objective of the study is to analysis production process, resources use and awareness about green product manufacturing among the select micro enterprises.

III. MATERIALS AND METHODS

Descriptive methodology was adopted in this study. Both primary and secondary data were collected from the field. Pre-tested interview schedule was used for collecting data from the field. Respondents were selected through random sampling method. Sixty respondents were met personally and data collected. Ten in each category of six broader micro enterprises (Table 1) were selected for interview purpose. Hence, the study is purely based on primary data. The primary data with respect to micro enterprises was collected in the month of February to March 2013. Dindigul district of Tamil Nadu was chosen for the present study.

IV. RESULTS AND DISCUSSION

Tables 1 explain the type of industry selected under Green Manufacturing Micro Enterprises. In general, industries are classified into eight categories, namely Agro Based, Engineering Industry, Food Industry, Mineral Based, Textile Based Industry, Service Based Industry and Polymer and Chemical Based Industry. However, the researcher has chosen six broader and 10 micro enterprises. These enterprises are eco-friendly and not damaging the environment.

Table 1: Selection of Green Manufacturing Micro Enterprises

Sl. No.	Broader Classification of Industry	Type of Enterprise Selected
1.	Agro Based Industry	<ul style="list-style-type: none"> • Coir Industry
2.	Engineering Based Industry	<ul style="list-style-type: none"> • Welding Industry • Carpentry Industry
3.	Food Based Industry	<ul style="list-style-type: none"> • Rice Mill • Mushroom
4.	Forest Based Industry	<ul style="list-style-type: none"> • Saw Mill • Bamboo Basket Making
5.	Mineral Based Industry	<ul style="list-style-type: none"> • Brick Industry
6.	Textile Based Industry	<ul style="list-style-type: none"> • Garment • Tailoring

Note: In a simple way an enterprise is the one which consists of people working together primarily for the purpose of making, selling and distribution of products or service. Similarly a micro enterprise is the one where in the investment in plant and machinery does not exceed twenty five lakhs rupees.

Table 2 shows that 83 per cent of the respondents are male and 75 per cent of them are falling in the working age group of 41-50 years. 72 per cent of them are living in a nuclear

type of family. The study found that a large number of the respondents hold big family size (60 per cent) with more than seven members in their family. 60 per cent of the respondents fall in the religion group of Hindus followed by Christians (24 per cent). Backward community dominates (83 per cent) in the selected

respondents group and 79 per cent of them have attained school education. All the respondents except one are married.

Table 2: Social Parameters of the Selected Respondents

Sl. No	Social Parameters	Particulars	No. of Respondents	Per cent
1.	Gender	Male	50	83
		Female	10	17
		Sub Total	60	100
2.	Age	30-40	23	38
		41-50	22	37
		51-60	15	25
		Sub Total	60	100
3.	Family Type	Nuclear	43	72
		Joint	17	28
		Sub Total	60	100
4.	Family Size	1-3 Members	02	03
		4-6 Members	22	37
		7-8 Members	36	60
		Sub Total	60	100
5.	Religion	Hindu	41	68
		Christian	14	24
		Muslim	05	08
		Sub Total	60	100
6.	Community	BC	50	83
		MBC	09	15
		SC	01	02
		Sub Total	60	100
7.	Education	Illiteracy	02	03
		Schooling	47	79
		Collage	11	18
		Sub Total	60	100
8.	Marital Status	Married	59	98
		Unmarried	01	02
		Sub Total	60	100

Table 3 explains the selected respondent's enterprise parameters. The table depict that 60 per cent of the enterprise are owned by themselves and remaining 40 per cent of respondents run the enterprise in a rented or leased-in building. The study found that 72 per cent of them have started the industry during the year 2011-13. There was a boom after liberalisation of the economy. 89 per cent of industry was started only after 1991. Similarly 83 per cent of enterprises were located in rural areas. 95 per cent of the respondent's ownership pattern is rest with sole proprietorship 80 per cent of the respondents invested less than Rs.10 lakhs. 80 per cent of the respondents provide employment to 10 persons.

Table 3: Enterprise Parameters of the Selected Respondents

SI No	Enterprise Parameters	Particulars	No. of Respondents	Per cent
1.	Ownership of the enterprise	Own	36	60
		Rent	24	40
		Sub Total	60	100
2.	Year of Establishment	1980-1990	07	11
		1990-2000	10	17
		2000-2013	43	72
		Sub Total	60	100
3.	Enterprise Location	Rural	50	83
		Urban	10	17
		Sub Total	60	100
4.	Proprietorship	Sole Proprietorship	57	95
		Partnership	03	05
		Sub Total	60	100
5.	Investment (Rs. in Lakhs)	1-5	34	57
		6-10	14	23
		11 and Above	12	20
		Sub Total	60	100
6.	Labour Employed	1-5	34	57
		6-10	14	23
		11 and Above	12	20
		Sub Total	60	100

The place of raw material purchase by the respondents is shown in Table 4. A majority (55-65 per cent) of the respondents are buying their raw materials locally, namely Dindigul and Natham. Some of the respondents (17 per cent) do go neighboring districts namely Thanjavur and Thiruppur to buy raw materials. 18 per cent of the respondent visit far off places, such as Surath and Jalandhar to buy their raw materials.

The distance travelled by the entrepreneur varies from five kms to 2839 kms. The study further shows that 50 per cent of the respondents use machineries for production and another 50 per cent do not use any machines in their production process.

Table 4: Place of Raw Materials Purchased

SI .No.	Clarification of the Industry	Place of Raw Material Purchase	Distance of Traveled (in.kms.)
1.	Agro Based Industry	Natham	50
2.	Engineering Based Industry	Surath, Dindigul	05
3.	Food Based Industry	Thanjavur, local	200
4.	Forest Based Industry	Surath, Dindigul	1628
5.	Mineral Based Industry	Local	30
6.	Textile Based Industry	Thirupur, Jalandhar	2839

Table 5 explains the percentage conversion of raw materials into finished goods. Industries convert their input into finished goods from 60

per cent to 90 per cent. Agro Based Industry and Engineering Based Industry convert the raw material into finished products to the maximum of 60-70 per cent. Nonetheless, as the Forest Based Industry and Textile Industry convert 71-

80 per cent of their raw material into finished products. The highest conversion of raw material into finished goods was found in Food Based and Mineral Based Industry (81-90%). Thus, the Food Based Industry and Mineral Based Industry are more environmental friendly and also least pollutes the land, air, soil, water, environment and health of the people.

Solid waste generated by selected industries is shown in Table 6. Solid waste is one kind of the

wastage generates by the industries during manufacturing process. Most of the selected enterprises are generating solid waste in one way or other. For instance the coir industry produces coir dust and coir pith as solid waste. But some of the micro enterprises such as mushroom and bamboo do not have any solid waste. Hence, they are environmental friendly and green manufacturing enterprise.

Table 5 Per cent Conversion of Raw Materials into Finished Good

Sl .No.	Percentage of Conversion of Raw Material into Finished Goods	Classification of Enterprise	Number of Respondents
1.	60-70	Agro Based and Engineering Based Industry	20
2.	71-80	Forest Based and Textile Based Industry	20
3.	81-90	Food Based and Mineral Based Industry	20
Total			60

Table 6: Generation of Solid Waste

Sl. No.	Solid Waste	Type of Enterprise	Number of Respondent
1.	Yes	Coir, Carpentry, Welding, Rice Mill, Brick, Saw Mill Garments and Tailoring.	53 (88)
2.	No	Mushroom and Bamboo	7 (12)
Total			60 (100)

Note: Figures in parentheses indicate Per cent to total.

The quantity of solid waste generate by the enterprise selected is shown in Table 7. The Coir Industry generate up to 40 tons of solid waste for every 100 tons of input. This was followed by saw mill. Saw Mills generate solid waste from 16 to 25 tons. Brick, Carpentry, Garments, Rice Mill, Tailoring and Welding enterprise generate 10 to15 tons of solid waste.

However, Mushroom and Bamboo were not producing any kind of noticeable solid waste and whatever waste comes from these enterprise are insignificant and use as manure.

Table 7: Quantity of Solid Waste Generated

Sl. No.	Quantity of Solid Waste (in Tons)	Type of Enterprise	Number & % of Respondents
1.	Insignificant	Mushroom and Bamboo	07 (12)
2.	10-15	Brick, Carpentry, Garments, Rice Mill, Tailoring and Welding	38 (63)
3.	16-25	Saw Mill	5 (8)
4.	26-40	Coir Industry	10 (17)
Total			60 (100)

Note: Figures in parentheses indicate Per cent to total.

The generation of liquid waste details is shown in Table 8. Of the total enterprises selected 87 per cent of the enterprises do not generate any liquid waste from their units and only 13 per

cent of the enterprises generate liquid waste. The rice mill is the only industry that generates liquid waste. They produce liquid waste to the tune of 2, 40,000 liter per year.

Table 8 Generation of Liquid Waste

Sl. No.	Liquid Waste	Types of Enterprise	Number & % of Respondents
1.	Yes	Rice Mill	8 (13)
2.	No	Brick Industry, Carpentry, Coir Industry, Saw Mill, Welding, Bamboo, Mushroom, Garments and Tailoring enterprises	52 (87)
Total			60 (100)

Note: Figures are parentheses indicate per cent to total.

Air pollution detail is shown in Table 9. Of the total enterprises 55 per cent of the enterprises create air pollution and the remaining 45 per cent of the enterprises do not create any air

pollution. Saw mill, rice mill, brick and coir generate air pollution. The non-air polluting industries are carpentry, bamboo, mushroom, welding, garments and Tailoring enterprises.

Table 9 Generation of the Air Pollution

Sl. No.	Air Pollution	Types of Enterprise	Number & % of Respondents
1.	Air Polluting Industry	Saw Mill, Rice Mill, Coir and Brick Industry	33 (55)
2.	Non-Polluting Industry	Carpentry, Bamboo, Mushroom, Welding, Garments and Tailoring	27 (45)
Total			60 (100)

Note: Figures are parentheses indicate per cent to total.

The noise pollution produced by the selected enterprises is shown in Table 10. Saw mill, rice mill and welding enterprises are generating noise pollution. They constitute 30 per cents of the sample respondents. A majority (70 per cent) of the selected entrepreneurs were not polluting any noise pollution. When asked about the machine replacement and repairing the

respondents viewed that the enterprise are replacing the old machine once in five years or once in ten years. They also carry out repairing service or maintenance of the machine once in six months.

Table 10 Generation of Noise Pollution

Sl. No.	Noise Pollution	Type of Enterprise	Number & % of Respondents
1.	Yes	Saw Mill, Rice Mill and Welding	18 (30)
2.	No	Coir Industry, Brick Carpentry, Bamboo, Mushroom, Garments and Tailoring	42 (70)
Total			60 (100)

Note: Figures are parentheses indicate Per cent to total.

The selected enterprise recycles the waste material by selling to other manufacturing enterprise. It is shown in Table 11. It is found that 55 per cent of the selected entrepreneurs sell the waste material to other enterprise as raw

materials. Coir, Rice Mill, Saw Mill and Brick Industry are disposing their waste to other manufacturing industry. For example the coir industry sells their waste (coir pith) for agricultural soil rejuvenation purpose. The coir

pith cake is also exported to foreign countries for crop raising. The rice mill disposed their rice husk to rice brand oil industry and also to animal and bird feeding purpose. The saw mill sell its waste pieces to bio-fuel, for making of home furniture and for firewood in the hotels

and houses. The brick industry sells their broken bricks to construction industry. 45 per cent of the respondents were unable to recycle their waste. They simply dump the waste in open yard.

Table 11 Recycling of Waste as Raw Material to other Enterprise

Sl. No.	Use	Type of Enterprise	Number & % of Respondents
1.	Yes	Coir, Rice Mill, Saw Mill and Brick Industry	33 (55)
2.	No	Bamboo, Mushroom, Garment, Tailoring, welding and Carpentry	27 (45)
Total			60 (100)

Note: Figures are parentheses indicate Per cent to total.

V. CONCLUSION

Based on the field experience and analysis interpretation, the study concludes that the selected micro entrepreneurs do adapt green manufacturing technology in their manufacturing process. The Green Technology adapted by the selected entrepreneurs are found as recycle and reuse the waste material, reduction of the raw material consumption, periodic serving and replacement of the worn out machinery, reducing solid waste, liquid waste, air pollution and noise pollution. They electricity consumption by the selected entrepreneur were also found less. Therefore, except few enterprises a majority of the selected respondents have adopted green manufacturing technology.

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The Job Demands, Control, Support Model: Where Are We Now?

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ABSTRACT

The demands-control (support) (JDC[S]) model (Karasek, 1979; Karasek & Theorell, 1990) continues to be highly influential in occupational stress and health literature, and has been the theoretical foundation of more empirical studies than any other work stress theory (Griffin & Clarke, 2011; Kain & Jex, 2010). The main ideas of the model are two-fold: that demanding work, control over working processes, and social support within the workplace all independently relate to well-being and strain; and control and support resources mitigate (or buffer) the effects of high demands on these outcomes. Despite its popularity and longevity, the model has been widely criticized for a predominance of self-report versus objective measurement, cross-sectional rather than longitudinal study design, variety and inconsistency in how the three main dimensions are measured, and a lack of consideration of individual difference variables. Kain and Jex (2010) reviewed the first 30 years of research on the model, and called for future research to address these issues. They also suggested that future research examine different conceptualizations of demands, and further individual difference variables. This paper serves to update the literature of the model, and reviews how calls for future research have been addressed since Kain and Jex's (2010) review. Additionally, further recommendations for continued development of research are suggested, including updating the taxonomy of jobs frequently associated with different combinations of demands control and support, operationalizing these dimensions in several different ways in each study to increase findings of interactive effects, and designing industry- or role-specific measures of these dimensions to improve this consistency.

Keywords: Demands, Control, Support, Review, Theoretical, Methodological

I. A BRIEF BACKGROUND: THEORETICAL FOUNDATIONS OF WORK STRESS RESEARCH

WORK stress is defined as a negative emotional state due to adverse experiences in the workplace (Beehr & Bhagat, 1985; Hart & Cooper, 2001). According to organizational stress theory (Kahn & Byosiere, 1992), stress is not a single event, but a process involving appraisal, response, and attempts to cope with and manage stressors in order to meet goals. Strains are adverse and potentially harmful reactions to stressful work from attempting to function effectively in the face of too many challenges. Furthermore, certain behavioral outcomes are thought to occur as a

result of physiological or psychological strains (e.g., counterproductive work behavior, absenteeism, voluntary turnover, smoking, excessive eating and drinking) (Kahn & Byosiere, 1992).

Organizational stress theory has served as the foundation for over a hundred stress theories which frame relationships between various stressors, strains, and in some cases behavioral outcomes (see Griffin and Clarke, 2011; Sulsky & Smith, 2005). A central theme to many of these theories is the *fit perspective* of work stress, whereby an employee's fit with their working environment (that is, their role or position and their workplace) is fundamental to minimizing stress at work (Edwards & Cooper, 1990; Eulberg, Weekley, & Bhagat, 1988;

French, Caplan, & Harrison, 1982). Perceptions of fit are largely driven by cognitive appraisal of correspondence between work demands and the availability of coping resources to meet these demands, with stress thought to be experienced if demands are appraised as *exceeding* resources (French et al., 1982; Lazarus, 1966). The term “resources” refers to many things, such as objects, energy, or work or personal characteristics or conditions that enable employees to facilitate problem solving in order to meet demands by accomplishing goals (Campbell, Perry, Maertz, Allen, & Griffeth, 2013). However, the central focus appears to be on cognitive and emotional resources needed for work and daily transactions with others (Jex & Yankelevich, 2008), with control over work, and support from within the workplace having been given the most attention (Griffin & Clarke, 2011).

II. THE JOB DEMANDS-CONTROL (SUPPORT) MODEL

In 1979, Robert Karasek introduced the job demand-control (JDC) model, which outlines the impact of work characteristics on stress, health, and occupational wellbeing (Karasek, 1979). Karasek envisioned how demanding job are, and how much control individual workers are afforded as essential to well-being, motivation, and productivity, as well as the minimization of psychological and physiological strains. The central tenet of the JDC model is that highly demanding jobs that afford little control over work are most likely to lead to decrements in well-being, and to induce strain. Specifically, in line with research on the classical stress process (e.g., Selye, 1956, 1976; Wundt, 1922) Karasek believed that such conditions would lead to individuals continually devoting high amounts of cognitive resources to meeting demands, which would result in an elevated level of physiological arousal and increased cardiovascular and nervous system attention. Moreover, if sustained, this condition would result in the individual’s body beginning to run out of resources, followed by impairment of physical functioning and psychological well-being (Karasek, 1979). Karasek termed positions characterized by high demand low control as high strain jobs (Häusser, Mojzisch,

Niesel, & Schulz-Hardt, 2010; Karasek, 1979). In a study on psychosocial work design that used data from quality of employment surveys in 1972 and 1977 to categorize a range of occupations based on perceived demands and control, Karasek (1989) found that among others junior nurses and assembly line workers typically characterized their work as high strain.

Although high strain jobs paint a negative picture of demanding work, Karasek (1979) also believed that demanding work can engender positive outcomes when accompanied by high levels of control. He stated that “some of the most challenging situations, typically of professional work, call for the highest levels of performance, but without negative psychological strain” (Karasek & Theorell, 1990, p. 35). He termed such jobs as active jobs. The theory behind active jobs is grounded in classical literature on competence (White, 1959), activation (Scott, 1966), and stimulation (Schwab & Cummings, 1976). Specifically, performance and learning are hypothesized to be maximal in high demand high control circumstances because workers can actively use the control they have been afforded to meet demands. This is thought to engender greater levels of productivity and goal achievement than when control is low (e.g., high strain jobs), or if the work is not demanding. Thus, when considering high strain and active jobs together, Karasek (1979) did not view positive and negative outcomes of demand and control conditions as simply lying at opposite ends of a continuum, but as two separable mechanisms surrounding the amount of control an employee has over his/her work when faced with high demands. According to Karasek (1989) examples of active jobs include electrical engineers, and physicians.

With regards to other combinations of demands and control, Karasek (1979) termed jobs characterized by low demands and low control as passive jobs, because workers tend to experience a degree of strain due to boredom from combined with an inability to control their work. Moreover, in line with classical stress theory (e.g., Selye, 1956) he contended that workers in these types of jobs experience a gradual atrophy of skills due to underutilization. Karasek (1989) has exemplified

public sector clerical work as adhering to the description of passive jobs. Finally, Karasek (1979) termed jobs characterized by low demands but high levels of control as low strain jobs, because workers would benefit from high levels of skill decision and autonomy without the pressure of high demands. Results of Karasek's (1989) study suggest that natural scientists often consider their work to be characterized as low strain.

Ten years later, following increased attention to the role of workplace support in the stressor-strain process (e.g., Ganster, 1989); the JDC model was extended to account for workplace social support as a *third* predictor of well-being and strain. This extended model became known as the job demand-control-support (JDCS) model (Karasek & Theorell, 1990). Karasek believed that effects of high strain (i.e., high demands, low control) jobs would be exaggerated if workplace support was also perceived to be low (Johnson & Hall, 1988; Karasek & Theorell, 1990). He termed such conditions as iso-strain jobs, whereby workers experience even greater strain through social isolation, or a lack of support at work. Conversely, he contended that positive outcomes in active jobs would increase still further for individuals experiencing high levels of support from within their workplace.

In summary, Karasek's model is underpinned by the fit perspective of stress (e.g., Edwards & Cooper, 1990; French et al., 1982), because fit with work is based on perceiving demands to be manageable in conjunction with resources of control over work, and support from within the workplace (Kain & Jex, 2010). In line with other discussions of the model, the acronym "JDC(S)" (Karasek & Theorell, 1990) is used in the remainder of this chapter as an all-encompassing term to reference both the original and extended versions of the model. The following section outlines these dimensions of the model in greater detail.

III. JOB DEMANDS, CONTROL, AND SUPPORT

Job Demands: Job demands constitute physical, social, or organizational aspects of the job that require physical or mental effort. These

include work pacing/time pressure, exacting task requirements, and overall workload demands (De Jonge & Dormann, 2006). According to classical theories on optimal activity level (Selye, 1956, 1976), and performance (Wundt, 1922), a certain level of demand placed upon the worker is beneficial to their psychological well-being, learning, motivation, performance, and job satisfaction. However, too low or high a level of demands can have the inverse affect, causing negative physiological and/or psychological outcomes. As such, most conceptualizations of role-related demand stressors conceive of stress based on how *much* of a stressor (e.g. time pressure or general workload) one experiences, or how *frequently* something considered to be stressful (e.g. interruptions or excessive noise) occurs (Sonnetag & Frese, 2003). Numerous studies in work stress literature found relationships between high levels of demands and a variety of strains, as well as negative relationships with psychological well-being (Griffin & Clarke, 2011).

Job Control: Control constitutes an individual's belief in his/her ability to affect a desired change on their work environment (Greenberger & Strasser, 1986). Karasek (1979) envisioned control as one's degree of autonomy or decision authority over tasks, including ordering of task completion, discretion in how tasks are completed, or a degree of autonomy over the nature of the tasks themselves (Ganster & Fusilier, 1989). The notion that human beings seek control over their environment is regarded as one of the most important elements of the stress process, and is central to many theories of work stress (for reviews, see Ganster, 1989; Spector, 2002). Specifically, the ability to intervene and changework processes may reduce inherently stressful cognitions of having insufficient resources to complete tasks (Hobfoll, 2001). Moreover, even illusions of being in control appear to promote well-being (Friedland, Keinan, & Regev, 1992). This is corroborated by numerous studies that have found strong negative associations between perceived control and psychological strains (Eatough & Spector, 2014). Conversely, perceiving a lack of control can induce strain by frustrating the intrinsic need to feel competent (Frese, 1989; Spector, 1986; White, 1959).

Workplace Social Support: Workplace support refers to helpful relationships at work regarding job-related matters, generally with supervisors and coworkers (Karasek & Theorell, 1990; Maertz, Griffeth, Campbell, & Allen, 2007; Price, 1997). Social support at work is an aspect of employee social capital, which is the extent to which relationships at work are valuable to the employee in terms of acquiring task information or assistance, or social companionship (Nahapiet & Ghoshal, 1998). Unlike job control, social capital does not afford employees the ability to directly intervene in alteration of work tasks, or other aspects of the work environment; however, social capital can benefit employees by reducing the burden on their other personal resources (Lin, 1999). The organizational literature is now replete with evidence that high levels of support are associated with increased well-being; whereas, a perceived lack of support can be a catalyst for strain (Häusser et al., 2010; Luchman & González-Morales, 2013; van der Doef & Maes, 1999).

IV. HYPOTHESES OF THE JDC(S) MODEL

The vast majority of research on the JDC(S) model has focused on high strain jobs, with comparatively little attention to active jobs, and almost no attention to passive or low strain jobs (Kain&Jex, 2010). Both the original JDC and extended JDCS versions of the model examine strain using two contrasting, but not mutually exclusive hypotheses each for high strain, and active jobs.

High Strain Jobs: The strain hypothesis pertains to an increased likelihood of strain when demands are additively increased, and control and/or support are decreased. It is exclusively concerned with main effects of these dimensions on strain. For example, Karasek & Theorell (1990) regard factory line workers as typically being subject to high demands, but also have low control due to the routinized nature of their work and the relatively low levels of support within the workplace. Thus, according to the strain hypothesis a job design intervention to reduce strain in factory workers could be effective by additively changing the balance between perceived demands, control, and/or support, such that (i) demands are reduced (ii) control and/or support are increased

or (iii), a combination of both, such that demands are decreased and control and/or support are increased.

In contrast, the buffer hypothesis is concerned exclusively with the moderating effects of control and/or support on the relationship between demands and strain. According to the buffer hypothesis, resources of control and support serve to mitigate the effects of high demands on strain. The practical implication of the buffer hypothesis is that it is sometimes unrealistic to recommend lowering work demands (Griffin & Clarke, 2011); such as for military personnel on operations, or for organizations that are short-staffed, or in a peak season of work (e.g., tax specialists). Thus, workplace interventions to reduce stress should focus exclusively on affording individuals greater control over their work, and/or support from within the organization, in lieu of reducing demands.

An important distinction between the strain and buffer hypotheses lies in the importance placed on supposed moderating effects of control and/or support on relationship between demands and strains. Whereas main effects of demands and control and/or support on strain are sufficient to support the strain hypothesis by showing that demands are positively related to strain, and control and/or support are negatively related to strain; the buffer hypothesis can only be supported if a moderating effect of control and/or support is found. That is, the form of control and/or support measured in the study must specifically moderate, or buffer, the form of demand measured, such that negative effects of demands are less when control and/or support are high, versus when they are low. The purpose for this requirement is to show that affording employees' greater control and/or support resources mitigates the negative effects of demands on strain. In contrast, the strain hypothesis simply shows that demands, control, and support reduce strain independently.

From a practical perspective, the distinction between the strain and buffer hypotheses is tied to differing implications surrounding the need to reduce demands in order to minimize strain. Specifically, according to the strain hypothesis, it is necessary to reduce demands in order to reduce employee stress levels, unless control

and/or support can be additively raised. Conversely, the buffer hypothesis implies that reducing demands is unnecessary to lowering stress, because control and/or support resources will directly counteract the effects of demands stressors on strain. Thus, the strain hypothesis focuses on counterbalancing demand levels with control and/or support resources levels to reduce strain, whereas the buffer hypothesis focusing on the counteracting effects of these resources on strain (Karasek & Theorell, 1990).

Active Jobs:As previously mentioned, the vast majority of research on the model has examined the strain and buffer hypotheses in relation to high strain jobs, with far less attention having been given to active jobs (Kain & Jex, 2010). However, the activation hypothesis is the term used for tests of high demands and high control and/or high support with positive outcomes such as performance, learning, or motivation (Karasek, 1979, Karasek & Theorell, 1990). The activation hypothesis is concerned exclusively with *interactive* effects of these dimensions, such that positive relationships between control and/or support and these outcomes are thought to be accentuated by high demands. Moreover, the greatest relationships with these outcomes are expected when both control and support interact with demands, such that all three dimensions are perceived as “high” (Karasek & Theorell, 1990). For example, a lawyer who is performing high demanding work well given high control over work, is thought to perform to even higher standards when well supported by constituents within his/her organization, than when an absence of support is perceived.

V. RESEARCH ON THE JDC(S) MODEL TO DATE

The JDC(S) model has been highly influential in occupational stress and health literature for over 37 years. It has been the theoretical foundation of more published empirical studies (over 300 to date) than any other work stress model (Griffin & Clarke, 2011; Kain & Jex, 2010). Most studies of the model have examined the strain and/or buffer hypotheses in a single sample of employees operating within a single organization or occupation, within a specific country. However, there has been little to connect the vast number of studies published

other than their theoretical underpinnings. As such, several reviews of research on the model have been published in order to collate findings (e.g., De Lange, Taris, Kompier, Houtman, & Bongers, 2003; Häusser et al., 2010; van der Doef & Maes, 1999). These reviews have adopted a vote counting (e.g., non-meta-analytic) method, whereby conclusions are drawn by tallying significant versus non-significant results. According to the vote counting method if the majority of studies show a non-significant finding it is generally concluded that no relationship exists, and vice-versa (Light & Smith, 1971). Findings and conclusions from each review are outlined in the following sub-sections.

Review 1: Van der Doef and Maes (1999): Van der Doef & Maes (1999) reviewed 63 studies published between the model’s 1979 inception, and 1997. Studies were categorized based on examination of (i) job-related and (ii) general psychological well-being outcomes. Job-related well-being outcomes included job satisfaction, work satisfaction, burnout, negative job feelings, occupational stress, job-related worries, and exhaustion. General psychological well-being outcomes included life satisfaction, depression, psychological distress, psychiatric distress, psychological strain, general strain, affective disorder symptomatology, psychotic affective disorder, mild psychiatric morbidity, social dysfunction, tension, anxiety, daily life stress, well-being, irritability, state anger, trait anger, happiness, schizophrenia/ delusion/ hallucinations, need to recover after work, lack of identification, hostility, and frustration.

Results revealed a moderate level of support for additive effects of demand, control, and support, in accordance with the strain hypothesis; but only weak support for interactive effects as predicted by the buffer hypotheses. Degree of support for the hypotheses was independent of sample characteristics (e.g., sample size, occupation, gender, nationality, and outcome variable). However, greater support was found in studies which employed narrower (rather than broader) measures of demands, control, and support. Fifty-four of 63 studies reviewed were cross-sectional, and nine were longitudinal. Stronger support was found for both strain and buffer hypotheses in cross-sectional studies than

in the nine longitudinal studies (van der Doef & Maes, 1999).

Overall, van der Doef & Maes (1999) concluded that support for the strain hypothesis is fairly consistent in both JDC and JDC(S) models, but limited in the few buffering hypothesis studies. They speculated this as partly due to poor matches between demand, control, and support constructs in most studies, with poor fitting measures of control and support less likely to buffer the negative effects of demands on strain. In this regard, the authors called for future research to improve the measurement of work characteristics, and to undertake more longitudinal studies of the model, given their methodological advantages over cross-sectional studies (which are addressed later in this review).

Review 2: De Lange et al., (2003): Given the relative lack of support for interactive effects in the first review, De Lange et al. (2003) conducted a second review of the JDC(S) model with the goal of increasing support for the buffer hypotheses by reviewing only “high quality” studies. Specifically, where van der Doef & Maes had reviewed all studies published to 1997, De Lange and colleagues evaluated the methodological quality of each study based on five criteria, and included only those studies that reached a certain level of quality based on their specifications. The first of these criteria related to *study design*. The authors evaluated whether each study had used a complete panel design for two variables, X and Y, in order to examine cross-lagged effects (i.e., effects of variable X as measured on Time 1 on variable Y as measured on Time 2, and effects of variable Y at time 1 on variable X at time 2). Complete panel designs afford the ability to examine possible reverse- or reciprocal causal effects, in addition to the relationships of interest (e.g., variable X at time 1 on variable Y at time 2) (Zapf, Dormann, & Frese, 1996).

The second stipulation related to *time-lags* between data points for longitudinal studies. De Lange et al., (2003) noted an absence of commonly accepted guidelines regarding the most appropriate time lag for predictor variables (X) to influence criterion variables (Y) (Taris & Kompier, 2003). However, they contended that researchers should evaluate what time lag is

appropriate by considering *how* the effect of X on Y develops over time (Frese & Zapf, 1988). Moreover, the authors posited that although time lags between data points in studies are often motivated by practical considerations (e.g., availability research facilities, and time availability of both researchers and participants), these considerations should be accompanied by plausible theoretical and methodological reasoning for the length of time lag between data points.

Their third criterion related to *measurement*. De Lange et al., (2003) acknowledged that the vast majority of studies of the JDC(S) model utilize survey design methods that come with inherent risks of self-reporting bias (e.g., Schnall, Landsbergis, & Baker, 1994). Thus, they stipulated that internal reliability of survey instruments (i.e., their respective Cronbach alphas) should be acceptably high (e.g., around .70, or higher, Stangor, 1998), in order to minimize possible conceptual overlap between variables. Moreover, they gave preference to studies that combined subjective self-report survey variables with objective (e.g., psychophysiological) measures, in order to reduce possible conceptual overlaps and self-report bias; provided that such measures accurately reflected the individuals’ experience of the job.

Fourth, with regard to *method of analysis*, De Lange and colleagues (2003) gave preference to studies employing multiple regression analysis, or structural equation modeling, over those that compared cross-lagged correlations. They reasoned that cross-lagged correlations are more likely to yield erroneous causal conclusions (Taris, 2000) because they depend on the variances of the variables measured (Zapf et al., 1996) as well as across-time stability of variables (Kessler & Greenberg, 1981).

Finally, the authors contended that studies of the model should include a *non-response* examination. That is, researchers should examine possible selectivity of responses (e.g., in terms of gender and age) both for baseline (e.g., time 1) measurement, and for subsequent follow-up measurements. Furthermore, they gave preference to studies that examined whether baseline associations between demand-

control-support dimensions and study outcome variables differed for responders and non-responders (i.e., those who did not respond to subsequent measures following their baseline response). They achieved this by comparing associations between work characteristics (e.g., demands, control, and support) and study outcomes at time 1 for the *response* group, versus those who opted not to respond following time 1 (e.g., Etter & Perneger, 1997).

Based on these stipulations, De Lange et al. (2003) selected studies from those published since the model's 1979 inception to 2000, thus chronologically overlapping with van der Doef & Maes' (1999) original review. They developed a point scoring system to rate the methodological quality of each study (see Table 1 in De Lange et al., 2003, p. 286). Studies were rated from 1-4 stars, with one star deemed insufficient for inclusion in their review. However, only 19 studies adhered to their stipulations for two or more stars. Their results showed that, only eight of the 19 studies demonstrated support for the strain hypothesis of the model, and only one study found interactive effects in accordance with the buffer hypothesis (Karasek, 1979; Karasek & Theorell, 1990). Thus despite their considerable stipulations for inclusion to their review, De Lange et al. (2003) were unable to demonstrate that "high quality" studies provided stronger support for the JDC(S) hypotheses (and in particular, the buffer hypothesis) than those included in van der Doef & Maes' (1999) original review. Instead, their review provided further evidence that moderating effects of control and/or support on demand-strain relationships are rare in JDC(S) studies (Kasl, 1996; Kristensen 1995; Theorell & Karasek, 1996; van der Doef & Maes, 1999). However, the authors conceded that a sample of 19 studies was insufficient to credibly test their hypotheses. Moreover, they acknowledged failing to account for how well measures of demands control and support were matched in each study may have limited their findings regarding buffering effects. This echoed De Jonge, Dollard, Dormann, Le Blanc, & Houtmann (2000), as well as contentions made by van der Doef & Maes (1999) in the first review that conceptual congruence in operationalizations of demand, control, and

support measures would yield greater evidence of moderating effects.

Review 3: Häusser et al. (2010): In the most recent vote counting review, Häusser et al. (2010) returned to van der Doef and Maes' (1999) original approach of including *all* published studies of the model, irrespective of methodological characteristics. In doing so, they reviewed 87 studies published between 2000 and 2007, thus chronologically continuing from van der Doef and Maes' end point. Studies examined similar psychological well-being and strain outcomes to the two previous reviews, and results of their review revealed four major findings.

First, Häusser et al., (2010) found that sufficient sample size appears to almost guarantee support for additive effects of demands, control, and social support, as per the strain hypothesis (Karasek, 1979; Karasek & Theorell, 1990). They concluded that studies showing support generally employed larger samples than unsupported studies. Moreover, all studies with $n > 1000$ found at least partial support for additive effects (i.e., whereby relationships were in the direction hypothesized, but not necessarily significant), and full support for main effects was found in *all* studies employing samples of $n > 3,000$. Based on these findings, Häusser et al. (2010) concluded that additive effects of the model have been proven beyond empirical doubt. Second, as with previous reviews Häusser et al. (2010) found support for additive effects to be consistently lower in longitudinal studies than cross-sectional studies, arguably because of reciprocal/reversed effects in cross-sectional studies (Taris & Kompier, 2003). Third, as with previous reviews, evidence for interactive effects was again sparse. Only 29 of 97 tests (30%) provide partial support for the demands-control interaction, with full support in just 14 tests (13%). Moreover, only seven of 52 tests (13%) provide partial support for the interaction of demands, control, and support, with full support found in only three studies (6%). Finally, Häusser et al., (2010) found studies of the extended JDCS model to be less strongly supported than studies of the original JDC model. However, they did not argue for a problem with the social support dimension due to finding approximately equal support for main

effects of demand, control, and support dimensions. Instead, they attributed lower levels of support for the extended model to *stochastic effects* of including an additional criterion, which would be expected to reduce multiplicative effects (Häusser et al., 2010).

Based on their findings, Häusser et al. (2010) called for more experimental rather than survey-based studies of the model to provide causal examinations of its major hypotheses. They also repeated van der Doef & Maes' (1999) call for more longitudinal studies to dangers of reduce reversed or reciprocal causation. The authors also contended that there should be more studies of objective (rather than subjective) measures -- or at least studies with a *mix* of objective and subjective measures – in order to reduce self-report bias in surveys, and because the model purports to make conclusions about the objective environment. Finally, Häusser and colleagues (2010) called for a transition from vote counting reviews to systematic meta-analyses of the model in order to measure population level effect sizes, and to examine possible moderating variables.

The following section briefly reviews the case for meta-analytic investigation as an improvement over the vote counting method, and outlines two meta-analytic studies to date of the model.

VI. THE NEXT STEP: META-ANALYTIC RESEARCH

Improvements on Vote Counting Reviews:

Although the three vote counting reviews (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999) have progressed research on the model by collating results of individual studies to form broader conclusions, there are several limitations of the vote counting method of summarization which limit what inferences can be made about the model. First, conclusions are formed by tallying of significant against non-significant results (Light & Smith, 1971). Thus, if the majority of studies show a non-significant finding it is generally concluded that no relationship exists. However, what are not taken into account are the near significant results that may have resulted from underpowered studies which are a critical

component of understanding true construct-level relationships (Hunter & Schmidt, 2004).

Second, due to the common issue of lack of power, the larger the number of studies analyzed in a vote counting review, the greater the certainty of concluding that no relationship exists (i.e., that $\rho = 0$) (Hunter & Schmidt, 2004). Third, significance is influenced by sample size (Bentler & Bonnett, 1980). Thus, readers may be misled as to the true nature of relationships simply due to the size of n across different studies. For example, relatively small sample studies (as often found in psychological research) produce seemingly contradictory results (Hunter & Schmidt, 2004). Conversely, in their respective reviews both Van der Doef & Maes (1999) and Häusser et al. (2010) concede that *all* studies above a certain sample size found significant additive effects. This makes for a muddy picture where holding other methodological characteristics constant, overall conclusions are strongly influenced by the number of participants in given studies.

A fourth limitation of the vote counting method is that in most cases (including both Häusser et al., 2010 and Van der Doef & Maes, 1999) effect sizes are not recorded, which leaves readers in the dark as to the true strength of relationships (Hunter & Schmidt, 2004). Conversely, Hunter and Schmidt (2004) argue that “these (population correlations) are *the* relationships of scientific interest” (p. 31, italics added), because they give the most accurate depiction of the population construct-level relationships. Finally, vote counting reviews fail to take into account study artifacts, such as sampling error, measurement error, and other artifacts that produce conflicting results. In contrast, one of the greatest contributions of meta-analysis is the ability to correct for these distorting effects (Hunter & Schmidt, 1990). Therefore, conducting a meta-analysis is the most accurate ways to estimate what the findings would have been had every study been conducted perfectly (i.e., with no methodological limitations). The following subsections outline two such recently published studies.

Meta-Analysis 1: Luchman & González-Morales (2013). The first meta-analytic steps were taken by Luchman & González-Morales

(2013), who examined cumulative interrelationships between the model's core demand-control-support dimensions, across 106 studies of the model. This represented a new approach to research on the model, and was based on the premise that understanding the nature of interrelationships between workplace characteristics would facilitate better understanding of employees' work experience. Moreover, they posited that this knowledge would facilitate more relevant and accurate job design, and occupational stress interventions.

Luchman & González-Morales (2013) hypothesized that demands would be negatively related to job control, because workers who perceived a high degree of control over work would likely restructure their tasks in order to reduce the effects of high demands on lost personal resources (Hobfoll, 2001, Spector, 2002). They also hypothesized a negative relationship between demands and supervisor support and coworker support, respectively, because of the instrumental and task-related assistance from supportive supervisors, and (Hobfoll, 2001; Lin, 1999); and because greater task assistance among coworkers allows the ability to call upon the resources of others if demands are high (Hobfoll, 2001; Settoon & Mossholder, 2002). Finally, Luchman & González-Morales (2013) hypothesized a positive relationship between control and both supervisor and coworker support resources, because according to COR theory gaining personal resources requires using personal resources; thus the more resources an individual perceives themselves as having, the more they will perceive they are able to acquire (Hobfoll, 2001).

Four out of these five hypotheses were supported. Specifically, demands were negatively related to supervisor support ($\bar{r}_{DC} = -.16$, 95% CI $-.19$ to $-.12$) and to coworker support ($\bar{r}_{DC} = -.11$, 95% CI $-.15$ to $-.08$); and control was positively related to support from supervisors ($\bar{r}_{DC} = .30$, 95% CI $.19$ to $.41$), and from coworkers ($\bar{r}_{DC} = .23$, 95% CI $.14$ to $.31$). However, their hypothesis that demands and control would be negatively related was not supported, because the meta-analytic correlation between these two workplace characteristics

was practically zero ($\bar{r}_{DC} = -.02$, 95% CI $-.07$ to $.04$). Another characteristic of their findings was that effects sizes for *all* hypothesized relationships showed evidence of heterogeneity (as indicated by the significant Q statistics on Table 1 in their study, p. 43). This indicated the possibility of moderating factors in *all* demand-control-support interrelationships (Hunter & Schmidt, 2004). Luchman & González-Morales (2013) addressed this by conducting an exploratory moderator analysis. They found that gender moderated the demand-control relationship, such that samples of mainly female participants tended towards a negative demand-control correlation, whereas more male-dominated samples showed, on average, a positive relationship. However, the authors did not report any other moderating effects.

Meta-Analysis 2: Fila, Purl, & Griffeth (In Press). The second meta-analysis of the model built directly off of the first, making several further contributions to knowledge of work stress and occupational health. In an analysis of 141 studies of the model, Fila, Purl, and Griffeth (in press) extended examination of interrelationships between the model's three dimensions to include estimation of relationships between each of these and job satisfaction and emotional exhaustion, which are the two most examined psychological outcomes in studies of the model (Häusser et al., 2010). Job satisfaction is a positive and pleasurable psychological state that results from positive appraisal of one's job (Cranny, Smith, & Stone, 1992; Locke, 1976). Moreover, it can affect organizational-level functioning through changes in performance, and employees' desire to remain with the organization (Hom, 2011). Emotional exhaustion is a form of psychological overextension that refers to feelings of being "...drained or used up, unable to face a day's work, totally unenthusiastic" (Sulsky & Smith, 2005 p.45). Emotional exhaustion is more likely to be experienced when emotional resources are depleted such that the employee feels as if he/she can no longer meet the demands of work-related stressors (Lee & Ashforth, 1996).

Fila et al. (in press) also extended Luchman & González-Morales' (2013) exploratory moderator analysis of gender by making a more explicit case as to *why* gender may moderate

DCS interrelationships (e.g., that different bi-behavioral mechanisms in men and women are thought to underpin interpretation of stressors, and coping with stress, Roxburgh, 1996; Taylor et al., 2000) as well as extending gender moderator analysis to other DCS interrelationships besides demands and control, and relationships with job satisfaction and emotional exhaustion. Furthermore, the authors examined two further potential moderators of DCS interrelationships, and relationships with job satisfaction and emotional exhaustion that have received significant recent attention: nationality and occupation. For example, according to the theory of culture's consequences, nationality influences perceptions of work stress based on how individuals from different countries appraise and respond to working conditions (Hofstede, 2001). Similarly, according to the job characteristics model (Oldham & Hackman, 2005) perceptions of work stress differ between occupations. This is thought to be based on social and structural differences in how jobs are designed which are thought to manifest in the stress process (Grant, Fried, & Juillerat, 2011; Sulsky & Smith, 2005). The author's analyses for these two moderators were conducted by sub-grouping samples from primary studies into categories (or clusters) based on nationality and occupation, respectively. In total, 27 moderating relationships were examined (e.g., nine DCS interrelationships and relationships with job satisfaction and emotional exhaustion, for each of the three moderators).

The author's primary meta-analytic results were similar to those of Luchman & González-Morales (2013). Additionally, they found job satisfaction to be negatively related to demands ($\bar{r}_C = -.27$, 95% CI $-.30$ to $-.23$), but positively related to both control ($\bar{r}_C = .46$, 95% CI $.44$ to $.48$), and to workplace support ($\bar{r}_C = .49$, 95% CI $.44$ to $.53$). Furthermore, emotional exhaustion was positively related to demands ($\bar{r}_C = .51$, 95% CI $.48$ to $.54$), and negatively related to control ($\bar{r}_C = -.20$, 95% CI $-.24$ to $-.16$), and to workplace support ($\bar{r}_C = -.30$, 95% CI $-.32$ to $-.27$). With regards to gender, the demands-control relationship was moderated similarly to that of Luchman and González-Morales' (2013) exploratory review. However, they also found that gender moderated the

relationship between demands and job satisfaction [$\bar{r}_C = -.32$, 95% CI $-.35$ to $-.28$] for females and ($\bar{r}_C = -.22$, 95% CI $-.28$ to $-.16$) for males], such that males had a smaller negative demands-job satisfaction relationship than females. Finally, almost all DCS interrelationships and relationships with job satisfaction and emotional exhaustion were moderated somehow by nationality and by occupation. Space restrictions here prevent full coverage of these results. However, hypotheses regarding moderating effects were strongly supported, with widespread implications for job design and work stress interventions for organizations throughout the world.

In summary, the JDC(S) model remains the most examined theory in work stress literature (Griffin & Clarke, 2011; Kain & Jex, 2010, Luchman & González-Morales, 2013; Sulsky & Smith, 2005). However, despite fairly consistent support for the strain hypothesis since its 1979 inception, support for the buffer hypothesis has been sporadic throughout. As such, the JDC(S) model has been widely criticized for several theoretical and methodological limitations that are apparent both in many of the individual studies of the model, and collective research on the model (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003). These issues, and attempts to address them, are outlined in greater detail in the following section. Further suggestions for future research are then made.

VII. MAJOR CRITICISMS OF THE MODEL

The most enduring criticism of the JDC(S) model is the inconsistency to which buffering effects of control and/or support are found (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003). Additionally, the model has been criticized for a predominance of self-report measurement studies, mainly cross-sectional rather than longitudinal research designs, and failing to account for individual difference variables that may moderate relationships underpinning its major hypotheses. These criticisms were echoed most recently by Kain & Jex (2010) in their review of the model. As such, each of these criticisms is expounded upon below. Additionally, the present review serves to update Kain & Jex (2010) by

reviewing studies published in the ensuing six years that have adhered to suggestions born out of these criticisms.

VIII. INCONSISTENT MULTIPLICATIVE SUPPORT

As highlighted in the three aforementioned vote counting reviews, and several other theoretical reviews of the model (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003), inconsistent buffering effects is by far the greatest criticism the JDC(S) model (Kain & Jex, 2010). From a theoretical perspective, this inconsistency has led to some scholars doubting the model's predictive value (e.g., Beehr, Glaser, Canali, & Wallwey, 2001). However, Karasek (1979; in De Lange et al., 2003) argued that interactive effects are unnecessary to support the validity of the model because; (1) its basic premise is supported if demands, control, (and support) separately exert main effects on strain; (2) reducing job demands and increasing control and/or support would additively reduce strain even if no interaction is present; and (3) implications for job redesign are the same with or without multiplicative effects. Additionally, in a recent review of the work stress literature Griffin & Clarke (2011) acknowledged difficulty in assessing the unique importance of interactions in the stress process independently of main effects, because "interactions are often reported in relation to multiple main effects...and the proportion of variance is often small" (p. 370). However, from a theoretical standpoint it could be argued that an interaction between demands and control (and support) is necessary to validate the model. For example, as Beehr et al. (2001) contended that: "... if main effects are all that constitute the theory, then demands and lack of control are simply a set of independent stressors with no necessary relationship to each other" (p. 117). Thus, the model's strength -- that is, the presupposed interactive effect of control and/or support on demand characteristics -- is at the same time also its weakness (De Jonge & Kompier, 1997).

Aside to debate regarding the model's validity as an effective predictor of well-being and strain, it is important to address theoretical and methodological reasons why multiplicative effects have been so inconsistent. The following

criticisms of the model are theoretical and methodological issues that have arguably contributed to this inconsistency, with Kain & Jex (2010) calling for further studies to address them.

IX. VARIED AND NON-MATCHING MEASUREMENT DCS CONSTRUCTS

Several researchers (e.g., Dea Jonge & Kompier, 1997; Kasl, 1996; Viswesvaran, Sanchez, & Fisher, 1999; Wall, Jackson, Mullarkey, & Parker, 1996) have contended that the probability of finding significant JDC(S) interaction effects is affected by how the model's key dimensions are conceptualized and operationalized. Specifically, inconsistent effects are thought to be attributable to both the number of different ways that demands control (and support) have been measured across studies, and by most instruments being too global -- that is, lacking in occupational specificity, and lacking in context when related to the other dimensions -- to reveal consistent interactive effects (e.g., Terry & Jimmieson, 1999; Wall et al., 1996). For example, in their recent review of the model Kain & Jex (2010) included a table of different conceptualizations of demand and control. According to this, job demands have been measured as self-reported workload, role conflict (i.e., stress attributed to incompatibility between multiple sets of work demands; Beehr & Newman, 1978) (Karasek, 1979), physical exertion, hazardous exposure (both in Landsbergis, 1988), and patient load (Fox, Dwyer, & Ganster, 1993). This is by no means an exhaustive list (see Häusser et al., 2010; van der Doef & Maes, 1999).

Additionally, control has been measured as autonomy, and decision making latitude (Karasek, 1979), as well as task control, scheduling control, and control over procedure and policies (Fox et al., 1993). Finally, although not included in this table, workplace support has been measured as an all-encompassing construct, as well as supervisory support, and coworker support (Luchman & González-Morales, 2013). Given this variability, even if it is theoretically plausible that control and/or support could moderate the effects of high demands on strain these effects have probably not been found in studies where the type of

control or support measured is incongruent with the type of demands they are hypothesized to buffer (e.g., De Jonge & Kompier, 1997; Kasl, 1996; Viswesvaran et al., 1999; Wall et al., 1996). These concerns were also raised by the authors of aforementioned vote counting reviews (e.g., Häusser et al., 2010; van der Doef & Maes, 1999).

In response to this concern, Häusser et al. (2010) conducted an exploratory analysis to examine whether degree of match between demand and control measures used in studies was associated with a higher likelihood of finding significant interactive effects. Measures of support were not included in this analysis. They divided reviewed studies into categories of “good” and “poor” match. Good match studies as those in which demand and control measures referred to the same level of functioning at the task level. For example, these studies typically operationalized demands as work load or time pressure, and control as control over the timing, scheduling, or pacing of tasks. Studies that utilized occupation-specific rather than global/generic measures were also included in this category. In all, twenty studies were classified as having a good match. Conversely, 76 studies were classified as having a poor match based on relatively unmatched or incongruent measures of demands and control (for example, *emotional* demands and timing control). Häusser et al. (2010) found that 50% of studies in the good fit category evidenced interactive effects of demands and control, whereas only 25% of studies in the poor fit category found interactive effects. This significant difference, $X^2(1, N = 96) = 4.69$, $p < .05$ indicates the benefit of congruency between key dimensions.

Unfortunately, despite this evidence many researchers have continued to measure demands, control, and support in numerous different ways, with varying degrees of match between measures. For example, Fransson et al., (2012) compared alternative demand-control-support scales in 17 European cohort studies. Their findings highlighted that not only had different measures been used across studies, but that variation exists between studies regarding which items were used to construct scales. Thus, even ostensibly matching scales are likely to vary in

the degree of actual match to others in the same study. Additionally, the variability in measurement extends to outcome variables with several different survey instruments having been used to measure frequently examined outcome variables such as job satisfaction, emotional exhaustion, and anxiety (Fransson et al., 2012). Thus, degree of match between demand, control (and support) measures may also be confounded by differences in how outcomes are measured because a well- or poorly matched set of measures may interact in their relationship with one measure of, say, job satisfaction, but not another. Furthermore, most studies of the model continue to use broad rather than occupation specific measures of demands, control, and support dimensions. This is understandable because most of the validated measures available are not specific to one particular job or industry (Kain & Jex, 2010). However, as previously mentioned the principle of matching measures of key constructs to achieve greater consistency of multiplicative effects is arguably harder to achieve if context is too broad (Beehr et al., 2001). With most empirical studies of the JDC(S) model designed as individual studies in their own right, and with seemingly little to tie them together, it appears that issues of varied and often poorly matched measures is likely to continue.

X. PREDOMINANCE OF SELF-REPORT MEASUREMENT

In empirical studies of the JDC(S) model, dimensions can be measured by imputation of job characteristics, or self-report questionnaires (van Vegchel, De Jonge, & Landsbergis, 2005). In the imputation method, scores for job demands, control, and workplace support are assigned to employees on the basis of their job title, as derived from large national studies (Karasek & Theorell, 1990). This method is recommended for large multi-occupational studies where information about an individual’s occupation is available (Landsbergis & Theorell, 2000). The most prominent example of this is the Occupational Information Network (O*Net; Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999) where myriad jobs are compared on demands and resources, as well as attributes and work styles required to be

successful, based on previous research. However, viewing stress objectively as a condition or an *event* in a given situation has been criticized for overlooking individual differences in cognitive appraisal of stress (Cooper & Marshall, 1976; Matteson & Ivancevich, 1979). Thus, most researchers of the JDC(S) model have been interested in stressor-strain relationships based on how job characteristics are *perceived* by workers (Kain & Jex, 2010) in accordance with the fit perspective of work stress (e.g., Edwards & Cooper, 1990; French et al., 1982). As such, self-report questionnaires have been used in the vast majority of studies of the model (Luchman & González-Morales, 2013; van Vegchel et al., 2005).

Self-report measures require people to report on their experiences, feelings, or attitudes (van Vegchel et al., 2005). In stress research such measures assess usually the affective, somatic, and cognitive aspects of perceived stress (Sulsky & Smith, 2005). Self-report measures have several benefits to researchers: They are relatively inexpensive, easy to administer to large groups of people, and easily quantifiable. Moreover, from a validity perspective individual perceptions are a critical component of the stress process because a large body of research suggests that the actual existence or degree of stress may be *less* important to an individual's well-being than how the individual appraises and copes with perceived stress (Aldwin & Revenson, 1987; Lazarus, 1966). Furthermore, validated self-report measures offer a high degree of face validity because arguably the best way to find out if someone is stressed is to *ask* (Sulsky & Smith, 2005).

Despite the obvious benefits of self-report methods they have received repeated criticism for being poor indicators of the objective work environment (van Vegchel et al., 2005). That is, the degree to which different employees find the same set of working conditions to be stressful is likely to vary (French et al., 1982; Lazarus, 1966). As such, there may be a danger in generalizing perceptions of demands, control, and support at the individual level to objective dimensions of an organization. Self-report measures are also prone to response bias, and a host of cognitive biases including reliance on

past experiences or schemas (Sulsky & Smith, 1995). Furthermore, psychological perception of stress may occur earlier or later than objectively measurable symptoms in the context of a stressful experience. Moreover, unreliability (e.g., a low Cronbach alpha) in any of the self-report measures used will attenuate relationships among them (Sulsky & Smith, 2005). Thus, there are inherent dangers in making too strong a conclusion about organizational phenomena using self-reports measures (Sulsky & Smith, 1995; van Vegchel et al., 2005). This is especially the case where self-reports are used to measure both independent *and* dependent variables of interest because of the risk of inflated relationships due to common method variance (Spector, 2006). However, transactional stress theory proposes that only the individual can appraise the challenging or threatening nature of the stressor (Lazarus & Folkman, 1984). Thus, despite poignant arguments against the use of self-report measures their popularity in work stress research -- including studies of the JDC(S) model -- continues to be unabating (Griffin & Clarke, 2011; Kain & Jex, 2010).

Different Types of Measures in a Single Study: Given the aforementioned potential problems with self-reports measures, Kain & Jex (2010) recommended that researchers either use different types of measures (e.g., subjective *and* objective) to avoid common method bias, or adopt experimental (or quasi-experimental) methods. Several studies have since followed their advice, with more consistent evidence of buffering effects. First, Pekkarinen & colleagues (2013) examined whether perceived control, workplace support, and distributive justice moderated associations between high physical and mental workload and musculoskeletal symptoms, among 975 female nurses working in 152 geriatric units in Finland. Objective workload measures were also taken. These consisted of unit-level incidents or occasions of work, including residents' dependency on physical functions (e.g., bed mobility, toileting, eating, and hygiene), residents' cognitive impairments (i.e., coma, short-term memory decision making, communication, and dependence in eating), and daily behavioral problems (i.e., wandering, verbal and physical abusiveness, resistance to care, and social

disruptiveness). However, rather than examining possible interactive effects between perceived control and support resources, respectively, and these measures, objective workloads measures were accounted for (e.g., held) in their regression analysis of subjective demand, control, and support measures. Their multilevel logistic regression analyses showed that self-reported physical workload was associated with higher risk of musculoskeletal symptoms among nurses with low social support. Additional examples of studies of the JDC(S) model that have used objective measures are outlined as follows.

Studies with an Experimental Design: First, Häusser, Mojzisch, & Schulz-Hardt (2011) examined the buffer hypothesis with respect to both psychological (e.g., subjective) well-being, and salivary cortisol as a physiological indicator of strain. Seventy-seven participants worked in a computer simulated workspace for approximately two hours, during which job demands (overall workload) and job control (self-paced vs. machine-paced work) were manipulated in a 2x2x7 study design of high versus low demands and control, and seven time measurements of both subjective well-being and salivary cortisol. Häusser and colleagues (2011) found that in line with the buffer hypothesis, high control (e.g., self-paced rather than machine-paced work) eliminated the impact of high demands on salivary cortisol responses. Their hypothesis of multiplicative effects of demands, control, and time of measurement on salivary cortisol was supported by a three-way interaction ($p < .001$). Given lagged cortisol reactions, no effects were found in times 1 and 2. However, high demands led to increased cortisol reactions only in the low control condition in each of the remaining five time measurements. Conversely, the authors found no main or multiplicative effects of demands and control on subjective well-being. They contended that their findings provided both clear-cut experimental evidence that the negative impact of high demands on endocrinological responses can be buffered by high levels of control, and that the lack of effects on subjective well-being can be attributed to an inherent lack of specificity in subjective well-being measures.

More recently still, Subhani, Malik, Kamel, Saad, & Nandagopal (2015) investigated the impact of demands and control on cognitive arousal. Their experiment involved manipulating task demand and control over method and order of task completion for *four* demand-control conditions (e.g., high-high, high-low, etc.), and recording electroencephalogram (EEG) to extract levels of cognitive arousal. Both the strain and buffer hypotheses were supported by cognitive arousal levels in association with task performance and subjective well-being feedback. That is, their results showed that the maximum arousal and the *worst* performance occurred under the high demands low control condition. Moreover, high control under conditions of high demands proved to significantly lower arousal and improve task performance when compared to the high demands low control condition. Subhani et al.'s (2015) results not only validate the strain and buffer hypotheses for high strain (e.g., high demands, low control) conditions in an experimental setting, but present a rare experimental examination of the *activation* hypothesis (high demands and *high* control; Karasek & Theorell, 1990).

Finally, O'Donnell, Landolt, Hazi, Dragano, & Wright (2015) assessed the possible buffering effects of control in an experimental design of the strain hypothesis. In a within-subject design, 60 female participants were randomly assigned to one of two control (autonomy) conditions whereby when completing a word processing task in a simulated office environment, they were either given the autonomy to choose their break times, or were assigned them. O'Donnell et al. (2015) measured adaptive physiology using heart rate variability (HRV) and salivary alpha amylase (sAA) as objective physiological markers of stress. To the authors' surprise, although participants reported increased perceptions of control in the task in the break-time autonomy versus the standard condition they reported no difference in demands, and performed *worse* than those who had been assigned break times. Thus, their results revealed support for the manipulation of autonomy, but in the opposite direction than hypothesized in the buffer hypothesis. Moreover, increased autonomy was related to dysregulated physiological reactivity, which is

synonymous with typical increases in the stress responses (Schneider, 2004). Thus, their findings suggest that autonomy can become an additional *stressor* when it adds additional complexity to work (e.g., Karasek & Theorell, 1990).

XI. PREDOMINANCE OF CROSS-SECTIONAL RESEARCH DESIGNS

The majority of JDC(S) studies have adopted cross-sectional rather than longitudinal research designs (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999). Cross-sectional designs allow for all data to be collected at a single time point. However, they have been widely criticized for potential reverse- or reciprocal-causation (Spector, 2006). Reverse/reciprocal causality is cause and effect in reverse, such that the effect precedes the cause (Tharenou, 1993). For example, where findings of a cross-sectional JDC(S) study show a positive relationship between perceived demands and emotional exhaustion, it is possible that being emotionally exhausted may evoke perceptions of job demands being high. Similarly, if results show a negative relationship between perceived control and emotional exhaustion, an employee who feels able to cope with the pressures of work (i.e., who is not emotionally exhausted) may be likely to perceive a greater degree of control (cf. Dalgard et al., 2009).

A weight of predictive evidence from longitudinal JDC(S) studies suggests that demands, control, and support respectively do in fact predict well-being and strain (Häusser et al., 2010; van der Doef & Maes, 1999). Thus, support of the model's hypotheses in cross-sectional studies may not be due to reverse- or reciprocal-causation. However, it may be a factor in more consistent support being found overall for both the strain and buffer hypotheses in cross-sectional versus in longitudinal studies (Taris & Kompier, 2003) (see Häusser et al., 2010; van der Doef & Maes, 1999). As such, Kain & Jex (2010) as well as the authors of JDC(S) reviews (e.g., Häusser et al., 2010; van der Doef & Maes, 1999) recommended that more researchers adopt longitudinal research designs. Longitudinal designs do not allow researchers to infer causality in non-

experimental survey research (Kasl, 1996; Zapf et al., 1996). However, they reduce the risk of reverse- or reciprocal-causality, particularly when cross-lagged correlations can be obtained that support directionality of effect (De Lange et al., 2003). Since Kain & Jex's (2010) review several further studies have been published that adhere to their call for more longitudinal research.

XII. STUDIES WITH LONGITUDINAL DESIGNS

First, De Jonge, van Vegchel, Shimazu, Schaufeli, & Dormann (2010) performed a two-wave longitudinal test of the demand-control model in a sample of 267 health care employees from a Dutch panel survey, with a 2-year time lag between waves. They examined the strain hypothesis using specific types of job demands, and both objective and subjective well-being. The specific types of demands were mental demands, measured with an eight-item scale that measured demanding aspects of the job, such as working under time pressure, strenuous work, and job complexity; emotional demands, which were assessed using a 12-item scale regarding aspects of work such as being confronted with emotionally demanding behavioral characteristics of clients (e.g., awkward or aggressive behaviors) and traumatic events such as human suffering; and physical demands, as measured by a seven-item scale that contained items about carrying heavy loads, severe bending, restricted standing, and carrying at shoulder height. Control was measured as perceived decision authority on the job. Finally, they measured job satisfaction, and subjective well-being in the form of psychosomatic health complaints, as well as objective well-being based on incidents of sickness absence, as recorded by the organization. De Jonge et al. (2010) found significant interactions between demands and control for mental and emotional demands, but not for physical demands. Specifically, they found a positive relationship between demands and job satisfaction for those who reported high levels of control, and a negative relationship for those reporting low control. Conversely, the relationship between demands and both psychosomatic health symptoms and incidents of sickness absence

were negative for those with high levels of control, but positive for those reporting low control.

In another study, Butterworth et al. (2011) used longitudinal data to investigate whether the benefits of having a job depended on its psychosocial qualities (e.g., levels of demands and control, as well as complexity, security, and fair pay), and whether poorer quality jobs were associated with better mental health than unemployment. The authors analyzed seven waves of data from 7,155 respondents of working age for a total of 44,019 observations taken from a national household panel survey. Longitudinal regression models evaluated the concurrent and prospective association between employment circumstances (e.g., unemployment versus employment in jobs varying in psychosocial job quality) and participants' reported mental health. Although as expected the authors found unemployed respondents to have poorer mental health than those who were employed, the mental health of the unemployed was slightly superior to those who were employed in jobs of the poorest psychosocial quality (e.g., high demands, low control, and also routinized work that lacked job security and was poorly paid). Although not a test of the buffer hypothesis, this examination of the strain hypothesis (e.g., main effects of demands and control) across time was revealing given that those who were unemployed experienced better mental health than those employed in psychosocially poor jobs.

Finally, Boyd et al. (2011) used structural equation modeling to conduct a longitudinal test of the model in a sample of 296 Australian university academics in order to determine how well job demands (work pressure, academic workload) and job resources (procedural fairness, job autonomy) would predict psychological strain and organizational commitment over a three-year period. The authors also conducted longitudinal tests of reversed causation to support the validity of their longitudinal design. Their results of SEM analyses showed that resources at time 1 directly predicted strain and organizational commitment three years later, but that demands in the first time wave only predicted strain three years later via job resources. That is, perceived control and

procedural fairness at time 1 mediated the relationship. Their results suggest that workers future levels of strain are affected by present levels of resources. Moreover, Boyd et al. (2011) did not find evidence for reversed causation.

Taken together, the results of this study show that although longitudinal studies of the model remain relatively rare, some support does exist for buffering effects on demand-strain relationships. Moreover, these more recent studies have adopted longer gaps between time waves than some of those reviewed by Kain & Jex (2010). Although justification for the length of gap between waves appears to be still lacking, adopting a longer-time lag between waves decreases the chance of finding significant effects. Thus, these studies go some way to validating that hypotheses of the JDC(S) model are valid over time.

XIII. FAILING TO ACCOUNT FOR INDIVIDUAL DIFFERENCE VARIABLES

In line with Karasek (1979), Kain & Jex (2010) contended that main and multiplicative effects of demand, control, and support on well-being and strain might vary based on individual differences; something that the model has been criticized for overlooking (Kristensen, 1995). In their review, Kain & Jex (2010) noted that although Karasek had outlined several possible individual differences (e.g., age, education, income, urban versus rural living), he had not hypothesized what these effects might be. Moreover, in the thirty years leading up to their review relatively little research had been conducted on possible moderating effects of these (or other) individual difference variables. This may have contributed to criticism regarding the model's simplicity, and relative lack of multiplicative effects in primary studies. Kain & Jex (2010) noted, however, that more recent studies of the model had included various measures of individual differences, such as proactive personality (defined as the propensity to show initiative, take action, and persevere until the problems one faces are overcome; Parker & Sprigg, 1999), active coping (e.g., a wide range of purposeful strategies which are directed towards altering or avoiding job-related stressors; Parkes, 1994), self-efficacy (an

individual's judgments of their own capabilities to organize and execute courses of action in order to attain designated goals; Bandura, 1977), and external locus of control (e.g., the degree to which one attributes or concedes control to forces outside of oneself; Spector, 1982). They reviewed findings of the effects of these individual difference variables on main and multiplicative effects of demand, control, and support dimensions, and reached several initial conclusions.

First, individuals with a proactive personality tend to use autonomy at work to cope with demands more effectively than those with a less proactive personality. However, strain levels tend to be higher for those with a proactive personality when perceived control/autonomy is low (Parker & Sprigg, 1999). Second, Kain & Jex (2010) acknowledged that one's choice of coping methods can depend on the situation (e.g., what resources are at hand). Specifically, they reported that job control mitigated the relationship between demands and physical forms of strain for those who adopted active coping methods, but not for those who didn't. This was attributed to the ability of those adopting active coping methods to use control in order to meet demands (Ippolito, Adler, Thomas, Litz, & Holzl, 2005). Conversely, as with proactive personality, employees reported higher levels of strain when control was perceived to be low (Parker & Sprigg, 1999).

Similarly, Kain & Jex (2010) reported that according to Salanova, Peiro, & Schaufeli (2002), employees reporting high levels of self-efficacy were more likely to experience a buffering effect of control on the relationship between high demands and strain because they believed in their ability to utilize control afforded to them in order to meet demands. However, those with lower levels of self-efficacy did not experience this interaction, even if they reported perceiving high levels of control, because they were unable to utilize it. Finally, with regards to locus of control, Kain & Jex reported that studies had shown control not to buffer relationships between demands and anxiety, and demands and musculoskeletal pain for those perceiving an external locus of control (Meier, Semmer, Elfering, & Jacobshagen, 2008). However, buffering effects were

strongest for those with an internal locus of control, particularly when workplace support was also perceived to be high (Rodriguez, Bravo, & Peiro, 2001).

XIV. INDIVIDUAL DIFFERENCE RESEARCH SINCE KAIN AND JEX'S REVIEW

In the ensuing years since Kain and Jex's (2010) review, further research on the JDC(S) model has taken individual differences into account. For example, there has been further evidence for the effects of active coping (van den Tooren, de Jonge, Vlerick, Daniels, & Van de Ven, 2011), self-efficacy (Panasik, O'Driscoll, & Anderson, 2011), and external locus of control (Parker, Jimmieson, & Amiot, 2010), which largely corroborate the aforementioned studies reviewed by Kain & Jex (2010). However, researchers have also examined several other individual differences variables.

First, it appears that *hardiness* is an important individual resource in relation to health at work by protecting against stress to enable healthy functioning. Hardiness is defined as a generalized style of functioning that is characterized by a strong sense of commitment to goals, control over circumstances, and willingness to undertake challenge (Bartone, 2000). The quality of hardiness is believed to influence how people interact with their environment by encouraging effective coping with stressful circumstances (Maddi & Kobasa, 1984). Specifically, Hystad, Eid, & Brevik (2011) investigated the role of hardiness in sickness absences from work in a sample of Norwegian Armed Forces employees. They found that hardiness predicted both the likelihood of having sickness absences and the number of absence spells over the following 12 months. Moreover, individuals who reported high demands and *high* control (in line with the activation hypothesis; Karasek, 1979) were absent more often if they reported a *low* versus high levels of hardiness. This suggests that hardiness comes into play when individuals are actively challenged by demanding work over which they perceive a strong measure of control (Hystad et al., 2011).

Another individual difference variable that has recently received investigative attention in a study of the JDC(S) model is emotional stability. Emotional stability is defined as the ability to remain calm when faced with stressful circumstances or environments, and to perform effectively under such conditions (Leone, Van der Zee, van Oudenhoven, Perugini, & Ercolani, 2005). It is associated with low levels of negative affect, as well as higher levels of self-confidence, productive coping strategies, such as problem-focused and emotion-approach coping, and a calm demeanor. Conversely, when faced with challenges, individuals with low levels of emotional stability are more likely to focus on their own inner turmoil, and to direct available resources (e.g., control or support) toward reducing negative emotions rather than to addressing situational demands (Baker & Berenbaum, 2007; Connor-Smith & Flachsbart, 2007). Moreover, individuals who are low in emotional stability are likely to inadvertently invite more stress and strain by dwelling on negative emotions, and to experience anxiety, hostility, and self-doubt (Costa & McCrae, 1987), despite a range of emotion-avoidance coping strategies (Baker & Berenbaum, 2007).

Rubino, Perry, Milam, Spitzmueller, & Zapf (2012) integrated study of the JDC(S) model (Karasek & Theorell, 1990) with the conservation of resources theory, which views stress as triggered by failure to acquire sufficient resources, or by threat or actual loss of them (Hobfoll, 2001), by positing that emotional stability can act as a personal resource by aiding in the management of job demands. The authors tested the moderating effect of emotional stability on job demands of uncertainty and time pressure, and control (i.e., decision latitude) in predicting job dissatisfaction and disengagement. For both uncertainty and time pressure they found that a significant three-way interaction emerged, such that the traditional demand-control interaction was found only in those with high emotional stability, and that those with low-emotional stability did not benefit as readily from decision latitude. Moreover, those with low emotional stability were more susceptible to job demands when they experienced high levels of control. This suggests that highly emotionally stable individuals are best able to capitalize on being

afforded significant control over their work to manage demands; whereas in uncertain situations, emotionally unstable individuals may view decision latitude as added responsibility that may further contribute to strain (Rubino et al., 2012).

Finally, Daniels, Wimalasiri, Cheyne, & Story (2011), examined whether personal initiative moderated demand-control-support relationships with outcomes of idea generation and idea implementation. Personal initiative is defined as a set of co-occurring behaviors consisting of being self-starting, persistent in implementing goals, and having a long-term orientation (Frese & Fay, 2001). Moreover, according to Seibert, Kraimer, & Crant (2001), individuals with high levels of personal initiative are future oriented, and thus may be more predisposed to resolve ambiguous problem situations through the development and implementation of new ideas. Such people also tend to be more creative than those with lower levels of personal initiative (Binnewies, Ohly & Sonnentag, 2007).

Daniels et al. (2011) used an experience sampling methodology whereby participants provided data up to four times per day for up to five working days ($n = 89$). They expected that workers with higher levels of personal initiative would be more likely to use job control to solve problems (e.g., demands) as a way to generate new and useful ideas (c.f., Searle, 2008). They operationalized job control as “changing aspects of work activities to solve problems” (p. 11), and found that the degree to which people reported doing so was associated with higher levels of idea generation for people with high personal initiative.

Additionally, Daniels et al. (2011) operationalized social support in the context of problem solving as “discussing problems to solve problems” (p. 13). They did not expect workers with high levels of personal initiative to use support in the idea generation process, because according to Paulus, Larey, & Dzindolet (2001) cognitive processes relating to idea generation can be hindered by the presence of others. However, people with high levels of initiative tend to be more persistent in *implementing* ideas (Frese & Fay, 2001), and idea implementation is thought to include a social element (whereby ideas can be both

supported and transformed based on feedback; e.g., De Dreu, 2006). Thus, Daniels et al. (2011) expected such people to discuss problems with others in order to refine and implement new ideas for solving problems (Frese & Fay, 2001). They found that the extent to which workers discussed problems to solve problems (e.g., support) was associated with higher levels of idea implementation for those with higher levels of personal initiative. Thus, Daniels et al.'s (2011) findings suggest that individuals with a high degree of personal initiative are more likely to make optimal use of control and support resources, in order to solve problems in the shape of work demands.

Taken together, these results further suggest that such differences are at play when examining the major hypotheses of the JDC(S) model. Furthermore, it appears that multiple individual difference characteristics share similar relationships, when accounted for in studies of the model. That is, the negative effects of strain tend to be less for those who are high in these characteristics, in conjunction with high levels of perceived control and in some cases support. Moreover, positive effects of *high* demands and *high* control (and in some cases, high support) appear to have the strongest affect on active learning and performance-related outcomes (as per the activation hypothesis; Karasek, 1979; Karasek & Theorell, 1990) in people who are strong in these individual difference characteristics.

XV. FURTHER ISSUES TO BE ADDRESSED: NEW CONCEPTUALIZATIONS OF DEMANDS

In addition to the theoretical and methodological concerns above, Kain & Jex (2010) followed up Karasek & Theorell's (1990) original call for tests of other demands using the model. That is, although studies have examined a number of different operationalizations of demands (e.g., workload, role overload, psychological demands), the authors called for examinations to test the strain and buffering hypotheses on alternative conceptualizations of the term "demands." Beyond these different operationalizations, and what has already been reviewed and discussed regarding objective versus subjective demands, arguably the most progressive change in relatively recent years is a

reconceptualization of demands as being both "bad" and "good" not only in their quantity (e.g., eustress, due to a moderate versus high or low amount of demands, Selye, 1956; or the different role of demands in the activation versus strain hypothesis, Karasek & Theorell, 1990), but also in terms of the nature and characteristic of the demands themselves. Thus, there is now greater consideration than before that the type of demand stressor may be important in predicting job satisfaction, and strain.

Challenge-Hindrance Stressors: For example, in their meta-analysis of work stress and employee turnover, Podsakoff, LePine, & LePine (2007) argued for two conceptually separate domains of stressor in their examinations, which they purport may somewhat explain inconsistencies in previously reported relationships where demands have operated within a singular domain space (e.g., Selye, 1956; Wundt, 1922). Specifically, Podsakoff et al. (2007) categorized job demands as either hindrance or challenge stressors. The authors defined hindrance stressors as demands that workers tend to appraise as potentially constraining to their personal development and work-related accomplishment. Examples included role ambiguity (i.e., the degree to which work is demanding because of uncertainty regarding expectations; Kahn, Wolfe, Quinn, & Snoek, 1964), organizational politics, and concerns about job security. In contrast, they defined challenge stressors as those that promote personal growth and achievement (Podsakoff et al., 2007). Examples include high levels of workload, time pressure, job scope, and responsibility. Thus, challenging demands require some energy, but are stimulating. Although the term "job demands" has come to encompass a variety of stressor variables, delineation of demands into negative and positive categories stands in contrast to previous stress research in which the term stressor was inherently thought to be negative to employee well-being. Interestingly, this conceptualization has stood in contrast to classical stress theory on there being an optimal level of stress for well-being, not a linear negative relationship (e.g., Selye, 1956, 1976).

In their recent meta-analysis, Podsakoff et al. (2007) collated primary studies based on whether stressor variables could be considered to be challenges or hindrances. Their findings revealed that hindrance stressors were more strongly related to strain ($r_c = .56$, 95% CI .50 to .62) than were challenge stressors ($r_c = .40$, 95% CI .34 to .47). However, although hindrance stressors were strongly negatively related to job satisfaction ($r_c = -.57$, 95% CI -.61 to -.52), challenge stressors had a near-zero relationship with job satisfaction ($r_c = -.02$, 95% CI -.10 to .05). Although challenge stressors are thus painted in a more positive conceptual light than hindrance stressors, Podsakoff et al.'s (2007) findings suggest that high levels of challenge stressors increase the occurrence of strain. Moreover, when seeking to enhance employee satisfaction through job redesign, interventions targeting job demands are unlikely to produce meaningful effects.

Despite the relative prominence of the challenge-hindrance stressor framework in recent years, and widespread acceptance that demand stressors can be delineated based on these characteristics, almost no research to date has investigated whether the moderating role of resources (e.g., control and support) differs in relationships between challenge and hindrance stressors, respectively, and job satisfaction and strain. This may be due to questions being raised regarding the accuracy of these concepts as standalone variables. For example, Schieman (2013) contended that “the conceptual fuzziness of demands and resources in the challenge-hindrance model is problematic on many levels” (p. 9). First, the challenge stressor and hindrance stressor conceptualizations blur the lines between the job attribute and the consequences that flow from it by blending the independent and dependent variables. Specifically, a job characteristic is labeled as a “hindrance stressor” if it is associated with decreased functioning or poor health; but as a “challenge stressor” if it is deemed to be stimulating. Moreover, Schieman (2013) argued that the challenge-hindrance framework obscures key distinctions between demands and resources, and, instead characterizes them all as different kinds of demands. That is, challenging demands may encompass positive assessment of resource availability for task completion, whereas

hindrance demands may simply be demands that the individual appraises as being imbalanced with resource availability. In addition to these contentions, as previously mentioned transactional stress theory (Lazarus & Folkman, 1984) proposes that only the individual can appraise the challenging or threatening nature of the stressor. Thus, what may be challenging for one individual may be a hindrance to another. Furthermore, a recent study by Webster, Beehr and Love (2011) showed that some employees simultaneously appraised stressors such as role ambiguity, workload and responsibility both as challenges and threats.

Despite these arguments, one recent study investigated whether the role of resources differed for challenge and hindrance stressor relationships with strain. Tadic, Bakker, and Oerlemans (2015) conducted a quantitative daily diary study to investigate whether primary school teachers experienced the most positive affect and work engagement on days when they were confronted with highly challenging (vs. low challenge) job demands and *high* resources of control and work support; and the lowest levels of positive affect and engagement on the days they were confronted with high (vs. low) levels of hindrance demands combined with *low* job resources. They found that hindrance demands had a negative relationship with daily positive affect and work engagement, but that control and support buffered this relationship. In contrast, daily challenge demands had a positive relationship with the two outcomes, and this was made stronger by the presence of resources. Tadic et al. (2015) have taken the first step to showing that resources may in fact have differing effects between challenge and hindrance stressors, but clearly, more research is required to draw firmer conclusions.

Illegitimate Tasks: Another relatively new conceptualization of job demands is that of illegitimate tasks (Semmer et al., 2005, 2015). The concept of illegitimate tasks, as well as an examination of their effects in a test of the JDC(S) model is covered in article 3 of this dissertation.

XVI. WHERE NOW? FUTURE RESEARCH ON THE MODEL

In addition to addressing Kain & Jex's (2010) calls for future research on the JDC(S) model, there are other concerns that arguably deserve more investigative attention. First, given significant changes in the design of many established types of jobs, as well as the advent of many new types of occupation since Karasek's (1989) original research (see O*Net; Peterson et al., 1999), categorizations of jobs based on demand, control, and support characteristics should be reevaluated. It would also be interesting to ascertain whether certain occupations have changed position in the ensuing period (e.g., from being active jobs, to high strain jobs), and to understand why. Aligned to this, further research could establish whether demographic trends exist in these different categorizations of jobs. For example, given the gradual shift towards greater levels of gender equality in the workplace, have there been changes in the work characteristic profile of jobs they frequently occupy (e.g., from an arguable tendency towards passive jobs such as clerical work, to more low strain, active, and high strain positions, such as scientists, management consultants, and attorneys?).

Additionally, future studies of the model could address concerns regarding interactive effects by examining a broader array of operationalizations of job demands, control, and support, within a single study (for example, physical demands, emotional demands, task demands; skill discretion, autonomy, and decision making authority; as well as coworker and supervisor support, and perhaps other sources of workplace support, such as from internal counselors). A more comprehensive approach to measuring demands, control, and support makes both theoretical and practical sense, and is necessary both to validating the buffer hypothesis on a more consistent basis, and moving the theory away from criticism due to frequently unjustified reasons for selecting a single measure only of the main constructs (e.g., Kristensen, 1995). Furthermore, future cumulative reviews of JDC(S) research could compare findings across different occupations to better determine what control and support resources are more or less likely to buffer

effects of demands on well-being and strain in different jobs. Doing so would increase the likelihood of finding interactive effects because of the greater number of tests that could be performed in a single study (e.g., two types of demands and two types of control would yield four tests of multiplicative effects). However, perhaps more importantly from both a theoretical and practical perspective, such an approach would allow for more specific *matching* between types of demands and control, which would aid efforts to redesign jobs for maximal positive outcomes such as learning, motivation, and performance, and minimization of strain. For non-experimental survey-based studies of the model, as adopted by the vast majority of studies of the model to date (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999), adding further measures of the three main dimensions of the model would simply be a question of adding more survey instruments to the investigation.

A third recommendation for future research, in line with the second recommendations, is that researchers make a greater effort to focus on forms demand, control, and support that are relevant to the type of work or organization participants work in, rather than relying on global measures. For example, a brick layer performs routinized physical and monotonous tasks (Karasek & Theorell, 1990). The three classical forms of control measured in studies of the JDC(S) model are skill discretion, participation in decision making, and autonomy. However, it is hard to argue that the average brick layer would have, or indeed benefit from either of the first two, much less that either or both would buffer the effects of their specific job demands on strain. Moreover, autonomy may be interpreted contextually. That is, a brick layer may perceive a degree of autonomy when, having been given instructions for the day's tasks, he or she is left to work with little supervision. However, if autonomy is contextualized as having the freedom to make larger scale decisions, such as what shift hours to work, when to take breaks, what products and tools to use, or what freedom to assess the quality of one's own work, then a typical brick layer (that is, an employee of an organization, not an independent contractor) may perceive having little autonomy in their work.

Furthermore, even for jobs with seemingly clear task demands, such as a brick layer, psychological demands of the work may be contextualized differently. For example, a laborer who is passionate about brick laying may interpret the nature of his/her work as low in psychological demands: the job is set, the tools are ready, and success is a question of applying oneself to a relatively set formula. Conversely, an aspiring laborer who wishes to become a manager may find the psychological demands of brick laying higher, because of having to suppress their as yet unfulfilled ambitions.

The validity of a more occupation-specific approach to measurement could also be examined. For example, until now most studies of the JDC(S) model have operationalized demands control and support with broad measures (De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003). Thus, it appears that researchers have either hoped or expected that participants would interpret these constructs in the context of their own job specific relevancies. However, this could be ascertained this by assessing perceptions of both broad and job-specific constructs, and comparing respective results.

Finally, given the vast amount of research published on the model, as well as three vote counting reviews (De Lange et al., 2003; Häusser et al., 2010; van der Doef & Maes, 1999), and numerous theoretical articles (e.g., De Jonge & Dorman, 2006; Kristensen 1995; Taris & Kompier, 2003), cumulative research should now adopt a meta-analytic approach. The transition to meta-analytic research is covered in article 2 of this dissertation.

XVII. CONCLUSION

Although the JDC(S) model has been highly influential in occupational stress literature for over 37 years, it has been widely criticized for inconsistent multiplicative effects of control and/or support with demands on strain and well-being outcomes. Research as a whole on the model has also been criticized for a predominance of self-report versus objective measurement, cross-sectional rather than longitudinal design, variety and inconsistency in

how the three main dimensions are measured, and a lack of consideration of individual difference variables. Other considerations include a progression in our understanding, conceptualization, and operationalization of job demands in recent years, and the need for meta-analytic research. However, the model remains a bedrock of work stress literature, and is popular not only because of its simplicity and the ease in which it can be tested given the numerous ways that demands, control, support, and strain can be measured; but because of the practical implications that can be gleaned from it, and the enduring (and arguably ubiquitous) concern regarding job demands, control, and support within the wider work stress and job design literature (Griffin & Clarke, 2011). Thus, its proponent's goals must surely be to increase its reputation for consistent multiplicative effects and rigorous research designs by ensuring that the model remains at the forefront of continually progressing theoretical and methodological developments in scientific research.

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E-Waste: Issues and Challenges in Kerala

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ABSTRACT

The production of electrical and electronic equipment (EEE) is one of the fastest growing global manufacturing activities. E-waste in India is a clear indicator in the complex form of digitization and economic growth. Currently, there are very few regulations, sound e-waste management systems, and recycling facilities available in the country. The availability, extent and reliability of data related to e-waste trade value chain are important to select a particular methodology for e-waste inventory assessment. After identifying the research gap regarding ever increasing e-scrap in the Kerala state, the researcher framed problem statement, research objectives and hypotheses. Data were taken from the statistically designed sample frame for household and institutional consumers. Proper reliability and validity checks were conducted for both target groups. The data were analyzed using SPSS and SEM. The SWOT Analysis revealed the existing situation of crude e-waste management practices in Kerala State. Even though heavy risks are there, the present strengths and opportunities revealed the possibilities of a profitable and sound e-waste management model by incorporating the multi- stakeholders.

Keywords: *E-waste, Recycling, Households, Institutional customers, Kerala*

I. INTRODUCTION

THE electrical and electronic waste (*e-waste*) is one of the ever growing waste streams in the present world. The increasing “market penetration” in developing and underdeveloped countries, faster replacement in developed countries and heavy obsolescence rate make e-waste as one of the fastest increasing waste flows. Environmental issues and trade associated with e-waste at local, trans-boundary and international level has driven many agencies and nations to introduce control measures. Rapid development, combined with rapid EEE-EOL and obsolete electronics is now the fastest growing waste stream in the developing world. Industrialized sectors all over the world are starting to address e-waste as it is cumulatively mixing into the solid waste stream. The growing

inventory of waste from electronic and allied industry, known as e-waste is beginning to reach immeasurable quantities. Solid waste management, which is already an unsettled job in India, has become more confused by the huge stockpiling of e-waste, particularly computer & ICT waste to India, from other parts of the world.

Electronic and electrical waste (e-waste), also referred to as waste electrical and electronic equipment, is defined as an end-of-life “equipment which is dependent on electrical currents or electromagnetic fields in order to work properly” (UNEP, 2007). Although EEE does not pose any visible danger to consumers while in working condition, it can start to show certain risks when it reaches the end of life. The dismantling and recycling of this waste in an unorganized and informal way in poor and developing countries, faces serious threats to

mankind and the environment. Also, regulatory frameworks drafted to protect the health of dismantling and informal workers in these countries are limited, or non-existent.

E-waste in India is an indicator for the complex form of modernity present in the upcoming world power (Toxic link, 2007). Currently in India, there is very least number of recycling facilities available that can take the treatment of the different categories of e-waste that produced by IT and electronics industry. This problem can be very complex and danger to health in the long time. The growth perspectives for electronic devices, both in the domestic and international market, underline the necessity and urgency to create a proactive Indian strategy for e-waste recycling, anticipating future problems. This is especially important in a country where illegal e-waste is imported and where consumerism is on the rise. The booming middle-class consumerism in India coexists peacefully with the traditional way of life. If India really wants to take up a comfortable leading role in the digital industry globally, a standard e-waste management policy is absolutely required.

Increase at the end of life of electrical and electronic products depends on the economic growth of the country, population growth, market penetration, technology up gradation, and obsolescence rates. E-waste comprises of wastes generated from used electronic devices and household appliances which are not useful for their desired and designed use and transport for safe disposal. Such e-wastes constitutes a wide array of EEE such as desktop & laptop computers, mobile phones, stereos, large household appliances such as televisions, batteries, refrigerators, air conditioners, etc. E-wastes contain over 1500 different substances, many of which are toxic and potentially hazardous to the environment and human health, if these are not handled in an environmentally sound manner (Toxiclink, 2007). The cumulative deposit of e-waste has received social, technological and economic impacts. The increase of electrical and electronic products, consumption rates and higher obsolescence rate are moving to the huge generation of e-waste. The major concerns related to electronic waste are: 1) increasing of huge amount of e-waste, 2)

heavy inclusion of toxic components, 2) lack of proper regulations 3) lack of sound e-waste management models, 4) less awareness levels for public and institutions 5) less inventorization methods etc.

E-waste inventory and its future projections within a geographical area provide the basis for planning, design and implementation of sound e-waste management. The availability, extent, method, validity and reliability of data related to existing e-waste stocks and supply chain are important to frame a particular model for e-waste inventory assessment.

E-waste is an emerging environmental problem in India and the rest of the world. It is like a multifaceted sword of some sort as e-waste has both economic and harmful effects. Waste electric and electronic equipment (WEEE or e-waste) is one of the fastest growing waste flows worldwide. Rapid product innovations and upgrades, especially in ICT segment and office equipment, and very lower prices, contribute to a steep growth of the market for EEE. This increasing quantity of EEE in use will eventually end up as electronic waste.

II. OBJECTIVES OF THE STUDY

The major objectives of this study are:

- 1) To measure the quantity of current and future e-waste generation with particular reference to Kerala State.
- 2) To study the awareness level of household and institutional consumers of EEE towards e-waste related aspects.
- 3) To study the reasons behind the high obsolescence rate of the EEE in household and institutional consumers through a statistical approach and proposes a sound EWM model to curb this growing threat.

Based on the preliminary discussion, ground studies, stakeholder interviews, focus group discussions and review of literature; the researchers framed appropriate hypotheses.

E-waste comprises of many items but the study was limited to six categories such as desktop computers and printers, mobile phones, televisions, refrigerators, air conditioners and

washing machines for estimations and quantifications of e-waste produced. Data on the number of units exiting in each sector has been collected from many sources, which are not available at one place and may have an error factor +/- 5 per cent. Sampled data will not give a correct picture, but gives an indication of the e-waste generated.

III. REVIEW OF LITERATURE

Mundada et al. (2004) described further that consumer electronic equipment has become a very important part of human life because of advances in the electronic industry and life styles over the last three decades as well as the increasing importance of information technology. The electronic industry is the world's largest and fastest growing manufacturing industry (Radha, 2002). Composition of the e-waste is very diverse and complex. E-waste contains more than 1,000 substances, which can be classified as hazardous (mercury, lead, cadmium, beryllium, etc.) and non hazardous (F, Al, etc.) substances. The MAIT study reports that out of the total corporate polled, around 94 percentage of them did not have any proper policy in place governing safe disposal of obsolete IT products/e-waste and the top states, in order of the highest contribution to WEEE, include Maharashtra, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh, Kerala and Punjab. The city-wise ranking of largest WEEE generators is Mumbai, Delhi, Bangalore, Chennai, Kolkata, Ahmadabad, Hyderabad, Pune, Surat, and Nagpur. Kumar et.al. (2011) electronics industry is one of the fastest growing manufacturing industries in India. Priyadharshini & Meenambal, (2011), stated that the new electric and electronic equipment has infiltrated all aspects of our daily life providing us with more comfort, health and security.

Prakash & Manhart, (2010) pointed out that proved the importance of social factors and economic factors while considering the problem of inventorisation and quantification of WEEE. Deepali Sinha-Khetriwal et.al. (2005) stated that the growing quantity of e-waste necessitates the development of systems which

can handle the waste in such a way that minimizes negative social and environmental impacts while maximizing the positive impacts. Jain & Sareen (2006) stated that the market supply method can be easily applied to e-waste estimation in the Indian context, considering constraints in data collection as a result of the informal nature of the e-waste trade. Chaturvedi et.al.(2007) were collectively reported that strategic planning is needed to tackle the e-waste as it can lead to serious threats to the environment and health. EPTRI Report (2010) revealed that many institutions in India are involved in illegal trade of their waste. Rode (2012) stated that in India, the different stakeholders of e-waste like government, citizens, recyclers, waste collectors, municipalities' producers and all other stakeholders should be made aware of the e-waste problem in society. Sastry & Murthy (2012), suggested that governments should enforce strict regulations and heavy fines levied on industries, which do not practice waste prevention and recovery in the production facilities.

Naik & Dandwate (2013) narrated that the reasons for prompt generation and obsolescence of E-waste include rapid economic growth, urbanization, the openness of the market, high Research and Development facilities, industrialization, increased consumerism etc. in India. Based on the in depth review of available literature, the researcher identified the categories of WEEE in Indian subcontinent and especially in the state of Kerala like TV, Refrigerator, Mobile phones, etc. The social, economic and technological factors are the leading subjective factors to the high obsolescence rate of used EEE.

IV. DISCUSSION

The study is explorative and analytical in nature. The research is exploratory in nature as it aims in the fact finding of an EOL EEE generation pattern of Kerala state. The study uses a series of preliminary studies and stakeholder interviews (both formal and informal) to get the data about a) how many households and industries using electric and electronic equipment? b) What are the major EEE coming under this segment, etc. The study includes both

primary and secondary data. Secondary data is used to analyze the existing scenario in Kerala state. Appropriate questionnaires were formed for ascertaining the variable measurements and attitudes of both household and institutional consumers. A 5 point scale (Likert scale) was used to establish the respondents' attitudes towards the issue.

Based on reviewing literature, a preliminary study questionnaire was designed for the attitude level of household customers and institutional customers separately towards the EEE and EOL WEEE and concepts of e-waste, e-waste rules, EPR, take back policy of manufacturers etc. for household consumers. The projection of e-waste till 2025-'26 was done from the sales data from the base EEE market of Kerala State after identifying the leading EEE. Pilot study questionnaire were designed on the awareness level of household customers and institutional customers separately towards the EEE and EOL WEEE and concepts of e-waste, e-waste rules, EPR, take back policy of manufactures etc. After the data analysis and consultations with field experts, one of the iterated sound and properly defined e-waste management models was formulated.

The respondents were required to be geographically diverse and to cover the social-economic spectrum to reflect as closely as possible the potential e-waste generation trend in Kerala state. The population for objective- 2 are 72,84,706 households as electrified houses based on 2011 census survey (the total no of household size is 77, 16,370) and 1975 institutions with specific characteristics in particular connection with the research problems. The institutions consist of banks, educational institutions like universities, schools, colleges etc., hospitals, IT organizations, R&D institutes, Central Govt. & State Govt. offices, etc. The preliminary survey and stakeholder interventions were conducted during the period 2012 January to 2012 June. The actual survey was carried out during the month of April, 2014. The following statistical tools were used widely and interpreted the outputs based on these tools accordingly. Simple Mean, Percentages, Cross – tabulations, Chi-square test, Kolmogorov-Smirnov and Shapiro-Wilk normality tests, Log linear transformations

& Correlations, Analysis of Variance (ANOVA) & Post hoc tests, Hierarchical Log linear Analysis, Multidimensional Scaling (ALSCAL Model), Factor Analysis – Exploratory Factor Analysis (EFA), Structural Equation Modeling (SEM)- Confirmatory Factor Analysis (CFA) and Path Analysis.

The first objective was to measure the quantity of current and future e- waste generation in Kerala State. For this, it was followed the market supply method, which considers the sales of the concerned EEE and the life span of these items. Proper consideration of these factors was given with allowable errors. A lot of sales data from different agencies, average weight and average life span of different EEE at different periods at different conditions were considered.

The total no. of sales of desktop computers, mobile phones, refrigerators, washing machines, televisions (CRT+LCD+LED) and air conditioners are 373920, 967600, 81672, 59532, 47396 and 21648 respectively during the period 2013-'14.

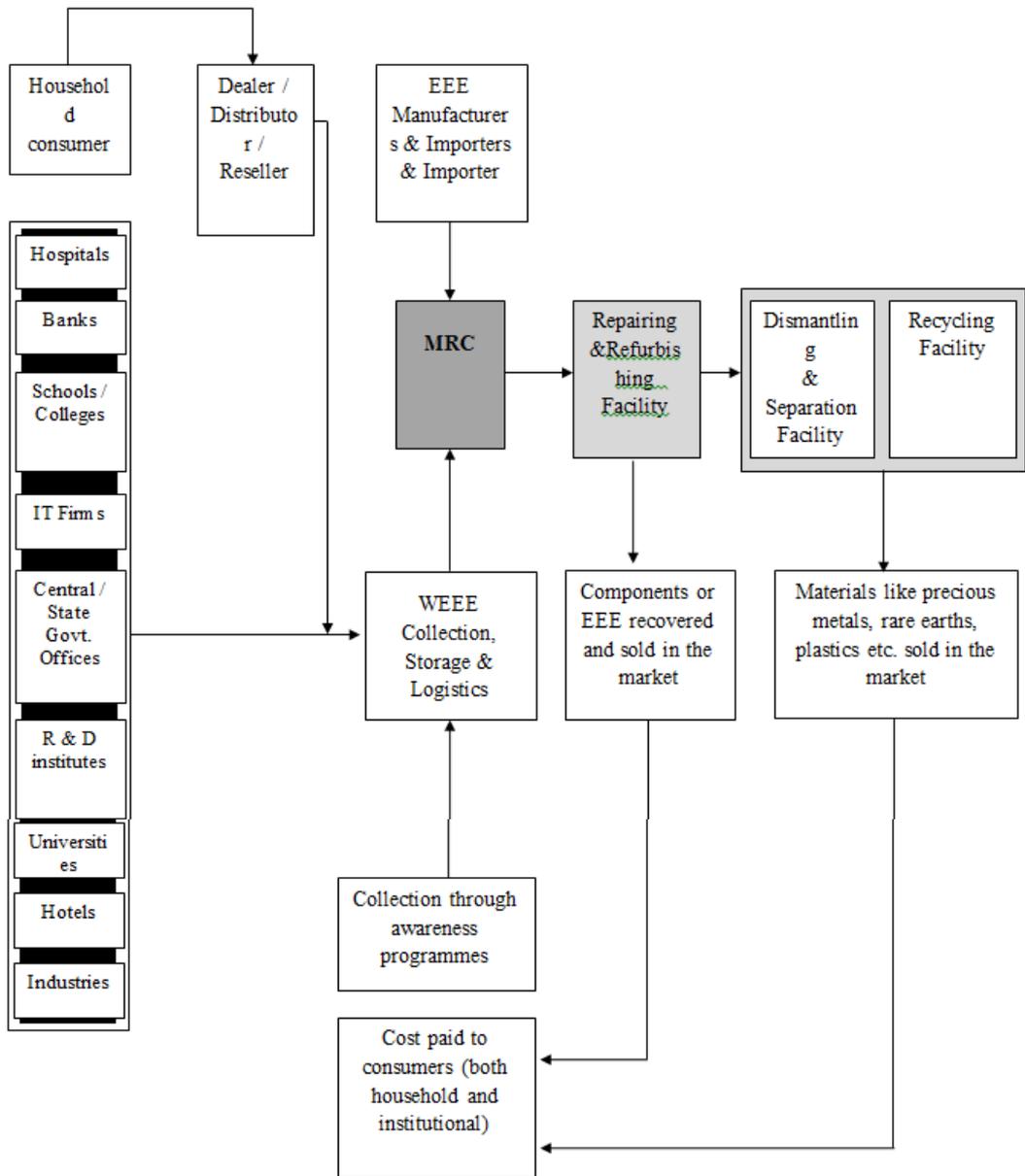
The average weight of EEE is considered in calculations here as 27, 0.12, 60, 40, 24 and 55 (all in Kgs.) and the average life span as 5, 3, 10, 12, 10 and 15 (in years) for desktop computers, mobile phones, refrigerators, washing machines, televisions (CRT+LCD+LED) and air conditioners respectively.(source : Toxics link, 2007). The total projection of Waste from Electrical & Electronic Equipment (WEEE) in WTA is 13649 MTA, 81 MTA, 721 MTA, 315 MTA, 285 MTA and 163 MTA for desktop computers, mobile phones, refrigerators, washing machines, televisions (CRT+LCD+LED) and air conditioners respectively during the period 2014 – '15.

The total waste projection for 2014-'15 is 15214 MTA. The projection of e-waste from identified EEE for the period 2025-'26 will be 50887, 1159, 4171, 2381, 1646 and 1084 MTA respectively and the cumulative total will be 61328 MTA. This showed that 82.97 percentage of the total waste projected will be from desktop computers (laptop computers + desktop computers + related accessories + net books etc.). Also the projection of e-waste from 2014-

'15 to 2025-'26 is around 4 times. This clearly showed the pace of e-waste related threats towards the people of Kerala, if this is not handled properly. The figures show very interesting as well as concern regarding the cumulative quantum of this waste stream. The researcher is much concerned whether this e-waste is stockpiled in houses or institutions or

carried away with the scrap dealers. But the much interesting factor is the majority of state scrap dealers and agents are working in the informal sector. Also the collected WEEE scraps are taken away from the Kerala state to outside states in the unorganized sector for dismantling and recycling.

V. PROPOSED E-WASTE MANAGEMENT MODEL– MRC MODEL



It is very specific that currently the majority of e-waste generated in the current period (2013-'14) is from desktop computers (10111 MTA), even though the total sales units are much higher for mobile phones. This is because of the average weight of desktop computers and accessories. But from the preliminary survey of household and institutional consumers pointed out that the scraped electrical and electronic wastes contained many units of printers (ink jet + dot matrix + laser jet), UPS, batteries, SMPS, power adapters (of mobile phones and other EEE), office automation equipment (like Photostat machines), etc. So the researcher included these EEE also into consideration in waste statistics calculations. After including the other scraps along the six identified WEEE, the projection showed that printers are provided much waste quantum compared to other wastes (2499 MTA in 2013-'14 period.). In 2020-'21, is estimated that the total e-waste projection as 52,511 MTA and the same for 2025-'26 as 73,710 MTA.

These figures clearly indicate the real threat of e-waste generation to mankind in the state of Kerala in future year(s). Total e-waste projection from 2014-'15 to 2025-'26 will be increased 4.1 times from now. This growth may be more abnormal than the normal nature. Since the WEEE data projected is not normally distributed, log transformation was followed. After achieving the desired normality, the e-waste projections were undergone correlation analysis. The analysis showed the correlation analysis between the year, all six WEEEs, scrap total (printers+UPS+batteries+SMPS+power adapters) and the grand total. This bivariate correlation showed that all the WEEEs possess high positive correlation with the period (year) also from the table, it was highly proved that correlation is significant at the 0.01 level. This proved the argument that the total e-waste generated/projected is highly increased as the period going on.

The chi-square test shows that between different area and income levels of the surveyed families across Kerala they possess different association (Pearson chi-square = 29.575, Likelihood Ratio=31.281, DF=3, $p < 0.01$). This strengthens the aspect that the income is a must and considerable fact across different area (urban

and rural), when WEEE statistics is accounted. The awareness about e-waste in urban community among surveyed households is different, and the difference is meager (52.1 and 47.9 per cent respectively). But among rural community, the awareness is very less (around 78 percentage of the rural consumers are unaware about e-waste.). Chi-square test (from table 4.34), it is also revealed that there is an association (dependence) between the awareness ('yes' or 'no') and the area (urban or rural). The Pearson Chi-Square statistic (38.025) and sig. value ($p < 0.000$) establishes this. The hierarchical loglinear analysis produced a final model that retained all effects. The area – say rural and urban significantly affects the awareness level. Also the income levels significantly affect the awareness level of household consumers about e-waste. The final backward elimination chi square test proved this one. Therefore, it is very much shown that there is a significant relation between income levels and the awareness level of household consumers about e-waste in Kerala state.

The researchers reduced the sampled data to get the proper latent variables as factors under the identified major factors, ie, social factors, economic factors and technological factors, to the high obsolescence rate of e-waste from household consumers in Kerala. The extracted factors, then further undergone for CFA (Confirmatory Factor Analysis) to confirm the factor structure and their identity through Structural Equation Modeling (SEM).

The results indicate that a factor analysis can be applied to the set of given data as the value of KMO statistics (0.704) which is greater than 0.5 and the Bartlett's test of sphericity is significant (0.000). There are three factors resulting from the analysis explaining a total of 60.579 percentage variation in the entire data set. The percentage of variance explained by, first, second and third factors is Family & education level (23.35 percentage), Culture and social status (19.706 percentage) and ICT & Internet revolution (17.517 percentage) respectively after varimax rotation is performed. Since the value of KMO statistics (0.860) which is greater than 0.5 and the Bartlett's test of sphericity is significant (0.000), a factor analysis can be applied to the set of

given data for economic factors. There are three factors resulting from the analysis explaining a total of 63.838 percentage variations in the entire data set. The percentage of variation explained by, first, second and third factors are Comfortable salary and dispensable income (40.910), Bonus and loan schemes (12.529) and Schemes and lower prices (10.398) percentage respectively, after varimax rotation is performed.

The Scree plot also indicates without many anomalies that the factor extracted properly as 3. The results indicate that a factor analysis can be applied to the set of given data as the value of KMO statistics (0.779) which is greater than 0.5 and the Bartlett's test of sphericity is significant (0.000). There are nine factors resulting from the analysis explaining a total of 59.276 percentage variation in the entire data set. The percentage of variation explained by, first, second and so on till nine factors are 12.468, 9.092, 6.098, 5.929, 5.629, 5.197, 5.184, 4.868 and 4.811 percentage respectively after varimax rotation is performed. The factors are termed as unawareness and technical bottlenecks, better technical education, technology and trend enthusiasm, high technical advertisements, high multi brand and multi store culture, technical peer pressure, technical unawareness about e-waste handling, uninterrupted power supply, and E-commerce.

VI. SUGGESTIONS

The major suggestions put forward here by the researchers are:

- While addressing the e-waste related issues in Kerala, the prime importance should be given to i) Large household appliances, (ii) Small household appliances, (iii) IT and Telecommunication equipment and (iv) Consumer electronic equipment. More precisely, the EEE, computers (Desktop + Laptop + Net book), Mobile Phones, TVs (CRT + LCD + LED), Washing Machines, Air Conditioners, and Refrigerators should be considered as pivotal devices into consideration. The factors like life span, energy, efficiency, guarantee- warranty conditions, reliability of the brand, affordability, etc. could be kept in the mind of household consumers. Recently, the

items like printers (inkjet + dot matrix + laser jet), UPS, batteries, SMPS, power adapters (of mobile phones and other EEE), microwave ovens, induction cookers, etc. used and got obsolete invariably. The strategists must account the waste from these EEE with proper concern.

- New generation gadgets, low weight digital equipment, spurious EEE, low life span equipment, multiple devices for the same uses, etc. could be availed only if the situation really warrants.
- As the time goes on, the stockpiles of e-waste are getting cumulatively heaped in the houses and office premises. So a sound e-waste management model should be followed by the different stakeholders.
- In the academic curriculum, e-waste related topics can be included in the school and college level to educate the youth in the state.
- ARF (Advance Recycling Fee) like concepts can be implemented among the public and institutional consumers who are the creators of e-scrap in the state.
- Full fledged hardware clinics can be conducted to make repaired the breakdown EEE to workable ones from the manufacture or govt. or any NGO's side. Central or state government funds can be used to convene these programs.
- Promote the refurbishing or repairing of malfunctioned EEE and then proceed to scrap it, if no other way.
- Promote and educate the users (all) to discard the WEEE to any formal, registered and legal e-waste scrap dealers. The recently implemented rule has covered these conditions very effectively. Institutions should strictly follow the stipulations of e-waste rule-2011. If they feel any technical or any other difficulty, the concerned agencies should assist them to come out of those situations.
- After detailed deliberations, a nominal fee can be imposed from the users to handle the e-waste generated by them. But very much care should be put, while considering the rural and urban consumers of EEE.
- Like advertisements against the usage of tobacco and liquor by govt. and other agencies, the advertisement which describes

the hazardous nature of parts of EEE and harmful effects of e-waste, deliver continuous advertisements through different media to catch the attention of the consumers.

- Agencies should take steps to disseminate data with state and national environmental agencies like ISBEID through the projects ENVIS, etc. to get pure data regarding the state e-waste statistics. This will help the researchers, data scientists, policy makers, NGOs, R&D institutions to come up with viable solutions to tackle the future threat of e-waste.
- Special attention should be given to handle/treat EEE like, CFLs, tube lights, LED lighting devices, other lighting equipment, etc., since resource recovery from these are feeble and highly hazardous in nature.

VII. CONCLUSION

Even though Kerala has offered to the nation in terms of superior human capital, remarkable environmental standards, and better governance, high educational level, moderate industrial atmosphere, etc., the future thrust of growth of the state is relying on the sustainable environmental strategies. The thesis, here, reveals that in the coming years, the state is going to face mammoth danger regarding the huge stockpiling or discarding of used electrical and electronic equipment comprising a lot of variants. The diversity of living standards, divide in cultures, high dispensable income, education level, etc. made this threat of e-waste so critical. Since the existing crude e-waste management system is in a nascent stage, a sound model to be implemented along the e-waste (handling & management) rule-2011 in the stage after the thorough deliberations and multi stakeholder interventions across Kerala. This model can be practiced in the other states in India with similar nature and characteristics.

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A Gateway to Greater Financial Literacy

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ABSTRACT

Financial Literacy is the front runner of financial inclusion, and the resultant inclusive growth. Global FinLit Survey 2015 shows that 76 per cent of the Indian adults are not financially literate. Knowledge about financial products and services, and ability to seek right information from the right source make people capable of comparing the risks and rewards involved in financial products and services offered by commercial banks and other financial intermediaries. Age, income level, educational attainment and socio-economic factors have significant bearing on the financial literacy level of the people. This paper makes an attempt to assess the financial literacy of marine fisher households in the District of Alappuzha. The analysis reveals that one-third of the marine fisher households are aware of the rate of interest offered by commercial banks for deposit accounts. Two-third of the fisher households, irrespective of the income level, is aware of the rate of interest charged by commercial banks for credit products. More than 70 per cent of them are unfamiliar with new-generation financial products and services offered by commercial banks. This study calls for a systematic and well-structured financial literacy programme to be conducted among marine fisher households.

Keywords: *Financial Literacy, Financial Inclusion, Marine Fisher Households*

I. INTRODUCTION

FINANCIAL LITERACY is acknowledged as a prerequisite for financial inclusion and economic development of the Nation. Financial literacy has great influence on the people and financial service providers at multi-dimensional spheres. It empowers poor households with limited resources to have better financial management and make them capable of taking informed decisions, thereby improving the standard of living. Mukherjee (2010) defines financial literacy as 'the familiarity with and understanding of financial markets, products especially rewards and risks in order to make informed choices'.

Financial literacy opens up a provision for consumer protection and fair dealings from commercial banks. Financial service providers need to be more transparent and accountable in

providing quality financial service to the well-informed customers. Banks as privileged institutions provide services in the nature of public goods. Their commitment towards customers needs to be multi-faceted. Besides the financial commitment to provide credit when required, and fulfilling the standing orders; banks are expected to 'treating the customer fairly' and to mend their grievances and complaints (Subbarao, 2010).

Financial literacy is found to induce quality and integrity to customers in particular and the market in general (Reddy, 2006). Financial literacy encompasses concepts ranging from financial awareness and knowledge, financial products, institutions and financial skills. It should also inculcate in customers the ability to calculate compound interest payments, and financial capability in terms of money management and financial planning (Xu & Zia, 2012). A study by Klapper, Lusardi, & Panos,

(2012) reported that financial literacy is low among women, low-income groups and people living in rural areas. Empirical studies have traced lack of financial literacy as the major constraint for greater financial inclusion. In India, financial literacy initiatives are just picking up. Social-economic and psychological factors of the people and the mindset of the service providers have definite bearing on the level of financial literacy. It is high time that appropriate innovative steps are considered to instill financial literacy, so that financial inclusion is ensured.

In India, financial literacy has been measured by various agencies and forums. These studies reveal that more needs to be done in this area. VISA's International Barometer 2012, found India's Financial Literacy Index Score to be 35 out of 100. India is ranked 23rd among the 28 countries. The Global Financial Literacy Survey conducted by Standard & Poor's Ratings Services is the world's largest and most comprehensive global measurement of financial literacy. The survey named 'S&P Global FinLit Survey-2015' reported that 76 per cent of the Indian adults were not financially literate. Further, the rate of financial literacy is much lower than the world average of 33 per cent. The survey was conducted among 140 countries and data was gathered from 1, 50,000 adults across the world. The survey examined financial knowledge in four concepts like risk diversification, inflation, numeracy and calculation of compound interest. According to Global Financial Literacy Excellence Centre (2016), financial literacy has become a prime concern for India, especially among the women and vulnerable sections of the society. Almost all recent assessment reveals that India has to tread a long way in this regard.

Adequate literature has evolved in the field of financial literature. Gopinath (2006) opined that financial education is much beyond financial information and advice. It should enable the individuals with low resources and skills to assess and estimate the financial dealings with various financial service providers. It ultimately influence and modify the behavior of the individual in managing the personal finance on a daily basis. He strongly brought out the point

that financial education could supplement the financial inclusion initiatives for long-term efficiency. He envisioned an 'auto pilot' concept wherein well-informed customers demand the needed financial services from the financial intermediaries. It was also argued that financial education is one of the significant aspects of the financial policy that can enhance financial literacy and financial access.

Joseph (2014) conducted a study to measure financial literacy among the economically marginalized people of Alappuzha and Kottayam district of Kerala state. The study was based on the data collected from 300 BPL families selected from 24 urban and rural Local Self Government wards. The major findings of the study, conducted under the four tier financial literacy-Saving literacy, Spending literacy, Borrowing literacy and Investment literacy found that:

- 1) Overall financial literacy of marginalized people is very high, with only a meager per cent of people being financially excluded.
- 2) General financial knowledge of the marginalized group in Alappuzha (74.2 per cent) was better compared to Kottayam (66.1 per cent).
- 3) Kottayam (89.5 per cent) depicted more saving literacy compared to Alappuzha (89.5 per cent) and have made their savings in Post Offices and Self Help Groups.
- 4) Spending literacy was found to be 96 per cent and borrowing literacy was 73 per cent.
- 5) Overall Investment literacy was 83 per cent.
- 6) Around 32 per cent of the respondents have savings in banks
- 7) Financial education and training could promote financial literacy leading to increased demand for financial products and services.

II. RESEARCH PROBLEM

Alappuzha, once the hub of business and trade, has become an industrially backward district as coir and fisheries sector have become stagnant.

The socio-economic status of marine fisher households in Alappuzha is low compared to other Southern districts in Kerala. People are struggling to make both ends meet; as fishing industry has become capital intensive and the volume of fish landings decreasing considerably, especially for the fishermen who are involved in pelagic fishing. Financial inclusion drive has succeeded to include every fisher households under the fold of formal banking institutions by routing the relief scheme through their bank accounts. Many households have secured insurance protection. These households continue to depend upon the informal financial intermediaries for meeting their financial needs. Hence, awareness level of the marine fisher households regarding the financial products and services offered by commercial banks and the risks and rewards involved in each financial product need to be explored. If marine fisher households are not given proper knowledge about the financial services and products offered by formal financial institutions, they may not be able to reap the benefit of the financial products.

III. OBJECTIVES OF THE PAPER

The objectives of the paper are:

1. To ascertain the extent of financial literacy of Marine Fisher Households
2. To determine the awareness level of Marine Fisher Households regarding the various financial products and services.

IV. HYPOTHESES

The hypotheses formulated for the study are the following:

- There is no significant difference in the financial literacy of Marine Fisher Households by income category.
- There is no significant difference in the awareness level of the Marine Fisher Households regarding the financial products and services.

V. SIGNIFICANCE OF THE PAPER

Financial inclusion and financial literacy are complementary to one another. Empirical studies have proved that financial literacy varies with income of the households, age and educational attainment of individuals. According to Census 2011, out of 24.67 crore households in the country, only about 14.48 crore or 58.70 per cent households had access to banking services. Further, of the 16.78 crore rural households, only about 9.14 crore or 54.46 per cent households were availing banking services. CRISIL-Inclusix, the financial inclusion measure used in India presents the district-wise financial inclusion index score of 638 district in India. Nine districts in India have attained cent per cent financial inclusion index; of which six districts namely Alappuzha, Ernakulam, Kottayam, Pathanamthitta, Thiruvananthapuram, and Thrissur are in Kerala state. It would be advisable to assess the level of financial literacy among the weaker sections of the society like marine fisher households. Since they are less banked, they depend mostly on money lenders. To have meaningful financial inclusion and inclusive growth, financial literacy is the sole solution.

Little understanding of the basic financial concepts makes people ill equipped to make decisions related to financial management. A number of financial literacy programmes has been rolled out under the aegis of Lead Banks of the State. The Financial Literacy Centers established in every Community Development Blocks in Kerala are sponsored by various banks. National Bank of Agriculture and Rural development (NABARD) and Small Industries Development Bank of India (SIDBI) also have trained a number of personnel to impart financial literacy to student communities at higher secondary and graduation levels. Effectiveness of these initiatives has to be assessed by examining the knowledge and awareness of financial products and its details. The present study attempts to assess the financial literacy of marine fisher households in Alappuzha district. These sections of the society are characterised by low and irregular income.

VI. METHODOLOGY AND DATABASE

The present study was conducted based on the primary and secondary data. The secondary data was collected from RBI publications, Lead Bank of Alappuzha district, books, journals, newspapers, and other national and international publications. A few focus group discussions were held with the target group, fisheries officers and bank officials. An interview was administered to collect data from marine fisher households. Population of the study consisted of 27,295 marine fisher households in Alappuzha spread out to nine coastal blocks as per the *Fisheries Statistics* published by Department of Fisheries Kerala-2013 (Department of Fisheries, 2013). Data for the study was collected from 200 marine households located in three coastal blocks, namely, Arthunkal, Ambalappuzha and Arattupuzha. Sample households comprised of 125 BPL households and 75 APL households.

VII. RESULT AND DISCUSSIONS

Retail banking contributes to 14 per cent of the countries' GDP (Srinivan, 2013). Hence financial inclusion is envisioned as a win-win initiative for the financial service providers and the general public, especially the untapped customers residing in the rural villages. Greater the financial literacy, deeper will be the financial service penetration among the people. Financial literacy could be measured by assessing the ability of adults to calculate rate of interest of deposit and credit, level of inflation, risk diversification and awareness level of financial products and services. In the present paper, four variables have been chosen for assessing the financial literacy of marine fisher households:

- a. Awareness of the Rate of Interest on Deposits
- b. Awareness of the Lower Rate of Interest for Loans in Commercial Banks
- c. Familiarity with Banking Transactions
- d. Confidence to Deal with Banking Personnel
- e. Familiarity with Financial Services and Products
- f. Familiarity with the Right Source of Financial Information

A. Awareness of the Rate of Interest on Deposits

Financial inclusion initiatives accompanied by financial literacy helps in equipping the weaker and low-income groups of the society, thereby enabling them to demand required financial services and products from the formal banking institutions. It is important for the fisher households with low and seasonal income to have some savings in formal institutions to keep alive the warm relationship with the banking personnel and to avail other financial products especially credit products. Hence, it is important to assess the awareness level of marine fisher households regarding the rate of interest offered by scheduled commercial banks.

Table 1 indicates that 14.4 per cent of the fisher households under BPL and 16 per cent of the APL households have awareness about the rate of interest offered by scheduled commercial banks for Savings Bank Deposit Account and Fixed Deposit Account. The Chi-Square value for the income category-wise difference in the awareness level of marine fisher households regarding the prevailing rate of interest on deposit account is found to be 0.094.

Table 1: Awareness Level of Marine Fisher Households on Rate of Interest on Deposits

Awareness of the present rate of interest		Income Category of Marine Fisher Households			
		BPL		APL	
		n	%	n	%
Present interest paid by the bank on SB & FD a/c s	Yes	18	14.4	12	16
	No	107	85.6	63	84
χ^2		0.094			
Sig.		0.759			

The value of the Chi-Square is 0.759, which is not significant, indicating the fact that there is no significant difference in the awareness level of the marine fisher households under BPL and APL.

B. Awareness of the Lower Rate of Interest for loans in Commercial Banks

Earlier studies show that marine fisheries sector is dominated by informal financial intermediaries like money lenders and commission agents. It is quite appropriate to know whether the lack of awareness of the rate of interest charged by scheduled commercial banks or the unsuitability of the credit products offered by commercial banks make this sector a

favoured area for informal moneylenders. Table 2 reveals that 80.8 per cent of the marine fisher households under BPL and 84 per cent of the households under APL are aware of the fact that commercial banks charge less rate of interest for loans. The Chi-Square value of 0.325 has been obtained for the awareness of the difference in the rate of interest charged for loan in commercial banks among the marine fisher households. The significance value of Chi-Square is obtained to be 0.568 which is not significant at the 0.05 level, indicating insignificant difference in the awareness level of the marine fisher households under BPL and APL.

Table 2 Awareness Level of Marine Fisher Households on Rate of Interest Charged by Commercial Banks for Credit

Awareness of the interest rate charged by formal banking institutions		Marine Fisher Households			
		BPL		APL	
		n	%	n	%
Formal Banking institutions charge less rate of interest on loans	Yes	101	80.8	63	84
	No	24	19.2	12	16
χ^2		0.325			
Sig.		0.568			

C. Familiarity with Banking Transactions

The district of Alappuzha is reported to have cent per cent financial inclusion as per the CRISIL-Inclusix 2015. It is therefore vital to fathom the level of familiarity of the marine fisher households in the conduct of banking transactions. Table 3 presents the confidence level of marine fisher households in conducting a banking transaction by them. It was found that 68 per cent of the marine fisher households under BPL and 69.3 of the households APL feel confident to conduct banking transaction by

themselves. A chi-Square analysis for the difference in the confidence level of the marine fisher households, by income category, to conduct a banking transaction depicts a Chi-Square value of 0.039, with significance value of 0.844. The significance value of the Chi-Square indicated that there is no significant difference between BPL fisher households and APL fisher households in their confidence level in conducting a banking transaction.

Table 3 Marine Fisher Households' Familiarity with Banking Transactions

Familiarity with banking transactions		Marine Fisher Households by Income Category			
		BPL		APL	
		n	%	n	%
Are you able to complete a financial transaction by yourself	Yes	85	68	52	69.3
	No	40	32	23	30.7
χ^2		0.039			
Sig.		0.844			

D. Confidence to deal with Banking Personnel

Fisher households are more familiar with informal money lenders who are prominent in this sector. Other local institutions like ‘neighborhood groups’ show inhibition in visiting banks and in dealing with banking personnel. Lack of knowledge of the details of the financial products and services, complicated procedures entailed in the banking deals and the sophisticated appearance of the banks itself make the fisher households to seek the help of

someone who is associated with the bank to deal with banking personnel.

An analysis based on the income category of the fisher households regarding the confidence level to deal with the banking personnel showed that there is no significant variation in the confidence level of the fisher households under BPL and APL, as the significant value of Chi-Square obtained to .939, which is not significant at the 0.05 level. It was found that 35.2 per cent of the BPL fisher households and 34.7 per cent of the APL fisher households seek the assistance of others to deal with the banking personnel.

Table 4 Confidence Level of the Marine Fisher Households to Deal with Banking Personnel

Confidence to deal with the banking personnel		Marine Fisher Households by Income Category			
		BPL		APL	
		n	%	n	%
Seek the help of any person who is associated with bank in dealing with the bank	Yes	44	35.2	26	34.7
	No	81	64.8	49	65.3
χ^2		.006			
Sig.		.939			

E. Familiarity with Financial Services and Products

A financially literate person is expected to have awareness about the products and services offered by financial institutions. Awareness of the financial products and services make them to demand the financial services from commercial banks. It is very important to know the level of awareness of the marine fisher households, one of the less privileged sections of the society, regarding the financial products offered by the scheduled commercial banks.

Table 5 depicts the awareness level of marine fisher households regarding the financial products and services offered by commercial banks. The conventional financial products are familiar to all fisher households but the new-generation financial products are very much strange to them. Chi-Square test result showed that there is no significant difference in the awareness level of marine fisher households

regarding the various financial products and services offered by commercial banks as the significant value of Chi-Square is obtained to be 0.249, which is not significant at the 0.05 level. Hence the hypothesis- there is no significant difference in the awareness level of marine fisher households regarding financial products and services offered by commercial banks stands rejected.

Table 5 Awareness of Marine Fisher Households with the Financial Products and Services Offered by Commercial Banks

Financial Products and Services			Marine Fisher Households by Income Category			
			BPL		APL	
			n	%	n	%
Conventional Financial Products & Services	Deposits & Loans	Yes	125	100	75	100.0
		No	0	0	0	0.0
	Collection of Cheques	Yes	125	100	75	100.0
		No	0	0	0	0.0
	Overdraft Facility	Yes	36	28.8	24	32.0
		No	0	0	0	0.0
Insurance	Yes	121	96.8	74	98.7	
	No	4	3.2	1	1.3	
New Generation Financial Products & Services	ATM services	Yes	123	98.4	75	100.0
		No	5	1.6	0	0
	Mobile Banking	Yes	35	28	27	36.0
		No	90	72	48	64.0
	Debit Cards	Yes	33	26.4	28	37.3
		No	92	73.6	47	62.7
	Remittance facility NEFT	Yes	25	20	22	29.3
		No	100	80	53	70.7
	Small Credits –KCC &GCC	Yes	12	9.6	13	17.3
		No	113	90.4	62	82.7
χ^2			12.56			
Sig.			0.249			

F. Familiarity with the Right Source of Financial Information

Knowledge to seek help/financial information from the right source is as important as the knowledge of the financial products and services. Quality and reliability of the information help to take better financial decisions out of the diverse choices available in the financial market. It is said that less financially included sections are over confident regarding the management of personal finance. And so, an attempt has been made to assess the familiarity of marine fisher households with the available formal and informal source of financial information.

Table 6 reveals that BPL fisher households depend mostly on the ‘Personal Experience’ for making financial information as the mean score of this response is 2.98, followed by ‘Friends and Neighbors’. It is significant to note that

fisher households under BPL are more inclined to depend on the informal source of financial information rather than the formal source. A further analysis shows that commercial banks have been ranked as the fifth source by BPL fisher households while APL fisher households ranked fourth. Similar result has been observed in the case of APL fisher households. It can be inferred that marine fisher households are not familiar with formal sources financial information like financial literacy centres, commercial banks, pamphlets distributed by responsible authorities.

Table 6 Source of Information Depended for Financial Information

Sl.No	Source of Financial Information	BPL		APL	
		Mean	Rank	Mean	Rank
1.	Banks	2.81	5	2.91	4
2.	Financial Literacy Centre	1.02	7.5	1.03	7
3.	Matsyafed	2.82	4	2.97	3
4.	Friends&Neighbours	2.96	2	3	1
5.	Advertisement	1.06	6	1.01	8.5
6.	Personal Experience	2.98	1	2.99	2
7.	Money Lenders	2.84	3	2.84	5
8.	Pamphlets	1.02	7.5	2.67	6
9.	Financial Literacy Programmes	1.02	7.5	1.01	8.5
10.	Web Sites	1.02	7.5	1.01	8.5

Table 7 Spearman Rank Correlation of Source of Financial Information Based on Selected Variables

Base Variable	Variables Correlated	Spearman Correlation Coefficient	Sig.
Income Category	BPL and APL	0.891	0.001**

** Significant at the 0.01 level

Table 7 presents the Spearman Rank Correlation for ranking the source of financial information based on certain variable of marine fisher households, for making financial decisions. It reveals that the correlation coefficient for BPL and APL marine fisher households is 0.891, which indicates a significant positive correlation between BPL and APL fisher households. And the significance value of correlation coefficient is found to be 0.001, which is significant at the 0.05 level.

VIII. FINDINGS

The findings of the study are summarized below:

- 1) The analysis shows that 14.4 per cent of the BPL marine fisher households and 16 per cent of the APL marine fisher households are aware of the rate of interest offered by Commercial Banks for various deposit accounts like Savings Deposit Account and Fixed Deposit Account.
- 2) Awareness level of the marine fisher households regarding the rate of interest charged by commercial banks for loans is very high. Around 89 per cent of the BPL fisher households and 84 per cent of the APL fisher households are aware of the fact that credit obtained from formal banking institutions are less compared to the informal sources.
- 3) Sixty eight per cent of the BPL fisher households and 69.3 per cent of the APL households have expressed that they are confident enough to complete a financial transaction with bank without the help of others.
- 4) Analysis undertaken to determine the confidence level of the fisher households to deal with the banking personnel revealed that 35.2 per cent of the BPL fisher households and 34.7 per cent of the APL households seek the assistance of some influential persons to deal with the banking personnel.
- 5) Marine fisher households are well aware of the conventional products and services offered by commercial banks but are unfamiliar with the new-generation financial products and services offered by commercial banks.

- 6) Marine fisher households depend mostly on the informal source namely 'Personal Experience', 'Friends and Neighbours' for seeking financial information rather than the formal sources. Commercial banks have been ranked as the fifth choice by the BPL fisher households while APL households ranked as fourth.

IX. RECOMMENDATIONS

Based on the findings the following recommendations are presented:

- 1) Financial literacy programmes have to be designed with the target groups in mind and close supervision has to be provided till an observable result is achieved.
- 2) Financial literacy programmes have to be conducted in smaller groups considering the nature of the occupation.
- 3) Financial programmes should be organised for different age groups so that financial concepts, financial responsibilities and financial discipline could be instilled in the mind of the youngsters before they begin to earn and spend.

X. CONCLUSION

Financial Inclusion has become an integral part of developmental schemes, plans and policies. Financial inclusion can be escalated through the penetration of financial literacy among the people especially among the low-income and the weaker sections of the society like marine fisher households. A detailed study on the awareness level of the marine fisher households regarding financial products, risks and rewards of these products and ability to conduct banking transactions revealed that financial literacy efforts are yet to reach the target group. This challenge could be addressed only through the systematic and well-structured financial literacy programmes under the supervision of able staff who know the dynamics of fishing industry and the behaviour pattern of the marine fisher households. Financial literacy of the households is inevitable

for the financial stability of the households, which is the smallest unit of the economy. An economy cannot claim its level of development when certain sections of the society lag behind in financial management.

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Disruption, Effectuation & Blue Ocean Strategy in Entrepreneurship

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ABSTRACT

Disruption in business results in loss and painful inflection. There are several instances of disruption being caused by technology enabled innovation. Most technology innovations metamorphose into billion dollars new generation business. Effectual entrepreneurship is a concept that is gaining currency. An effectual entrepreneur is one who starts small with the means that are closest at hand, without any great planning and move almost directly into action. The article also discusses about Blue Ocean Strategy, which go after untapped market space for demand creation and growth. Experiences show that most successful effectual enterprises follow Blue Ocean Strategy. It is concluded that the best form of an enterprise is one that applies disruptive innovation, through the effectuation principle of evolving to control an unpredictable future through Blue Ocean Strategies.

Keywords: *Entrepreneurship, Disruption, Effectuation, Blue Ocean Strategy*

I. DISRUPTION

DISRUPTION in business is considered by established business houses as a painful inflection. Imagine the tumultuousness caused when a successfully running business is obliterated into nowhere by a completely new business model or a substitute product! It is akin to the game of Cricket where a seasoned batsman, good at playing spin bowling, is suddenly castled with a googly and there goes his wicket! When a successfully running business with established planning and execution strategy is totally surprised by a new entrant with a new model that is hitherto unheard of; the resulting loss and the subsequent pain that it causes and the disruption that it brings to the industry is tremendous.

In the recent history of business, there had been several instances of disruption caused by innovation (Christensen, 2010, 2011). A classic example is silent movies being disrupted by talking movies which brought such a huge impact to the audience. The disruption caused to the postal business by the courier model is a similar case. Another example is the impact that

was brought into the communication industry by e-mail technology at first and later by technologies such as instant messaging solutions; WhatsApp etc. that is still felt by us all.

To put in management science perspective, this isn't anything new. Long back, Prof. Michael Porter of Harvard Business School, in his 'Five Force Analysis' had spelt out the distinct forces such as; the power of bargaining of the customers, the power of bargaining of the suppliers, the intensity of the competition, the power of the new entrant and finally, the power of the substitutes; that impact businesses, from which the last two forces have immense power to cause business disruptions (Dastur, Sawant. & Bawa, 2012).

In the disruptions that we see around, the core of it happens to be the innovation that had caused it. In most of the cases, it could be the technology that enabled the innovation. All the billion dollar businesses that had emerged in present times stand testimony to the above fact. For instance, we are now seeing the disruptive power of 'e-commerce' over the traditional retail model in India. Technology had

accelerated the pace of innovation. Using technology, today start up entrepreneurs are finding new ways of solving problems of the mankind and filling the gaps that exists in business models, in addition to following larger trends in social, financial and demographical shifts that are happening around the world. Most of these technology innovations are metamorphosing into billion dollars new generation businesses now.

II. EFFECTUATION

A concept that is gaining currency in the realms of entrepreneurship is now discussed. It is called 'effectual entrepreneurship' and is based on the effectual reasoning. The concept was originated by Prof. Sarasvathy of Darden Business School of University of Virginia (Sarasvathy, 2009). It has now gained traction as a thought movement in the form of 'Society for Effectual Action' led in the forefront by business leaders and academicians from all over the globe.

Before proceeding to effectual entrepreneurship, the concept of effectual reasoning and the opposite of it - the causal reasoning is discussed. Causal rationality begins with a pre-determined goal and a given set of means and seeks to identify the optimal – fastest, cheapest, most efficient, etc. – alternative to achieve the given goal. On the other hand, effectual reasoning does not begin with a specific goal. Instead, it begins with a given set of means and allows goals to emerge contingently over time from the varied imagination and diverse aspirations of the proponent of it. Causal practitioners can be compared to the great generals seeking to conquer fertile lands and effectual reasoners as explorers setting out on voyage into uncharted waters.

In a well-established industry with well-defined customers, competitors, business models and lower dynamism; a causal process would work well. However with the advent of very advanced disruptive technologies, we don't live in such a world anymore. The present world is replete with shorter product life cycles, fast changing business ecosystems, unique business models, rapid product & technology innovations and

novel distribution systems. Therefore, a well-defined, well established industry does not exist any longer. It is here that the effectual entrepreneurship practitioners score well.

Effectual entrepreneurs begin with the following three categories of means:

1. Who am I? – My capabilities, talents and traits
2. What I know? – My competencies, learning and experience; and
3. Whom I know? – My social and professional connects.

With the above means, the entrepreneur begins to think and implement possible effects that can be created with them. Mostly, he starts small with the means that are closest at hand; and without any great planning, move almost directly into action. Unlike causal entrepreneurship that comes alive through careful planning and execution, effectual entrepreneurship is an evolving one and it is all about execution.

Effectual reasoning is inherently a creative process. To take an analogy, the straight and simple task of cooking dinner may be considered to contrast the two types of reasoning. A chef who is given a specific menu will only need to pick out his favorite recipes for the items on the menu, shop for the ingredients and cook the meal in his own kitchen; is an example of causal reasoning. An example of effectual reasoning will involve a chef who has not been given a menu in advance, and is led to the kitchen where he has to explore the storage area for unspecified ingredients and cook a meal with them. While both causal and effectual reasoning call for domain-specific skills, effectual reasoning demands more imagination, spontaneity and risk-taking. By far, the effectual process is deemed the best to tackle the uncertainties and the unknowns of future business (Considering the fact that entrepreneurship is a wealth creation and distribution process which involves risks – calculated, uncertain and unknown, in that order)

Causal entrepreneurship focuses on expected return but effectual entrepreneurship emphasizes on affordable loss. Causal entrepreneurship depends upon competitive analyses whereas

effectual entrepreneurship is built upon strategic partnership. Causal entrepreneurship urges the exploitation of pre-existing knowledge and prediction, but effectual entrepreneurship leverage on contingencies and surprises (googly that is!)

Causal entrepreneurship is based on the logic, “to the extent that we can predict the future, we can control it” and spends enormous amounts of thoughts and resources for developing predictive models. Effectual entrepreneurship is based on the logic, “to the extent that we can control the future, we do not need to predict it.”

If the germination, growth and consolidation of companies such as eBay, Facebook, Zara, Gap, Alibaba etc. are considered, we could come across the manifestation of effectuation principles in the establishment of these hugely successful companies. What is listed is only some prominent ones where as there exist many companies of various size and shape, belonging to multifarious industry segments that are following effectuation principles of entrepreneurship.

III. BLUE OCEAN STRATEGY (BOS)

Blue Oceans are defined by untapped market space, demand creation and the opportunity for profitable growth. Blue oceans can be the market created from within red oceans

(competitive markets) by expanding existing industry space well beyond its boundaries or a total new market that did not exist till now (Mauborgne & Kim, 2005). Compared to the industries thirty years back, many industries we have today such as mutual funds, cell phones, gas-fired electricity plants, biotechnology, discount retail and coffee bars were nonexistent then. With ‘Value Innovation’ as the core theme that places equal emphasis on value and innovation; it is a business strategy that results in the creation of a blue ocean that breaks away from the competition.

Hitherto, corporates and businesses followed the famed strategic management theory put forth by Prof. Michael Porter which was all about creating competitive advantage either thru cost leadership or thru differentiation leadership which results only in a ‘zero sum’ game, Value Innovation proposes both differentiation and cost leadership within it, something that was completely un-thought by the proponents of management (Christensen, 2010, 2011). By applying the principles of value innovation and by creating newer industries and newer market spaces exclusively for oneself, Blue Ocean Strategy makes the competition irrelevant because the rules of the game are only waiting to be set (Table 1).

Table 1 Distinction between competitive & Blue Ocean strategies

Competitive strategy	Blue ocean Strategy
Focuses on rivals within the industry	Looks across alternative industries
Focuses on competitive position within strategy groups	Looks across strategic groups within industry
Focuses on serving buyer group better	Redefies industry buyer groups
Focuses on maximising value of product within industry boundaries	Looks across to complementary products& services
Focuses on improving price performance within the functional/emotional orientation of the industry	Rethinks the functional/emotional orientation of the industry
Focuses on adapting to external trends as they occurs	Participating in shaping external trends over time

Blue Ocean strategy brings the product/solution into a strategic canvas covering all the strategic elements and then applies the ‘Eliminate-

Reduce-Raise-Create’ grid (ERRC grid) that allows total redefining of the market and the industry thereby getting ahead by completely

disregarding competition (Mauborgne and Kim, 2005)..

www.blueoceanstrategy.com/tools/value-innovation

<https://hbr.org/2015/12/what-is-disruptive-innovation>

IV. THE BOS – EFFECTUATION LINK

It could well be observed that many of the successful effectual enterprises follow the Blue Ocean Strategy of business. Many entrepreneurs follow a process that starts with what one has and select among possible outcomes. It is nothing but effectuation entrepreneurship; a logic of thinking that uniquely serves entrepreneurs in starting businesses, provides a way to control a future that is inherently unpredictable. The blue ocean strategy also allows the entrepreneur to evolve a course and follow it by disregarding the competition that allows the entrepreneur to control his destiny.

Coming to think of it, the best form of an enterprise could be the one that applies disruptive innovation to takeover a market/industry, through the effectuation principle of evolving to control an unpredictable future through Blue Ocean Strategies of charting a course by making the competition irrelevant. Can we, therefore, call in a win-win-win enterprise?

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Human Capital Management in complex organisations: Is it time to challenge some conventional wisdom?

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ABSTRACT

There is a substantial body of opinion that Human Resource (HR) functions have failed to provide organisations with the strategic guidance and support that will make the best use of the human capital asset. This opinion is influenced in part by research and practice guidance that identifies the potential for enhanced organisational performance following from the adoption of high performance work systems and best-practice HR organisation, policy and practice. Many HR functions have adopted new organisational models and ways of working, but there is still a view that HR continues to work on operational and transactional matters rather than taking the strategic partner role that would make a significant contribution to organisational performance and success. The current research examines levers and barriers to HR taking on a more strategic role. There are three studies, an interview study and a Q study in a case study organisation (CaseOrg), and a further Q study in a sample of complex organisations. The findings begin to question the 'one-best-way' nature of much of the research and practice guidance, and suggest that HR will only be recognised as a strategic partner when a number of contextual issues are addressed.

Keywords: HR function, Human capital; Strategic partnering; HR organisation; Q methodology.

I. PEOPLE ARE THE 'GREATEST ASSET' IN AN ORGANISATION

WEBSITES and Annual Reports for many of the World's leading organisations carry a message confirming the importance of their people, as human capital, to that organisation. For example: Goldman Sachs (2015) affirms that '*Our people are our greatest asset*'; and Accenture (2014) establish that '*one of our top priorities is having the best talent*'. While there is a good deal of skepticism around whether the 'greatest asset' message is always genuine or simply one of those glib phrases to which CEOs and other senior managers pay lip service, with people costs likely to represent anything up to 70% of total costs, there is no doubt that having the right people doing the right things is critical to organisational performance.

There is a well-established body of research that has identified the benefits to organisations of introducing high performance work practices and high performance HR practices (Appelbaum, Bailey, Berg & Kalleberg, 2000; Kehoe and Wright, 2010; Tregaskiset al, 2013; Huselid, 1995). The available research also identifies a number of 'best practice' principles. One of the key themes of 'best practice' is that HR needs to move from being seen as administrative to taking a more strategic role (Legge, 1978; Guest, 1987; & Kanter, 2003).

Research into this more strategic role for HR has led, inter alia, to guidance on roles and organisation for the HR function (Ulrich and Brockbank, 2005; Caldwell, 2008; Wright, 2008; Guest and King, 2004), in particular to a shared service organisation model with: HR Business Partners; Centres of Expertise; and Service Centres supported by HR technology. The 'best practice' principles established in this

research guidance have been supported by professional bodies, in particular the Chartered Institute of Personnel and Development (CIPD), and have been adopted and implemented in many medium and large-sized organisations (CIPD Outlook Review, 2015).

II. BUT HR IS STILL NOT SEEN AS STRATEGIC, AND WHY IS THAT?

Despite this reasonably extensive adoption of the 'best practice' principles of strategic business partnering and associated restructuring of the HR function there is still a view, within organisations, and within the HR function itself, that HR functions will often fail to take a sufficiently strategic role, and as a consequence that HR functions are still seen as providers of administrative and process services rather than being recognised as strategic partners to the business. A number of surveys continue to point to HR still being overly focused on service delivery, for example with routine recruitment and training, (Mercer, 2011; Boston Consulting/EAPM, 2011) with an overriding message that HR seems to be making slow, if any, progress (Guest and King, 2004) to the more strategic role.

Despite the general view that HR is not doing enough to be seen as strategic there are examples of organisations where HR is seen to be properly strategic and making a difference (Allen, 2015). Unfortunately the balance of research and practice-related articles still suggests that there is a lot more to be done, and that the pace of change needs to be accelerated.

III. THE RESEARCH

One of the reasons most commonly advanced for HR failing to take on the more strategic role is that HR practitioners are themselves unwilling or unable to move away from a comfort zone of process and routine (Schuler, 1992; Hird, Sparrow, and Marsh, 2010). There is therefore an outstanding question to be answered as to whether this criticism of HR practitioners is valid and fair.

The current research was designed to identify and qualify those factors that may enhance or

constrain the opportunity for the HR function to take a properly strategic role, working with business leaders on the human capital initiatives and interventions needed to make a significant difference to organisational performance and sustainability. The research has been conducted with a particular focus on the situation in multi-business organisations, those with departments or business units that will have significantly different human capital requirements. For example different human capital requirements for business units within the same organisation may be generated by: the markets served; the nature and length of contracts or service agreements; the professional or technical qualifications required; and the expected scale and pace of any change.

IV. METHODOLOGY AND METHODS

The research followed a fairly traditional overall structure, selected to be robust and to generate relevant and defensible findings. Capturing the complex dynamics present in organisational entities with scope for so many different and subjective perceptions and actions argued for a case study approach (Eisenhardt, 1989; Yin, 1981). The intention was to provide insight into one issue, in this case HR adopting a role as strategic partner, and/or to challenge generalisations around the emerging 'best practice' guidance on strategic human resource management (SHRM) and roles for HR.

The fieldwork in CaseOrg followed a multi-method data collection strategy (Saunders, Lewis, and Thornhill, 2009) in order to target the 'real-life' experience and perspectives of members of the HR community, with semi-structured interviews providing broad and rich qualitative information supported by Q analysis to promote more structured but equally rich responses and findings (Watts and Stenner, 2012). Q methodology gathers data in the form of opinions relating to a specific issue from the participant perspective in order to determine whether those opinions demonstrate a theme, or themes.

Following early findings from this multi-method case study approach, it was determined that the Q analysis fieldwork should be extended to

examine the dynamics and practice in other multi-business organisations. This further fieldwork provided an opportunity to determine whether the case study findings were unique to CaseOrg or could be seen to be relevant to a broader community of comparable organisations.

Despite the view that using Q analysis would be 'highly appropriate for the conduct of HRM research' (Sulphrey, 2014), there is no evidence that it has been used previously in studying SHRM and HR roles. While senior HR practitioners and CaseOrg HR leaders expressed broad interest in following the Q analysis approach there were concerns that the novelty factor could be either good or bad. The research experience around the Q study exercise, as an alternative to a traditional questionnaire approach, has actually been very positive. An example unsolicited comment from one Q study sort was *"It was certainly different to anything I have done before and I think it really made me think about why some statements might be more important to me than others - other questionnaires that I have come across don't really let you do that to a satisfactory level"*.

V. FINDINGS

The research focused on potential barriers and levers contributing to the more strategic role for HR, and extended this focus to consider well-supported 'best-practice' propositions. The fieldwork in CaseOrg provided a broad range of perspectives on how HR was seen in the business and the extent to which HR was able to operate as a strategic partner. One explanation for there being such a wide range of views in a single organisation was that the HR professionals were supporting individual business units in CaseOrg which operate in different markets, with staff with different competencies and ways of working, and facing different commercial challenges and opportunities.

An early message emerging from the CaseOrg research was that there was an HR community (a Factor in Q analysis) where HR professionals felt that they engaged closely with the business and were operating at a strategic level at least

some of the time, and a second community/Factor who felt that they had not been able to forge strong and positive relationships with the business, with the consequence that they reverted to a more traditional role as providers of good HR advice and practice rather than strategic partners.

The Q analysis in other multi-business organisations confirmed, and extended, the range of views about whether HR was expected and able to play the more strategic role. The multi-business Q analysis identified a number of differing Factors but, at least at the extremes, the range of views was similar to that for CaseOrg, that there are organisations where HR is engaged with the business and acting in the more strategic role and others where HR is focusing on operational and transactional HR matters.

This article now reviews the contribution, as barriers or levers, of four of the themes identified and explored in the current research:

- Business leader expectations of HR;
- The shared service model for HR;
- The policy conundrum; and
- The impact of volatility.

VI. BUSINESS LEADER EXPECTATIONS OF HR

A good deal of the more normative theory and guidance on Strategic Human Resource Management and the strategic role for HR (Ulrich & Brockbank, 2009; Guest, 1987) develops from the presumption that business leaders wish to see their HR team adopt a more strategic role. However, fieldwork in the current research has identified a wide range of business leader views regarding a strategic role for the HR community, ranging from broad support for HR taking a more strategic role through to resistance to HR being involved in anything but more transactional HR process matters.

A number of HR contributors were very positive about the support and encouragement they received from business leaders, for example with business leaders being ready to accept challenge from HR provided the HR challenge made sense. One short but powerful observation

from the multi-business Q study was “*my clients want my business input*”.

However, other contributors were equally positive about the lack of interest, and sometimes resistance, they encountered from their own business leaders, to a point where one interviewee observed “*what I experience here is people saying I don’t want to hear about that issue. Just shut up and handle the process things*”

There appear to be at least three factors in play. First, there is the interest that business leaders have in HR and people management issues in their businesses. Some business leaders recognise that HR has a strategic contribution to make and are open to spending time on HR and people management matters. Others may be focused on securing and delivering the business and may be reluctant to the point of resistance to consider proposals and challenge from HR.

Second, it is clearly a responsibility of the relevant HR professionals, in particular in HR Leadership and HR Business Partner roles, to establish their own credibility with the business leaders. They will achieve this through demonstrating their competencies in HR and organisation development and their understanding of key business issues, and in the way that they present and support their arguments.

Third, there may be a situational consideration. Businesses that are struggling to deliver on their commercial objectives may allocate a lower priority to people management when compared with winning and delivering business. And businesses that are doing well may not wish to do anything to change what seems to be working well. Interviewees pointed to the need to identify the right time to make more strategic proposals, and noted that this could mean waiting for a change in legislation, or the market, or in the supply of staff to the business concerned.

VII. THE SHARED SERVICE MODEL FOR HR

In a perfect world the shared service model would include:

- HR Business Partners, working closely with business leaders, and planning and leading on strategic initiatives and interventions in strategic HR, Organisational Development, and change management;
- Centres of Expertise (or external specialists) providing in-depth technical analysis, guidance, and support relating to specific topics, for example on Reward or Learning and Development; and
- Service Centres (in-house or outsourced) with a strong e-HR technology base supporting staff, managers, and the broader HR community with more transactional HR and people management matters.

The interviews and Q study responses provided broad support for adoption of the shared service model for HR but there were caveats about how the model operates in the real world. One of the major concerns raised was that the systems and technology that should have encouraged staff and manager self-service and provided HR with data and process support were often out-dated, not linked to other systems, and subject to failure. The consequences for HR being: inaccurate information; additional HR time being spent in manual rather than strategic activity; and problems in delivery and assigning accountability. One relevant observation was that “*Poor investment in systems has led to much manual administration and workarounds.*”

Concerns were also raised regarding the extent to which line managers were able, and committed, to play a full role in managing people in their teams or departments: this was raised in a number of interviewees and Q study responses. The ‘best-practice’ proposition is that line managers should be competent as people managers and ready to play that role. The challenge from the current research is that, at least for some organisations, there is an emerging generation of line managers who are unable or unwilling to exercise their people management responsibilities. One research participant observed “*Managers don’t always understand that they need to manage and we will advise - they think poor and challenging*”

performance is for HR to address". If organisations are genuinely committed to line managers being people managers that needs to be reflected in their recruitment, career progression, and performance management, with an acceptance that people management is at least as critical as winning and delivering business.

VIII. THE POLICY CONUNDRUM

The core principles of HR policy in any organisation are: that it provides clear, and often contractual, guidance on the interpretation of terms and conditions of employment; and that the policy encourages fairness and equity in the way that employees are treated. In an ideal world policies would be easy to understand and explain, and there would be minimal need for exceptions.

Unfortunately, complex businesses do not operate in an ideal world. HR policy has often been developed to accommodate the needs and interests of the major staff group. For example in CaseOrg the major staff group was comprised of professionals who had joined as graduates or apprentices and who, following professional and personal development, could expect an opportunity to progress through to the most senior roles. Changing business opportunities for CaseOrg have seen new businesses created. In some cases this has necessitated recruitment of staff with very different experience and competencies, for example the recruitment of senior executives from other blue chip organisations. These new entrants will not follow traditional CaseOrg career paths and, to accommodate the different work patterns they may adopt, their contract terms may be significantly different from other CaseOrg colleagues.

HR faces a conundrum. Should these new entrants continue to be treated as 'exceptions', or should existing policy and practice be modified to accommodate the needs of different entrants? The argument for fairness and equity would support the view that policy and process should be modified to be consistent for everyone in the organisation. Contributors to the research observed that this can lead to a situation where

policies are so "*clunky and cumbersome*" that staff, line managers, and even specialists in Service Centres are unable to be confident about interpreting the policies and may refer everything back to HR Business Partners, reinforcing the message that HR continues to have a role that is routine and transactional rather than strategic.

Unfortunately, continuing to treat new entrants as 'exceptions' also leaves problems. Issues will come direct to HR Business Partners, with a common observation from the HR teams being "*we have so many sub-groups and it is always the exceptions that take up your time*". The clear message is that tinkering with HR policy and process is unlikely to help HR adopt the more strategic role. A small number of contributors identified HR processes in their own organisations as a lever, referencing initiatives to clarify and simplify HR processes: "*Over time we have refined our HR processes by simplifying our policies and procedures and engaging with managers early. The collaborative approach has meant that HR is fully embedded in the business and managers are supportive of HR processes*".

These clearer and simpler policies and processes have enabled managers and staff to understand and use HR processes allowing HR to be less involved in operational activity and more closely aligned at a strategic level with the business and business management. However, it should be noted that it is normally smaller organisations, with fewer different business units, that have been able to simplify HR policy and process.

IX. THE IMPACT OF VOLATILITY

Volatility in the business was seen as a major barrier to HR taking on the more strategic role. Comments from the research fieldwork suggest two related themes. First, there is reference to volatility creating a short-term focus. This represents a particular challenge for HR where more strategic initiatives such as a new leadership development programme will take time, often measured in months and even years rather than weeks, to develop and embed.

Example quotes from the fieldwork are *“Business results are short-term orientated; HR strategy and change needs a long-term view and sustained commitment over time”*, and *“HR initiatives often require a longer time horizon than the business and its leaders are able to sustain”*.

The second, and related, theme is that operating in a state of almost continual change will drain the emotions and energy of managers, staff, and the HR community, with people fire-fighting on today’s problems rather than taking the longer-term view required for strategic planning and delivery. An example quote from the fieldwork is *“The business is constantly going through change. Whilst this can be a good thing, continuous change is exhausting for all employees and the HR team, and means that employees can get tired of the constant requirement to move, change processes, move teams etc. This can undermine the HR contribution as we are often seen as the bearer of bad news”*.

There is an increasing volume of research and practice guidance on how organisations can operate in a VUCA world, facing Volatility, Uncertainty, Complexity, and Ambiguity. One particularly relevant theme from that research relates to a potential organisational reluctance to commit to detailed business strategies that may need significant modification at very short notice. This creates a particular challenge for an HR community attempting to develop People and HR strategies that would complement business strategy.

One interesting finding from the desk research has been that organisations in the public sector are the most likely to have comprehensive People and HR strategies. While these organisations do face the need for change, for example to reduce costs or improve service performance, that change is likely to be aligned with historic organisational activity. Change for some of the businesses and business units in the current research can see businesses running down or growing rapidly, and completely new business starting up.

X. RESEARCH LIMITATIONS

There are two potential limitations in the current research. These relate to: (a) the adoption of Q methodology as a survey approach; and (b) the research focus on multi-businesses, in particular those in knowledge industries.

The rationale behind adopting Q methodology was to secure an in-depth view from HR practitioners on their personal experience, in their current role. The research limitation from Q methodology is that findings from any Q study are not intended to be generalisable. Given that the research secured the expected rich detail on a range of individual perspectives it seems to be a reasonable exchange to be sharing findings as examples and indications rather than as robust generalisable theory.

The research interest was in exploring the delivery of SHRM and the strategic role for HR in complex organisations with different people needs across and between business units. It is important to recognise that organisational size, in itself, will not always generate organisational complexity. The initial focus was on CaseOrg as a case study but the research base was extended by accessing other multi-businesses in the Q study. It is accepted that the multi-businesses with significant human capital management differences between business units represent a comparatively small community even in medium to large organisations. It is therefore important not to interpret the learning from this research as being applicable to all organisations. What the focus on multi-businesses has confirmed is that HR and people management needs and opportunities may vary not just between organisations but within organisations, and also that those needs and opportunities may change over time in response to market, governance, or even internal considerations.

XI. CONCLUSIONS

The research fieldwork has delivered a rich and varied collection of experience and views on how SHRM is practised in different business units and different organisations, and on ways in which adoption of the more strategic role for HR is supported or constrained. The research

challenge is how best to bring consistent themes and messages together and to explore where and why differences exist. The proposal is to consider those themes and messages in four blocks.

First, there is the clear influence of the organisation, in particular: whether the employee community is homogenous or operating with very different ways of working; and regarding the business leader awareness and interest in HR and people management issues and opportunities. Second, there are: the strategic intent of the organisation, possibly represented in a business strategy but more likely needing to be deduced from business plans and operations; and planned or reactive strategic initiatives or interventions required to protect, sustain, or grow the business.

The third cluster embraces the strategic HR community, in terms of: roles and responsibilities; competencies; and ways of working. The final cluster relates to the infrastructure for people management in the business and will include: HR policy and process; systems and technology; staff and line manager responsibilities; Service Centres; and Centres of Expertise.

There is a substantial body of professional and practice guidance aimed at enhancing the knowledge and competencies of HR professionals to equip them to deliver SHRM and to play a more strategic role in their organisations. One possible weakness in this guidance is that it tends to advocate specific, and often individual, solutions, for example: a software application that supports HR self-service; or training programmes in 'HR as a Business Partner'.

The current research suggests that it may be a helpful exercise to look the issue through the other end of the telescope and, inter alia, to consider: the extent to which the organisation is ready for HR to play the more strategic role; whether business leaders and line managers are ready to support HR and play their own role; and if the policy and systems infrastructure is consistent with a shift from a transactional to a strategic role. Two of the key themes emerging from the current research are that:

- Every organisation is different, and that difference extends to business units and sub-business units within the same organisation, and will change over time; and
- Barriers to the more strategic role for HR are unlikely to be addressed by a single solution but rather by a holistic approach featuring a number of complementary activities.

The summary message is that it may be appropriate to criticise HR for not playing a sufficiently strategic role to ensure best use of an organisation's human capital, but that any such criticism should take account of the extent to which the HR function in an organisation is supported or constrained in that role. The development of a diagnostic model and tool to enable business leaders and candidate HR professionals to assess the potential for HR to play a strategic role in an organisation is a clear target for future research.

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Essentials of Microfinance

M. M. Sulphey and Vivek Viswan (Publisher: Viva Books)

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Microfinance is emerging as an effective tool in alleviating poverty through financial inclusion, empowerment and emancipation. It helps in promoting self-sufficiency and economic development among people who are poor and 'unbanked'. On account of its consistent and reliable growth, microfinance foresees a huge potential of development. Though there are a few books available on the subject, most of them can be placed in academic parlance only. The book by Dr. M. M Sulphey & Vivek Viswan takes a fresh and balanced look at the subject. The structure of the book is broadly categorized into three, where part I provides a setting for the exploration of the core concept of the book namely microfinance, part II focuses on the structure, concepts and approaches, and part III discusses the viability and way forward.

The book unfolds by tracing the evolution of microfinance in India after examining the status of poverty in the country, elaborating the causes there of, urban rural divide, various poverty alleviation programs by the Government, thus extending its arm to the poor and bring them out of poverty. Rural Finance is all about providing financial services for needy people living in rural area, on account of its large untapped potential forced by the low penetration level of modern financial architecture in rural markets. The second chapter on Rural Finance begins by identifying the need for rural finance and an elaboration about financial inclusion and exclusion. The series of reforms that documented on a positive note the impact on rural credit and economic development, failed by the non availability of credit to the backward regions has become extremely adverse. With this backdrop, rural credit and rural finance flow is also dealt with in detail. The chapter finally concludes with an

explanation of financial requirement of rural population.

With an objective of providing basic banking services to the rural people, rural banking facilities are made more convenient. The chapter on rural banking highlights this premise while analyzing the problems in rural banks and exploring the hurdles in rural finance. The changing landscape of banking services to villages poses many threats or challenges often, during the disbursement of loans and lending resulting in unaffordable transaction costs. By adopting diverse business models, alternate business channels and integrating ICT, banking systems can march ahead positively.

One of the lengthiest chapters of the book deals with the evolution and emergence of Microfinance as a poverty alleviation tool. The step-by-step approach of drawing connections with the services and benefits of microfinance, working of successful credit lending models by understanding the global scenario and analyzing the current status of the sector in India, leading to the prediction of the growth of micro finance in India, though easy to comprehend, presents the complexity and challenges faced by micro finance institutions. Microfinance institutions are playing a catalytic role in the empowerment of the rural poor at the same time facing both micro and macro constraints. The chapter also refers to the different delivery models of micro finance in general and Self Help Groups in particular.

The fifth chapter titled Organizational design and culture of Microfinance institutions discusses the components that are critical and harmonious for managing the growth of Microfinance institutions namely: organization structure, leadership and

organization culture. Outlining the scenario, evolution of SHGs, structure of SHGs, features of SHGs, objectives of SHGs, principles of SHGs, stages for the formation of SHGs, the sixth chapter titled, Self Help Groups examines the impact of SHGs in the socio economic development of India.

The seventh chapter presents in detail approaches to financial sustainability and management, sound risk management measures that ensure development of MFIs, by elaborating the risk of management framework, categorizing risk, and providing risk mitigation guidelines. In order to maintain transparency and make informed judgments about microfinance institutions, The CAMEL model framework is discussed to be integrated into financial systems. In Marketing of Microfinance institutions, the applicability of marketing concepts are laid down by underlining the strategies for different MFIs, marketing environment for the MFIs, market segmentation, marketing program and developing a market strategy. As the money transfer market is in a constant flux, there is a need to understand the mechanics of transfers and ensure if it is capable enough to handle the impact of the new service. The book would have been incomplete without the presentation on money transfer system that presents the micro finance institutions with an opportunity to grow, expand and extend their services. Information on technological partnership and MFI bureau constitute the concluding chapter of the book.

One significant take-away of the book is its lucid explanation of Camel rating, CRISIL rating and other popular tools used for measuring credit worthiness. The significant characteristic of the book is its simple and straightforward style interspersed with diagrammatic representations and illustrations. The book makes an easy analysis of concepts with the use of case lets and the most note worthy of it being the KIVA story for stating the recent developments in MFIs. The authors present a holistic view of the multifaceted aspects of microfinance thus proclaiming that the book

neither falls to the *for-dummies-mode* nor portrays an ivory tower financial knowledge, but remain accessible and useful to students, novice and professionals alike.

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$$A = [(1+b)/x]^{1/2} \quad (1)$$

- h. Tables and Figures should be provided at the appropriate place within the text and not at the end of the text. Number tables consecutively in accordance with their appearance in the text. Place a table's caption above the table's body and its description (if required) below the body. Avoid vertical rules. Be sparing in the use of tables and ensure that the data presented in tables do not duplicate results described elsewhere in the article.
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Time to review: **4-6** weeks.

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