

STEM CELL-DERIVED TREATMENT FOR CARDIOVASCULAR AND PULMONARY DISEASES

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ABSTRACT

Stem cell technology is a vast and promising arena for regenerative therapies. With each novel advancement, we move closer to curing the two most lethal diseases after cancer: cardiovascular and pulmonary disorders. This is an overview of the stem cell-based therapies that could one day, after numerous developments, cure the aforementioned diseases. Newer supplements to stem cell technologies like scaffolds and secretomes change our perspective of how stem cells function. Understanding the types of stem cells, the modes of administration, and the challenges are the key to unlocking the doors to the future of regenerative medicine.

Keywords: Stem cells, therapeutics, cardiovascular and pulmonary diseases, challenges, future prospects, overview

1. Introduction

Stem cells (SCs) have been a promising solution to many cardiovascular and pulmonary diseases given their potency to transform themselves into a multiplicity of cells. The general idea is that stem cells can be turned into any kind of cell, and then be transplanted into the body or organ that has already or is deteriorating.[1] The advantage over organ transplant seemed to be obvious: where there is a surplus demand for organs, stem cell-derived organs could potentially close the supply-demand gap, if not eliminate it.[2] This would seem a groundbreaking medical advancement that would save millions of lives, but the challenges to achieving a fully functional organ made entirely out of stem cells have not yet been overcome.

Stem cells are unspecialized cells with the ability to differentiate into any cell of an organism as well as self-renewal. Each stage of life in an organism has stem cells, be it an embryo, or an adult. There is a hierarchy of stem cells that is based on their potency to be changed into any kind of cell. This hierarchy is important for us to understand because we lose out on some options of cells as we move down the hierarchy.[2]

The stem cell at the top is called a Totipotent Stem Cell. It has the highest differential potential and can form embryonic and extra-embryonic structures. The embryonic structure has the potential to be fully developed into an organism. The most basic example of this would be a zygote, post-fertilization.

The next type of cell is called a Pluripotent

Stem Cell (PSC) that can form all the germinal layers of a growing zygote, but not the extra-embryonic structures. The two types of PSCs are categorized based on their extraction point. Embryonic Stem Cells (ESCs) are extracted from the inner parts of an embryo that has not been implanted yet, whereas induced Pluripotent Stem Cells (iPSCs) are extracted from the epiblast of implanted embryos. iPSCs can also be reprogrammed from the somatic cells of adults. Pluripotency is on a spectrum that encompasses a multitude of differentiable cells that have ESCs and iPSCs on the most differentiable side, and on the other side we have cells that can differentiate into cells of a specific lineage. These are Multipotent, Oligopotent, and Unipotent Stem Cells.

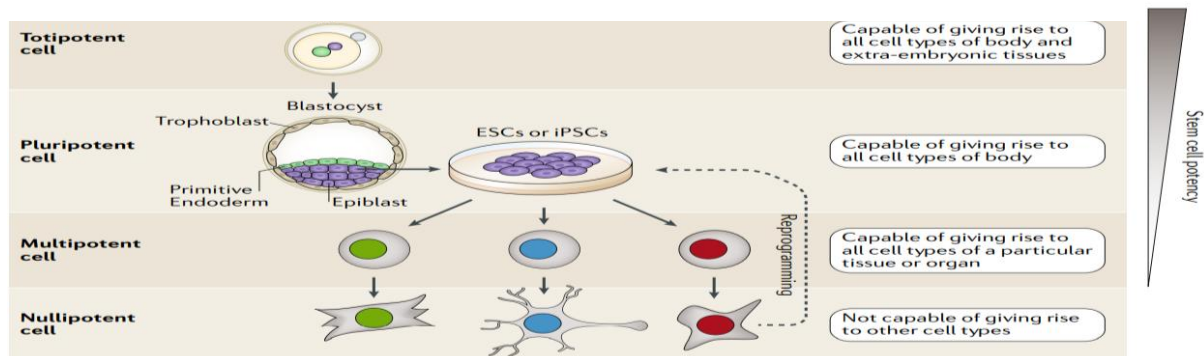
Multipotent stem cells can only form a variety of cell lines as they give birth to primitive progenitor cells. A common example is Hematopoietic Stem Cells (HSCs) that go on to form either red or white blood cells. It has been noted that under proper stimuli, multipotent stem cells can also transform into cells of unrelated cell lineages. Oligopotent stem cells have a narrower band of differentiation. They can differentiate into a few cell lines. A Common Lymphoid Progenitor can differentiate into white blood cells, but not red blood cells. Unipotent stem cells have the narrowest band of differentiation. They can divide repeatedly, but only form one type of cell. Dermatocytes are the perfect example of this. Furthermore, there are multiple types of tissue-specific stem cells, that are just adult stem cells at various locations throughout the

body. There are many such stem cells present throughout our body: hematopoietic stem cells, mesenchymal stem cells, neural stem cells, epithelial stem cells, muscular stem cells, cardiac stem cells, and dental pulp stem cells.[2], [3]

Many cardiovascular and pulmonary diseases, that were once thought to be incurable are now easily treatable. With the introduction of stem cell-derived treatments, many diseases like emphysema, and heart failure are looking at potential novel approaches for their cure.[4] Yet, for all cardiovascular and pulmonary diseases, we cannot employ the use of a single type of stem cell or a single type of delivery system. Thus, the different types of stem cells used to treat cardiovascular and pulmonary diseases, some stem cell-derived treatments, followed by the challenges that new researchers are facing have been discussed further.

Figure 1: Hierarchy of stem cells, from most to least potent. A totipotent cell can differentiate into an entire organism. A pluripotent cell can differentiate into all cell types of the body. A multipotent cell can differentiate into an organ or a tissue type. A nullipotent cell or a somatic cell does not differentiate into any other type of cell.

Ref: M. Tewary, N. Shakiba, and P. W. Zandstra, "Stem cell bioengineering: building from stem cell biology," *Nat. Rev. Genet.*, vol. 19, no. 10, pp. 595–614, Oct. 2018, doi: 10.1038/s41576-018-0040-z.



in our bodies, scientists have tried to figure out ways to check which stem cells would be the most suitable for a variety of diseases. To understand stem cell-derived treatments, we must also understand which stem cell is applicable for which disease.

2.1. Stem cells used to treat cardiovascular diseases

A lot of clinical studies have gone into identifying the right SCs to combat HF with safety and feasibility. Yet, no cell therapy, so far, has shown unambiguous effectiveness

2. Stem Cells used to treat Cardiovascular and Pulmonary Diseases

Cardiovascular and pulmonary disorders are very common in adults and have been responsible for millions of deaths annually.[5], [6] The term cardiovascular and pulmonary diseases are very broad and include diseases like ischemic injuries, myocardial infarction, chronic obstructive pulmonary disease (COPD), acute respiratory distress syndrome (ARDS), idiopathic pulmonary fibrosis, and many more.[7] Most of these lead to heart failure (HF) or respiratory failure. As mentioned before, most of these disorders are incurable, and thus we rely on the regenerative capacity of stem cells to mitigate the damage without any, or with minimal intrusion. Since we have a variety of stem cells

against cardiovascular diseases. Thus, a lot of different SCs have been proposed and used, and more strategies have been established to enhance the potency of said SCs.

ESCs: They are derived from the inner mass of a blastocyst and can turn into the mesoderm, ectoderm, and endoderm. Human ESCs (hESCs) possess nodal-like, embryonic atrial-like, and embryonic ventricle-like action potential characteristics. These cells have unlimited differentiation potential, with an easy generation of cell lines, and get integrated into the host myocardium with electromagnetic

stimuli. However, it is difficult to transform them into pure and mature cardiomyocytes in large quantities, with a risk of teratoma formation and genetic instability. It has also been noted that a healthy heart retains more ESCs than a diseased heart, defeating the entire purpose of using these as a cure against HF. They have been shown to regenerate myocardial tissue and lessen scarring, but the allogenic origin of these cells needs the host to be on immunosuppressants, which still does not guarantee a successful graft.[5], [8]–[11]

PSCs and iPSCs: PSCs are derived from different stages of embryonic growth, and can either be naïve or primed. Somatic cells can also be directly converted into cardiomyocytes, but with very low efficacy. Due to the emergence of iPSC-derived cardiomyocytes, the use of PSCs has been eliminated in fighting HF. Induction to pluripotency is done via programming with pluripotent factors like SOX2, OCT4, NANOG, and LIN28. Thus, fibroblasts can be directly converted into iPSCs. Human iPSCs (hiPSCs) are autogenic in nature and bring about very little immune response as they are made from the hosts' cells, still, they are not a completely reliable solution to immune response. They lose their pluripotency when grafted near the border of damaged or infarcted cardiac tissue, and only partially differentiate into cardiomyocytes. hiPSCs are very similar to hESCs concerning their morphology, gene expression, telomerase activity, and reaction to stimuli, thus even they can be grafted into the host myocardium electromagnetically. It has also been theorized that allogenic grafting of hiPSCs may result in teratoma formation. They also have the same disadvantages as ESCs.[5], [8]–[11]

MSCs: They were first isolated from the stroma of bone marrow, but they are found throughout the body like in the skin, umbilical cord, adipose tissue, muscles, etc. They express some surface markers such as CD73, CD90, and CD105, to name a few. Since they also express a moderate level of the human leukocyte antigen (HLA), their surface has the absence of major histocompatibility complex (MHC) class I and II molecules. This makes them slightly more prone to avoid being detected by the immune surveillance system as foreign entities. They are easily acquirable, and modifiable,

have low tumorigenicity, and rapidly multiply *in-vitro*. Hence, they are the most widely used stem cells, not only to combat HF but many more diseases. Unfortunately, due to a limited cell quantity, low cell retention, limited differential potential, and a heterogeneous cell population, therapeutic effects have been inconsistent. That being said, the paracrine effects of MSCs, whether differentiated into cardiomyocytes or not, play a major role in the survival and rejuvenation of existing myocytes, and promote the reduction of fibrosis and scar formation.[5], [8]–[11]

Cardiac Stem Cells (CSCs): The origin of CSCs is called 'mystical' as they are "isolated from heart tissue and expanded *in-vitro* for cardiac therapy *in-vivo*". [10] The heart has been assumed as a terminally differentiated, post-mitotic organ without the ability to regenerate itself, but recently it has been shown that resident CSCs can differentiate into cardiomyocytes, smooth muscle cells, and endothelial cells. They have also shown the ability to replenish the adult cardiomyocytes lost to any infarction or ischemic injuries. The most widely accepted marker that now defines CSCs is tyrosine kinase Kit (c-Kit) positive. These cells, isolated from a rat heart demonstrated self-renewal, multipotency, clonogenicity, and essentially all the features of stem cells. In a pool of c-Kit positive cells, myocyte progenitor cells express kinase insert domain receptor (KDR^+), whereas vasculogenic progenitor cells do not express KDR (KDR^-). The former has a higher susceptibility to transform into cardiomyocytes, whereas the latter turns into vascular smooth muscle and endothelial cells. One might think with all the advantages like autologous grafting, proof of safety in clinical trials, endogenous cardiac localization, and low risk of tumorigenicity, CSC is the best cell type for grafting. However, there have been contradictory results concerning cardiovascular differential potential due to insufficient cell characterization, and acquiring even a limited quantity of CSCs requires an invasive myocardial biopsy.[5], [8]–[11]

Skeletal myoblasts: They are a derivative of skeletal muscle progenitor cells (satellite cells) located under the basal lamina of skeletal muscular fibers. After a muscle is damaged,

these cells undergo multiplication and renew the damaged fibers by differentiating into myotubes and fuse into the new muscle fibers. Their use was the first for cardiac regeneration due to their easy accessibility from autologous muscle biopsies, rapid expansion *in-vitro*, ability to differentiate into myotubes, and low teratoma formation. This led many researchers to conduct multiple small- and large-scale tests on animal models including rodent, sheep, and pig. Clinical trials with humans were also conducted even though they have a major flaw. Post-differentiation, the skeletal myotubes, due to their deficiency in expressing gap junction proteins like nexin-43 and N-cadherin, resulted in a lack of electromechanical coupling between resident cardiomyocytes and the skeletal myotubes. This resulted in a high risk of ventricular arrhythmia, and studies trying to bridge this gap had inconsistent results. Thus, the spotlight on skeletal myoblasts as a cure for HF faded.[5], [11]

Bone marrow-derived SCs (BMSCs): Bone marrow is a heterogeneous tissue consisting of various cell lines of varied maturity. It was noted that BMSCs get activated whenever there is injury, which leads to tissue regeneration. Clinical trials have reported the benefits of BMSCs for the treatment of heart diseases, thus a lot of new research was pioneered by this discovery.[5]**BM-derived mononuclear cells (BMMNCs):** They include HSCs, MSCs, and Endothelial progenitor cells (EPCs). The maximum population is of HSCs cell lineage at various stages of maturation. They are mostly found in the bone marrow, but HSCs can also be isolated from blood. The entire characterization of BMHSCs and BMEPCs is not well defined as they share multiple cell markers, and are thus hard to differentiate from each other, e.g., CD133. However, during clinical trials (phase III), a reduction in scar size and non-viable tissue, along with an improvement of segmental myocardial perfusion was noted. When the largest randomized trial was held, the results were inconclusive. In the case of BMMSCs, they can differentiate into osteoblasts, adipocytes, and chondrocytes *in-vitro* and have a defined set of cellular markers to differentiate them from other BMMSCs. BMMSCs have the same immunogenic advantages as any other MSC,

and also showed positive effects on global cardiac function. However, no studies have shown a significant difference while using BMMSCs.[5], [9], [10]

Adipose-derived stem cells (ASCs): Also called adipose-derived stromal cells are very similar to BMMSCs in nature. They show potential to transform into osteocytes, adipocytes, chondrocytes, cardiomyocytes, neurons, and hepatocytes, both *in-vitro* and *in-vivo*. The addition of specific growth factors determines their differentiation pathway. They are also considerably immune-rejection resistant. This may be because like BMMSCs, their cellular markers are CD73, CD 105, CDC90, and CD 34 (early stages). They can be distinguished from MSCs as their markers do not include CD34, and CD106 (early stages). These cells can be easily acquired from subcutaneous adipose tissue, and in greater numbers than BMMSCs, and by a much less invasive method. Clinical trials have shown no significant changes post-transplantation except migration of ASCs towards the scar tissue, and an improvement in the maximal oxygen consumption.[5], [10]

2.2.Stem cells used to treat pulmonary diseases

The lung is a complex organ that comprises more than 40 unique differentiated cell types, and after years of research, multiple endogenous lung stem and progenitor cells have been found out localized in various anatomical regions of the lung.[4] It is also known that the epithelium of the complete respiratory system is differentiated from the anterior ventral foregut endoderm, characterized by the transcription factor Nkx2-1.[6] The lungs also have an indigenous regenerative system that employ trachea and proximal airway stem cells, distal airway stem cells, lung mesenchymal stem cells, and maybe more. These are regulated by molecular signaling mechanisms like Wnt signaling, Notch signaling, Histone Deacetylases (HDACs) signaling, and miRNAs and long non-coding RNAs (lncRNAs) regulation.[12] Here, most cell therapies rely on manipulating cell signals to increase tissue regeneration, but there are also SCs administered into the lungs

for regenerative effects. The cells that are used are as follows:

ESCs and iPSCs: hESCs/hiPSCs and their effects on administration are only studies *in-vivo* but there has been advancement in differentiating them into different types of lung tissue capable of regeneration. This was in the hope of creating biosynthetic organs that could easily be transplanted into a host. Administration of the differentiated cells has shown a reduction in lung injury, which is due to the paracrine effects of the cells. Nonetheless, these cells need further research and development for lung injury repair.[4], [12]

MSCs: They are the most widely used stem cell in lung regenerative therapies. They have shown an increase in bronchioalveolar stem cells and distal epithelial progenitor cells. Tests were performed to show that engrafted MSCs mediated regeneration by paracrine effects, and not by the grafting and differentiation.[13] Still, administration of MSCs showed increased lung regeneration in COPD, ARDS, idiopathic pulmonary fibrosis (IPF), and pulmonary arterial hypertension (PAH).[14]

EPCs: They originate from BM-derived vascular progenitor cells that play a role in vascular remodeling by differentiation into smooth muscle cells. They also preferentially localize themselves to the injured part of the lung and thus are suspected to have paracrine effects to mitigate inflammation. Autologous EPCs administered to patients with pulmonary hypertension led to an improvement in cardiopulmonary functions.[6]

3. Stem cell-derived treatments

There are various routes of administration of SCs, which severely impact the way any disease regresses. On top of that, modifications can be done to the SCs that make them better to be used for certain conditions. This is because the cells themselves play a huge role in how the treatment will work: they should be allowed to migrate to the site of damage, have the potential to be engrafted, be undetected by the immune system, or be autogenic as to not cause an immune rejection, and they should have the ability to blend in with the native tissue of the area while working with them synchronously.[15] They can help modify a cell in the best manner to achieve the speediest and

most effective method of treatment. Some additional tools that complement the regenerative effects of stem cells are also discussed.

3.1. Transplantation

Transplantation can be defined as a process that involves extraction of an organ, tissue, or cell, and grafting it in another place, to and from either same or different individuals. SCs can be transplanted by many methods, and since it is a mode of treatment, we administer the therapy to the patient.

Although, one of the most important factors in stem cell-derived therapeutics, there is no agreement on the right mode of administration of stem cells or their mode of delivery.[15] The route ultimately decides the potency, retention, and survival of the cells in the recipient. There basic necessity that a mode of administration should fulfill is that the cells should not form a clump, or be delivered to a place from where migration is not possible. Hence multiple methods have been devised to administer SCs to the lungs and the heart.

Intramyocardial injection: It supplies the SCs directly to the targeted area of the heart, and thus promises an adequate supply of blood to them. This method has exhibited the highest rate of cell retention, potential to form into newer muscles, and greater engraftment. Cells also show a decreased paracrine function. The downside to this method is its invasiveness, and the potential risk of embolism and vascular injury, myocardial perforation, and arrhythmias.[15]

Intracoronary infusion: It is a commonly used method that is deemed safer due to its less invasive nature, while also improving nutrient flow to the cells from the coronary artery. It provides a more uniform distribution of the cells, an increase in paracrine activity, and minimal inflation after the grafting. Due to the potential risk of ischemia and reperfusion injuries, large doses are not given via this route. Lower cell retention has also been observed due to the rapid washout in the coronary artery, which results in decreased rejuvenation.[15]

Transendocardial injection: This method is minimally invasive, and shows the potential for high cell retention. This is accompanied by an

increased risk of perforation and arrhythmias.[15]

Intravenous: The I.V. route is effective for both lungs and heart, and it is the least invasive method for the administration of SCs. Cells are attracted to the damaged site in both organs. However, there is poor cell retention and engraftment, and SCs are destroyed via phagocytosis in the reticuloendothelial system. In the case of the heart, it has been reported that cells get trapped in the lungs.[15] In the lungs, I.V. administered SCs have been shown to

reduce inflammation and fibrosis.[7]

Intratracheal: In the lungs, MSCs have been transplanted intratracheally, and although a little invasive, it has shown airway remodeling, a reduction in inflammation, and improvement in overall lung function in a mouse model for asthma. There is very little cellular retention and a decrease in proliferation of the native epithelium, and a reduction in excessive production of airway mucus glycoproteins.[15], [16]

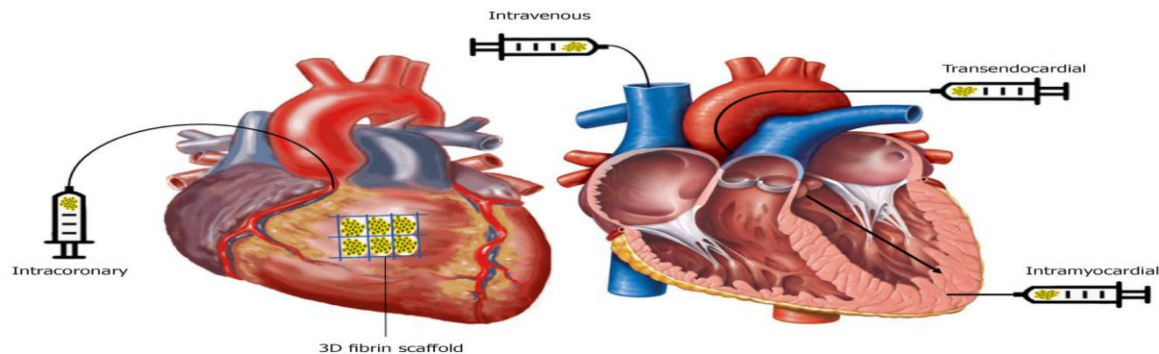


Figure 2: The various routes of stem cell administration to the heart to combat cardiovascular diseases. Ref: M. Rheault-Henry, I. White, D. Grover, and R. Atoui, "Stem cell therapy for heart failure: Medical breakthrough, or dead end?," *World J. Stem Cells*, vol. 13, no. 4, pp. 236–259, Apr. 2021, doi: 10.4252/wjsc.v13.i4.236.

Biocompatible scaffolds: Biocompatible scaffolds could be called the skeletal system on which any type of cells can grow. Scaffolds could be either hydrogels or patches made from keratin, collagen, fibrin, graphene sheets, etc.[17] Hydrogels are minimally invasive and are injectable. Patches require open surgeries and thus, are invasive. Scaffolds are used to attract retain cells, and the cells show greater engraftment in the lungs. In the heart, the retention in the myocardium is still low, compared to other scaffolds placed in the body, although more than without the use of scaffolds. [15]

Recently, new methods of making 3D cardiac tissue without the help of scaffolds have been researched upon. Scaffold-free mature and functional cardiac microtissues with enhanced cellular organization and electromechanical coupling with resident cells have been produced that are spherical in nature, and show better retention. This study is still very novel and needs more research. [18] These cell

aggregates are administered by injecting them into the body.

Electromagnetic migration: Extremely low-frequency electromagnetic fields promote MSC migration in an intracellular calcium-dependent way. It was mediated by FAK/Rho GTPase signaling pathways. This method also potentiated the paracrine function of the MSCs. Further research is needed in this field.[19]

Injection techniques are pretty standardized. An isotonic solution containing the SCs in a suspension is injected into the bloodstream or a specific part of the body. For scaffolds, the hydrogel may be injected into the heart, followed by a routine injection administration of the SCs, or the patch may have cells growing on it, which is engrafted onto the surface of the heart.[15]–[17]

3.2. Modifications done to stem cells

Some SCs potentially have infinite potential to differentiate into any kind of cell, which in theory, if transplanted into the human body would be completely identical to the native cells there. However, with infinite potential

come infinite hurdles. To overcome those hurdles, modifications we done to SCs to get as close as we can to complete rejuvenation of dying tissue. The following key methods signify ways a stem cell can be modified to be better incorporated into the living tissue, or avoid detection by immune surveillance, or be differentiated into the right kind of cell for grafting.

Directed differentiation: It refers to the manipulation done to ESCs or PSCs to the cells of interest. It is called directed as these cells naturally would turn into some other cell lineage, but we direct them to form into

something else that those cells are capable of transforming into. Another additional direction is required when converting somatic cells into hiPSCs. Three techniques are generally used for the differentiation of hESC/hiPSCs into the cardiac progenitor cells. First is the cultivation of human PSCs (hPSCs) with a stromal layer with lineage inductive characters, second is differentiation in a monolayer, and the third is differentiation directed by mechanical or enzymatic methods to form human embryoid bodies (hEB) that form spherical clusters of cells. Each method has varied reproducibility of differentiation.[20]

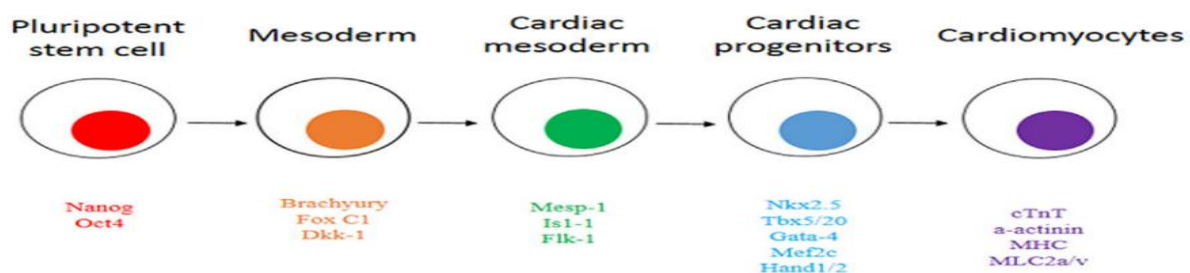


Figure 3: The steps of differentiation from a pluripotent stem cell to a cardiomyocyte. Their identification markers are noted below.

Ref: N. H. Goradel et al., "Stem Cell Therapy: A New Therapeutic Option for Cardiovascular Diseases," *J. Cell. Biochem.*, vol. 119, no. 1, pp. 95–104, Jan. 2018, doi: 10.1002/jcb.26169.

Hypoimmunization: Unlike other SCs, MSCs have certain markers that help them avoid detection from immune surveillance. Despite this, post-transplant immune suppressants are a must, which increases the risk of a pathogenic infection. The idea to make every transplantable cell immune evasive mitigates the amount of immune suppressants to be taken, if not discontinuing their need altogether. Using gene editing, immune-evasive SCs are under development. This is done by isolating the immune receptors and ligands and modifying them to reduce the immunogenicity of cells. This has resulted in the generation of universal, hypoimmune endothelial and cardiac cells. However, there is only early proof-of-concept for this modification, and it is still in its rudimentary stages to be used to treat cardiovascular or pulmonary disorders.[21]

Tissue engineering: Tissue engineering is a multidisciplinary field that includes the use of most, if not all methods that have successfully shown an improvement in cellular to organ function and regeneration. These methods may

include the use of cells, scaffolds, physical or chemical means of stimulation, various routes of administration, and all their variants.[15] Implantation of skeletal myoblasts cell sheet has been proven to be more effective than using cell suspension.[8]

The general direction of tissue culture comprises of two schools of thought. The first is the use of bioactive scaffolds that direct the cell differentiation in progenitor SCs by physical or chemical stimulation to turn them into the desired cell phenotype, and the second is to co-transplant bioactive molecules that improve cellular retention and engraftment. The general advantage seems to be that a greater number of cells survive the transplantation process. There have been multiple animal model trials conducted to prove the efficacy of tissue engineering, but the common consensus is that the results are modest, and more research is needed in the field. Nonetheless, tissue engineering or any multimodal SC-derived therapy seems to be the future of cell therapies. This could also be combined with xenogeneic

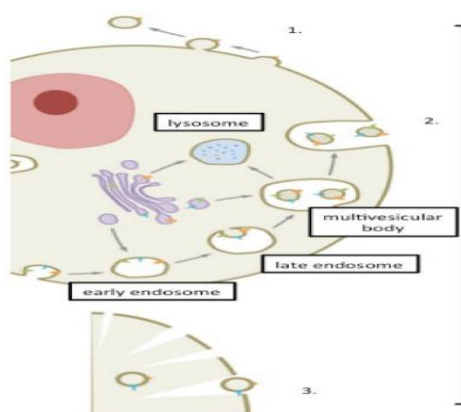
cells and chemical factors to combat ethical and scaling-up problems.[8], [15], [22]

Tissue engineering also includes technologies like human-on-a-chip, where stem cells are grown on silicone microporous membranes. These cells differentiate into different organs that can interact with each other in a microfluid system. This is used to study drug discovery and *in-vitro* inter-organ interactions.[23]

3.3.Secretome therapy

As clinical trials were being conducted to identify the efficacy of stem cell therapy, there was parallel research being conducted to figure out the exact mechanism of cellular or tissue rejuvenation with the use of stem cells. Multiple experiments were conducted and it was found that the rejuvenation was not because of the cellular differentiation, but because of the paracrine modulation, the grafted SCs brought about.[24] These paracrine factors, or simply the biochemicals that were secreted from these SCs are termed as secretomes.

Secretome, by definition, comprises of all the proteins it expresses extracellularly and these proteins comprise of growth factors, cytokines, exosomes, extracellular miRNA, etc. Exosomes are extracellular vesicles, manufactured in the endosomes, and are thirty to several hundred nanometers in diameter. The function of secretomes is inter-cellular communication. The secretome of SCs are responsible for tissue



repair, angiogenesis, downregulation of

Secretomes can be derived from any kind of SC or progenitor cell. Depending on the disease or organ targeted, the need for different biomolecules changes, and after those biomolecules are identified, a proper industrial

apoptotic proteins, and have effects like immunoregulation, anti-inflammation, and cellular protection against damage and tumorigenesis. This therapy is also the least invasive method so far. It can help fight against a wide variety of diseases like myocardial ischemia, diabetes, neurodegenerative diseases, cancer, and even aging.[25]

Figure 4: The genesis of secretomes and their uptake by recipient cells.

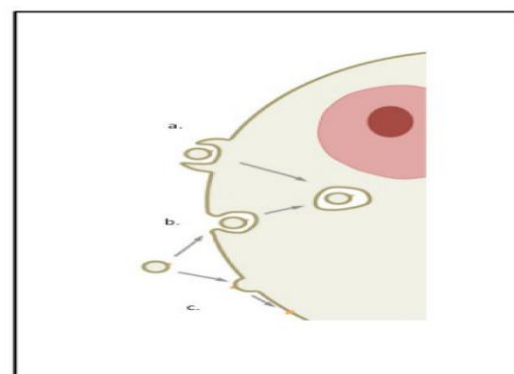
Genesis of secretomes: They originate from distinct intracellular compartments.

1. Macrovesicles containing cytoplasmic biomolecules, formed by budding of semipermeable membrane.
2. Late endosomes merging with Golgi or cell-surface related biomolecules, formed by invagination of semipermeable membrane.
3. Apoptotic bodies released from cells undergone apoptosis.

Uptake by recipient cell: The payload is released by secretomes in the cytoplasm of the recipient cell.

- a. Phagocytosis
- b. Endocytosis
- c. Direct membrane fusion

Ref: A. Monsel, Y. Zhu, V. Gudapati, H. Lim, and J. W. Lee, "Mesenchymal stem cell derived secretome and extracellular vesicles for acute lung injury and other inflammatory lung diseases," *Expert Opin. Biol. Ther.*, vol. 16, no. 7, pp. 859–871, Jul. 2016, doi: 10.1517/14712598.2016.1170804.



manufacturing plan has to be set up to produce cheap and efficient secretomes. There have been multiple studies regarding this, but they have only been done in animal models and still, the exact recipe for cardiovascular regeneration

has not been found.[26] Secretomes from MSCs are still getting more attention because, like MSCs, the molecules are immune-evasive, but a direct comparison to MSCs for the treatment of pulmonary diseases cannot yet be made based on the data that we currently have.[27], [28] Secretome therapy also suggests the possibility of a cell-free therapy, as it would be safer, could be evaluated and tested analogous to other medicines, would be easier to store for a longer period, and would be economical to scale up rapidly.[29] It is also speculated to replace SC-derived therapies altogether.[30]

4. Challenges

Many challenges to SC therapy are already solved, but many more remain unsolved or even hidden. If SC-derived therapies are proven to cure cardiovascular and pulmonary diseases, they still would need to be economical, efficient, and most of all – safe. Some challenges are discussed below.

Growing or acquiring cells: SCs are not abundant in adult bodies, and embryonic SCs are very difficult to isolate and the process only extracts a handful of cells that are duplicated *in-vitro*. Even after identification and isolation, the maintenance of SCs is difficult, and not all cells survive till implantation. However, via trial and error, and multiple educated conjectures, the *in-vitro* growing of stem cells is not as difficult as it used to be. Soon, industrial manufacturing may be achieved.[31] Post-transplantation, the cell retention is low, further lowering the efficacy of the treatment. The cells that are retained may die out due to various factors.

Genetic instability: During cell programming and directed differentiation, as well as during cell division, DNA damage and repair takes place. This causes SCs to respond to the DNA damage, raising questions about the safety and reliability of SC therapy. hiPSCs may undergo apoptosis, and thus additional methods had to be developed to select the best lineage for SC therapies. To combat this, genotoxic agents like etoposide have been suggested.[32]

Implant rejection: Every transplant is a foreign body to our immune system, even if it is a regenerative therapy. Transplant rejection has been one of the largest concerns surrounding

SC therapy as it can do more damage than it can heal. We have identified SCs that are immune-evasive like MSCs but only to a certain extent. We have also looked into hypoimmune SCs, but even they are just a proof-of-concept.[21] The need to tackle implant rejection is key in increasing the safety aspect of SC-derived therapies.

Tumorigenicity: Self-renewal comes with the risk of developing into a carcinogenic SC. This is prevalent in ESCs and PSCs. The exact mechanisms are not completely known, but it is speculated that due to damage or any chronic irregular event, an SC may turn into a cancer stem cell. [33]

Ethical issues: ESCs are taken from human or humanized embryos. There is already a huge debate whether an embryo or a foetus should be considered as a living person or not. The extraction of SCs from a foetus is frowned upon by the group supporting the former argument. iPSCs from animals, especially from pigs have a more religious perspective for their disapproval. Moreover, due to the incompleteness of the therapy, safety concerns arise when SC-based therapies are promoted as a ‘complete cure’. [15]

Deficit information: The most difficult challenge that we currently face is the incompleteness of our knowledge. Although research has been done extensively in this field, we have merely scratched the surface of the infinite potential that SC-derived therapies have to offer.

5. Future possibilities

Complete organ transplant: The possibility that we could make new organs from stem cells is not novel. Researchers have been trying to make organs from scratch for a long time to try to meet the ever-growing demand for organs for transplantation. However, whole organ transplant is not an easy process and carries its own hazards. Thus, whole organ transplants should only be conducted for end-stage diseases. There have been speculated methods to make whole artificial organs. The first is the proliferation followed by differentiation and the addition of stromal cells to make the new organ. The second way is by using the blastocyst complementation system. The third method is decellularizing the donor organ, implanting it in a matrix to recellularize for

organ grafting. The last method is to form a polymer template from polylactic acid and polyglycolic acid of the organ, and seed stem cells to make the new organ.[34]

Multimodal therapy: Tissue engineering is the perfect example of a multimodal approach to overcome the current challenges we face in SCS-derived therapies. Yet, all the combinations of grafting, secretomes, and their various modes have not been tested. It would seem better to isolate secretomes for the right application, but cases may exist where localized tissue damage has already crossed the point of rejuvenation. Here, simultaneous damaged cell removal and tissue grafting would be the best alternative, along with secretome therapy.

Personalized therapy: Autografting is possible with SCs, and in time personalized therapies could exist that not only treat any disease but prevent them from happening altogether. This would require a thorough understanding of the cells, their interactions with the environment, and advancements in the field of predictive genetics.

6. Conclusion

Stem cells provide us with an opportunity to cure a variety of diseases, and a lot of accomplishments have been made concerning their understanding and application. Clinical studies have given us no significant results,

although *in-vitro* results have. This has created an aura of hope around stem cell-derived medicines, which may not be fulfilled anytime soon. Yet, there is still a lot to discover in this newfound vista, and in due time breakthroughs would continually occur till we are able to cure cardiovascular and pulmonary diseases.

7. Abbreviations

SCs: (Stem cells); PSC: (Pluripotent Stem Cell); ESCs: (Embryonic Stem Cells); iPSCs: (induced Pluripotent Stem Cells); HSCs: (Hematopoietic Stem Cells); COPD: (chronic obstructive pulmonary disease); ARDS: (acute respiratory distress syndrome); HF: (heart failure); hESCs: (Human Embryonic Stem Cells); hiPSCs: (Human induced Pluripotent Stem Cells); HLA: (human leukocyte antigen); MHC: (major histocompatibility complex); CSCs: (Cardiac Stem Cells); c-Kit: (tyrosineprotein kinase Kit); KDR: (kinase insert domain receptor); BMSCs: (Bone marrow-derived SCs); BMMNCs: (BM-derived mononuclear cells); EPCs: (Endothelial progenitor cells); ASCs: (Adipose-derived stem cells); HDACs: (Histone Deacetylases); lncRNAs: (long non-coding RNAs); IPF: (idiopathic pulmonary fibrosis); PAH: (pulmonary arterial hypertension); hPSCs: (human Pluripotent Stem Cells); hEB: (human embryoid bodies)

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**AVAILABILITY OF HEALTH CARE SERVICES IN THE RURAL HEALTH SECTOR –
A STUDY WITH REFERENCE TO KARNATAKA****D.Kumar¹ and A.Siddiq²**^{1,2}Department of Commerce, University College, Hampankatta, Mangalore**ABSTRACT**

The present study is based on a sample survey conducted in Karkala Taluk of Udupi District, Karnataka from January to March, 2021. The main purpose of the study was to identify the availability and utilization of rural health care facilities and services. For this purpose a total of 100 respondents were given the structured questionnaire and collected the primary data. The study finds that doctors are available every day in 80% of PHCs of Karkala Taluk. In 20% of PHCs, doctors are available in alternative days. Majority of patients are not so much satisfied towards medical examination in PHCs. Emergency services and surgery for cataract are not available at PHCs but they are available at CHCs. Inpatient services are available only during the working hours of the day and week. 24/7 service is not available in any of the PHCs in Karkala Taluk.

Keywords: Health care facility, funding, Primary Health Centre and Community Health Centre

Introduction

‘It is health that is real wealth and not pieces of gold and silver.’ —Mohandas K. Gandhi

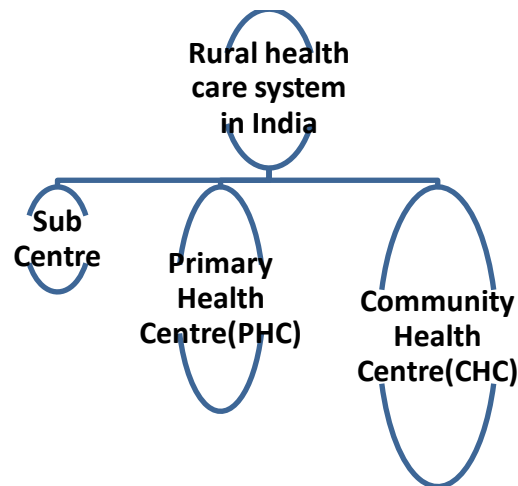
The recent COVID-19 epidemic has emphasised the significance of the healthcare sector and its inter-linkages with other main sector of the economy. The continuing pandemic has showcased how a healthcare crunch can get transformed into a fiscal and social crisis. The health of a nation depends analytically on its citizens having access to an equitable, reasonable and accountable healthcare system. Health affects domestic economic development directly through labour output and the economic liability of illnesses (WHO 2004). On quality and availability of healthcare, India was ranked 145th out of 180 countries (Global Burden of Disease Study 2016). Only few sub-Saharan countries, some Pacific islands, Nepal and Pakistan were ranked below India.

The role of government in safeguarding that its country's healthcare system provides best services for its population has been greatly highlighted upon (The World Health Report, 2000). As health is a state subject in India,

expenditure on healthcare by states matters the most when examining government healthcare spending. According to National Health Accounts, 2017, 66 per cent of spending on healthcare is done by the states. India ranks 179th out of 189 countries in prioritization accorded to health in its government budgets (consolidated union & state government). Health status of any country critically depends on the accessible health infrastructure in general and human resources for health. Some research studies, using cross-country data, have painted a positive fundamental link between the availability of the health workforce in a healthcare system and health outcomes (Jadhav et al, 2019, Choudhury and Mohanty 2020, Anand and Bärnighausen 2004).

Rural Health care system in India

Primary Health Care is one of the items under the restructured 20 Point Programme. The State is following the National Pattern of three tier Health Infrastructure in rendering Primary Health Care by establishing health institutions viz., Sub Centres, Primary Health Centres and Community Health Centres.



The health care infrastructure in rural areas has been developed as a three tier system (table 1) and is based on the following population norms:

Centre	*Population Norms	
	Plain Area	Hilly/Tribal/Difficult Area
Sub Centre	5000	3000
Primary Health Centre	30000	20000
Community Health Centre	120000	80000

Source: Ministry of Rural Development Annual Report

Number of persons covered under the services of a particular Facility (SC, PHC & CHC)

Table 1: Beneficiaries of Health Programmes in Karnataka

Programmes	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Prasuti Aaraike	485795	246219	45940	66587	---	----
Madilu	323155	271815	334189	339365	----	----
Thayi Bhagya	42471	37194	17871	16225	----	----
Janani Suraksha Yojane	383251	411423	425711	396840	282731	325197
Rastriya BalaswasthyaKaryakrama	-----	256	1769	1036056	1136789	945095
Arogya Kavacha	565709	695061	759434	1036056		
Dialysis	-----	7831	8358	12288	52185	55871
Telemedicines	34624	41414	49704	49809	59656	28170
Burns cases	1076	980	948	960	888	913
Extended Thaiy Bhagya	15081	6772	1993	11739	----	----
Total	1851162	1718965	1645917	2965925	1532249	1355243

Source: Directorates of health and family welfare services- annual report 2015-16 &16-17

Table 2: Total beneficiaries and expenditure under Vajpayee Arogyashree

Year	No. of beneficiaries	Expenditure in lakhs	Expenditure per beneficiary in lakhs
2010-11	4095	2284.98	0.56
2011-12	7564	4358.18	0.58
2012-13	12829	6807.8	0.53
2013-14	32344	15921.94	0.49
2014-15	38223	19058.61	0.498
2015-16	43808	23324.9	0.53

Source: Directorates of health and family welfare services- annual report 2015-16 &16-17

Scope of the Study

The present study is conducted to analyse the availability of medical care facilities by the rural community in KarkalaTq. The various government schemes on rural health will be

evaluated with the help of PHCs and data collected from respondents. This study is conducted in rural areas of Karkala Taluk, Udupi District.

Objectives of the Study

This study has been conducted to achieve the following objectives:

- To know the various government schemes pertaining to rural health sector.
- To know the awareness programs conducted by the PHC/CHC in Karkala Taluk.
- To assess the medical facilities available to beneficiaries in PHC/CHC in Karkal Taluk.
- To identify the level of satisfaction of rural community regarding the services provided by PHC/CHC.

Methodology of the Study

This study attempts to evaluate the availability of medical facilities to rural community in Karkala Taluk. Both primary and secondary data were collected for the study to know the impact of availability of medical facilities on the development of rural health sector. Data was collected from 100 respondents of rural Karkala with the help of structured questionnaire.

Literature Review

Ray, S.K. , Basu, S. S. , & Basu, A.K. (2011), they opined that an attempt should be made by the government to improve utilization by cordial behavior, providing more time for patient care by the doctor and staff, explaining their prescription and report, reducing the time for registration as well as waiting and finally cost of medicine which they can afford.

Olatomiwa, L., Blanchard, R., et al. (2018), in the research presents a statistical analysis of the potential of wind and solar energies for selected rural locations in Nigeria based on the available long-term hourly and daily meteorological data. It was concluded that, the abundance of wind and solar resources in the country create an ideal environment for inclusion of renewable energy systems in the design and implementation of standalone power supply systems to improve rural healthcare delivery.

Neogi, S., Khanna, R., Chauhan, M. et al. (2016), conducted a study and revealed that Newborn Stabilization Units have not received the required attention and have remained a weak link in most of the districts. Increased

demand for services coupled with absence of an intermediate level has resulted in an overload at Special Newborn Care Units. Shortage of doctors and beds, and absence of mechanisms for timely repair of equipment are common challenges.

Kumar, M.N., & Manjula, R. (2014), identified the massive shortage of proper health care facilities and addressed how to provide greater access to primary health care services in rural India.

Majrooh, M.A., Hasnain, S., Akram, J., et al. (2014), found in their study that the coverage and quality of the antenatal care services in 'Punjab' are extremely compromised. Only half of the expected pregnancies are enrolled and out of those 1/3 drop out in follow-up visits.

Sudharsan, R., & Saravanabavan, V. (2019), they concluded that explicit recognition of the role of socioeconomic factors in clinical decision making may be an important contribution in the development of quality standards to ensure high quality care and a physician workforce willing to care for susceptible populations.

Nagarajan, S., Paul, V. K., et al. (2015), concluded that the National Rural Health Mission (NRHM) has been a watershed in the history of India's health sector. They added that huge expansion of infrastructure and human resources is the hallmark of the NRHM action.

Sabesan, S., & Raju, K. H. K. (2005), say that the rural health care information system envisaged on Geographical Information System (GIS) domain in the article explains how GIS eventually facilitates utilization of resources, preventing disease and promoting health care, working towards the overall rural development and thereby ensure sustenance of the programme at all levels.

Dalal, K., & Dawad, S. (2009), in their study indicated that respondents' education, economic status and standard of living are significant predictors for non-utilization of public healthcare facilities. The study concluded that improving public healthcare facilities with user-friendly opening times, the regular presence of staff, reduced waiting times and improved quality of care are necessary

steps to reducing maternal mortality and poverty.

Sharma J K and Narang Ritu (2011), found that IPD and OPD patients those visiting the hospital for small health issues, physical and financial access to health centres, availability of doctors, providing enough time, and reasonable prescription to help them recover fast were more important than other factors. However, for those requiring hospitalization, physical and financial access became unimportant while all other aspects of service assumed great significance.

Mujib-Ur-Rehman, & Abbas, Muhammad. (2007), the research study suggested the

availability of safe drinking water; effective health units, availability of medicine in time and their distribution at a reasonable price, presence of doctors in the respective units, and availability of family planning devices and medicines for control measures, which play a significant role in the improvement of health status of the people in the rural area.

Navaneetham,K and Dharmalingam,A (2002), Utilization of maternal health care services is not only linked with a range of reproductive, socio-economic, cultural and program issues but also with state and type of health service.

Data Analysis

Table 3: Economic status of the respondents

Economic indicators	Frequencies	Percentage
APL	10	10%
BPL	90	90%
TOTAL	100	100%

Source : Primary Data

Interpretation : Out of total respondents, 10% are belong to APL family and 90% are belong to BPL family. From the above data we can observe that majority of the respondents belong

to BPL family. The motive of government is to provide adequate medical facilities to the poor and this purpose is served.

Table 4: Availability of doctors at PHC/CHC

Particulars	Frequencies	Percentage
Yes	80	80%
No	20	20%
Total	100	100%

Source : Primary Data

Interpretation : From the above information it is clear that doctors are available in majority of

PHCs in Karkala Taluk. In few PHCs doctors are available alternative days only.

Table 5: Satisfaction level of patients towards medical examination of doctors

Particulars	Frequencies	Percentage
Extremely satisfied	45	45%
Somewhat satisfied	55	55%
Not at all satisfied	0	0%
Total	100	100%

Source : Primary Data

Interpretation : Out of total respondents 45% are extremely satisfied with medical examination in PHCs and remaining 55% are somewhat satisfied. From this information we

can say that majority of respondents are not satisfied with the medical examination in PHCs of KarkalaTq.

Table 6: Availability of Medicare facilities at PHC/CHC

Particulars	Yes (%)	No (%)
OPD services	100	0
Emergency services	10	90
Inpatient services	60	40

Source : Primary Data

From the collected data it is clear that all PHCs and CHCs are having the OPD services. Only CHCs are providing emergency services. 60% of respondents say that there is inpatient facility at PHCs.

Table 7: Availability of treatments at PHC/CHC

Various treatments	Yes (%)	No (%)
Surgery for cataract	5	95
Primary management of wounds	95	5
Primary management of cases of poisoning/snake insect, scorpion bite etc	60	40
Primary management of burns	80	20

Source : Primary Data

Table 8: Facilities available to women at PHC/CHC

VARIOUS FACILITIES	Yes (%)	No (%)
Antenatal care	80	20
Intranatal care	20	80
Normal delivery	15	85
Post natal care	75	25
Temporary family planning	60	40
Permanent family planning	15	85
Abortion	15	85
Janani suraksha yojana	70	30

Source : Primary Data

Table 9: Facilities available to new born babies and children at PHC/CHC

VARIOUS FACILITIES	Yes (%)	No (%)
Treatment of low birth weight babies	15	85
BCG and Measles Vaccine	80	20
Immunization service	95	05
Fixed immunization day	95	05

Source : Primary Data

The above table shows that 15% of respondents say that treatment of low birth weight babies available at CHCs, 80% of respondents say that BCG and Measles Vaccine facility is also available, 95% of respondents opine that immunization service and fixed immunization day facilities also available at PHCs/CHCs.

Table 10: Availability of other services at PHC/CHC

OTHER SERVICES	Yes (%)	No (%)
Nutrition service	60	40
Availability of medicines	100	0
Staff nurse service	85	15
School health programme	95	05
Controlling epidemic diseases	85	15
National Health Programme service	80	20

Source : Primary Data

Table 11: Other facilities available at PHC/CHC

OTHER FACILITIES	Yes (%)	No (%)
Drinking water and sanitation facility	95	05
Labour room facility	60	40
Operation room facility	30	70
Emergency room facility	35	65
Laboratory	75	25
Wheel chair facility	65	35

Source : Primary Data

Table 12: Awareness programs conducted by PHC/CHC

AWARENESS PROGRAMS	Yes (%)	No (%)
Malaria awareness	90	10
TB awareness	70	30
Dengue awareness	85	15
Diabetes awareness	70	30
AIDS awareness	75	25
Polio awareness	85	15

Source : Primary Data

Table 13: Satisfaction level of respondents with the services and facilities provided at PHC/CHC

Satisfaction level	(%)
Extremely satisfied	5
Satisfied	90
Neutral	0
Dissatisfied	5
Extremely dissatisfied	0

Source : Primary Data

Out of total respondents 90% are satisfied with the services and facilities provided at PHC/CHC, 5% of respondents are extremely satisfied and 5% of respondents are dissatisfied with the services and facilities provided at primary health centres and community health centres.

Findings of the study

Doctors are available every day in 80% of PHCs of Karkala Taluk. In 20% of PHCs, doctors are available in alternative days. Majority of patients are not so much satisfied towards medical examination in PHCs. Emergency services and surgery for cataract are not available at PHCs but they are available at CHCs. Inpatient services are available only during the working hours of the day and week. 24/7 service is not available in any of the PHCs in Karkala Taluk. Rural women are getting benefits of antenatal care, post-natal care, temporary family planning and jananisuraksha yojana facilities at PHCs as well as at CHCs. Intranatal care, normal delivery, permanent family planning and abortion facilities are available only at CHCs. Treatment of low birth weight babies is not available at PHCs but it is available at CHCs. Drinking water and sanitary facility, labour room facility, laboratory and wheel chair facilities available in majority of PHCs. Operation room facilities and emergency room facilities are available only at CHCs. Majority of PHCs create malaria awareness, TB

awareness Diabetes awareness, AIDS awareness and Polio awareness programs from time to time. 90% of respondents are satisfied with services and facilities provided at PHCs and CHCs.

Recommendations

Government should see that everyday availability of doctors & try to provide emergency services and surgery for cataract in all the PHCs. Government should introduce 24/7 service in PHCs so that rural people need not worry for medical services during night time. Rural women are not getting intra-natal care, normal delivery, permanent family planning and abortion facilities in PHCs. Therefore government should take necessary measures for the availability of these services in PHCs. Treatment for low birth babies should be made available in PHCs.

Conclusion

The study finds that the various facilities which are available in CHCs are not available in all the PHCs. Government has to take necessary steps to upgrade the facilities available in the PHCs and it should start some new health services in PHCs which are available in CHCs. In the study it is revealed that majority of the respondents are belonging to BPL family. Therefore government should provide sophisticated health care services and facilities in all the PHCs because poorest of the poor are getting the treatment in PHCs. The recent

COVID-19 pandemic has underlined the status of healthcare and government must take steps to improve healthcare accessibility and affordability in the rural areas.

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Appendix

Questionnaire

I am Datta Kumar, Research Scholar, Department of Commerce, University College, Hampankatta, Mangalore, conducting a study on 'AVAILABILITY OF HEALTH CARE SERVICES IN THE RURAL HEALTH SECTOR – A STUDY WITH REFERENCE TO KARNATAKA'. For this purpose I am gathering public opinion about availability and utilisation of medical services in the rural areas

of Karkal. I have listed out few questions through which I want to collect your valuable opinion on rural health sector in your area.

I kindly request you to spare few minutes of your precious time in filling these questions and I assure you that the information provided by you will be kept confidential and utilized only for the research purpose.

- Your name :

- Age :
- Gender : Male / Female
- Educational qualification :
- Marital Status : Married / Unmarried
- Economic Status : APL/BPL
- Place of Primary Health Centre:
- Have you visited Primary Health Centre (PHC) / Community Health Centre (CHC) for treatment in the last 6 months?

• YES	• NO
-------	------

- How long you travel to reach the PHC/CHC at your area?
- | | | |
|--------------|-------------|-------------|
| • Below 5 KM | • 5KM – 8KM | • Above 8KM |
|--------------|-------------|-------------|

- Is Doctor available in your PHC every day?
- | | |
|-------|------|
| • YES | • NO |
|-------|------|

- If no, when is doctor available? Please mention the days.....

- How you are satisfied with the doctor’s medical examination of patients?
1. Extremely satisfied
 2. Somewhat satisfied
 3. Not at all satisfied

- Are the following Medical Care Facilities available at your PHC/CHC?
1. OPD services
 2. Emergency services
 3. Inpatient services

- Are the following treatments available at your PHC/CHC?
1. Surgery for cataract
 2. Primary management of wounds
 3. Primary management of cases of poisoning/snake, insect, scorpion bite etc
 4. Primary management of burns

- Identify the facilities available to women at your health centre.
1. Antenatal care
 2. Intranatal
 3. Facility of normal delivery
 4. Post natal care
 5. Temporary family planning service
 6. Permanent family planning service
 7. Abortion facility
 8. Facilities under Janani Suraksha Yojana

- Identify the facilities available to new born babies and children at your health centre.

1. Treatment of low birth weight babies
2. BCG and Measles Vaccine
3. Immunization service
4. Fixed immunization day

- Identify the other services available at your PHC

1. Nutrition services
2. Availability of medicines
3. Staff nurse services
4. School health programme
5. Controlling epidemic diseases
6. National Health Programme services

- Identify the other facilities available at your PHC

1. Drinking water and sanitation facility
2. Labour room facility
3. Operation room facility
4. Emergency room facility
5. Laboratory
6. Wheel chair facility to pregnant women and handicaps

- What are the awareness programs conducted by PHC/CHC?

1. Malaria awareness
2. TB awareness
3. Dengue awareness
4. Diabetes awareness
5. AIDS awareness
6. Polio awareness
7. Any other please specify

- How are you satisfied with the services and facilities provided at your PHC/CHC?

- Extremely satisfied
- Satisfied
- Neutral – No Opinion
- Dissatisfied (Poor Service)
- Extremely Dissatisfied

- Is PHC/CHC charging any fee for the services rendered?

• YES	• NO
-------	------

- If yes please specify the treatment taken and the amount of fee
- Do you have any other remark about your PHC?

DESIGNING A COST EFFECTIVE EMBEDDED SYSTEM USING INTERNET OF THINGS TECHNOLOGY FOR MONITORING HEALTH ISSUES IN RURAL AREAS IN INDIAN PERSPECTIVE: A THEORETICAL APPROACH

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ABSTRACT

Healthcare must be as efficient as possible. Internet of Things (IoT) technologies have great potential to address some of the challenges faced by developing countries like India in providing affordable, accessible, high-quality healthcare services. The present paper proposes an Embedded system design using Wireless Sensor Network (WSN) to provide wide range of services in Telehealth clinics which facilitates the provision of medical facilities from distance. In the present paper we propose to design a circuit of Sensor nodes, implemented for collecting data and process them to extract useful information regarding public health. Sensors are interfaced with micro-controller (Arduino UNO board is suited for the purpose) through analog module, the written software in the micro-controller (in Embedded C language) processes data and the processing results are sent to the authority then to web-portal using Bluetooth connection (or wifi module). The proposed System structure has following components (Medical Sensors, Communication module, Application Platform). An IoT platform can be used to monitor remotely the live ECG signal, heart rate, SPO2 (blood oxygen level), and the body temperature of patients. The signals can be measured and processed by using a micro-controller based device (Arduino + input / output modules). The main contribution of this technology is sending health related details to a specific smart mobile phone to be monitored by a doctor.

Keywords: Arduino UNO board, telehealth, embedded system

I Introduction

"Web or Internet of Things (IOT)" is the system of physical items or "things" installed with electronic gadgets, programming innovations, sensors, and system availability, which encourages these articles to gather and trade information. This technology connects nodes (including sensors and micro-controller) wirelessly through WSN technology. Embedded systems based on IoT finds application in monitoring of ECG, blood pressure, heart rate, body temperature, etc. IoT Technology enables the monitoring of a patient from distant areas as well. This feature of such Embedded Systems can be used for monitoring of remote areas, such as villages.[1]

In developing countries like India, medical field needs a lot development because the population is very high but the number of doctors available are not so many. High poverty rates in rural areas make the rural society inaccessible to health assistance. Hence, the use of smart electronic technology of IoT can prove very helpful in this regard.[1]. Around the world, the health status of people in rural areas is generally worse than in urban areas. Particularly in India, available resources through the National Rural Health Mission, is too little and too late. India accounts for the

largest number of maternity deaths. A majority of these are in rural areas. The Indian Government schemes like Ayushman Bharat Yojana and Gram Vani are proving their potentials to improve health care, special in rural areas of India. Technology can assist the telehealth field to a great extent.[8]

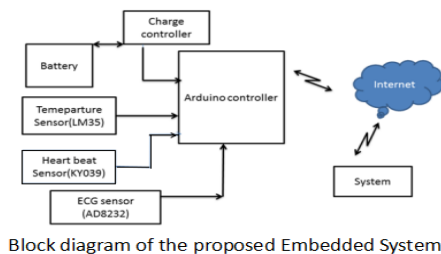
The proposed system can act as a tele-clinic in itself. The Embedded system for health monitoring, along with GSM/GPRS module can enable health monitoring from far distance also. As we know that in severe times of Pandemic, the ratio of doctors to patients become very less and hence, in such critical situations, developing countries like India require technology of tele-clinics.[2]

Designing an IoT based Embedded System for Monitoring Rural health can also use a real-time monitoring system, with the help of which the doctors and the paramedical staff can get real time data of health parameters of patients from remote areas.[9]

Doctors always prefer to have precise information in marginal time about the patients under treatment. Presently nurses continuously monitor for such critical cares but availability of qualified nurses and other healthcare staff is big concern particularly most of developing country like India. Another advantage of proposed system is to reduce the chances of

human errors significantly, as in one of the finding by US institute of Medicine argues that medical errors persist as the number 3 killer claiming lives of some 400,000 people each year.[10]

II Components of the Embedded System



Microcontroller:

Arduino Uno Board: It is a micro-controller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains many things needed to support the micro-controller; it is simply connected it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. [2]



Figure 1: Arduino Uno Board

SENSORS: Sensors constitute another important part of the Embedded System, which sense the physical parameters and provide electronic signals corresponding to it. The sensors used for the proposed work include:

Temperature Sensor (Lm-35): This temperature sensor has linear output, low output impedance and provides accurate inbuilt calibration so that the control circuit is becomes easy. Only single power supply is needed to operate this temperature sensor.[1]



Figure 2: Lm-35Temperature Sensor

Heartbeat Sensor (KY039): This unit consists of an optical sensor and an infrared light emitting diode (IR LED) to measure heartbeat in beats per minute (BPM). The heartbeat sensor is based on the principle of photo plethysmography.[3]

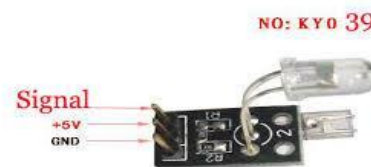


Figure 3: Heart beat sensor KY039

ECG Sensor Module (Ad-8232):This sensor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analogy reading. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op amp to help obtain a clear signal from the PR and QT Intervals easily. The AD8232 is an integrated signal conditioning block for ECG and other bio-potential measurement applications.[4]



ECG Sensor Module (Ad-8232)

III Working of the Proposed Embedded System:

The proposed Embedded System is designed using the sensor technology, which senses the

physical parameters like body temperature, heart beat and ECG on fetching instructions from the micro-controller board Arduino-UNO, followed by processing and analysis of this data. Thereafter this sensor node uses GSM/GPRS module to transfer the processed data to the doctors, who are present at far distant places. This technology enables doctors to monitor the health condition of patients in remote areas, specially in villages of developing countries like India.[7]

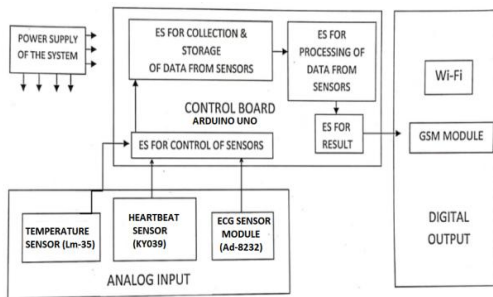


Figure 5: Block cum signal flow diagram of the proposed Embedded System

IV. Coding:

The micro-controller board Arduino- UNO is compatible with many different programming languages, but Embedded C is the most popular one.

Code for health monitoring system, which measures ECG, heart-rate, blood Pressure, Blood Oxygen levels, is given as:

```
#include <TheThingsNetwork.h>
#include <SPI.h>
#include <MAX30100_PulseOximeter.h>
#include <Adafruit_Sensor.h>
#include <Adafruit_BME280.h> // Set your
AppEUI and AppKey
const char *appEui = "0000000000000000";
const char *appKey =
"00000000000000000000000000000000";
#define loraSerial Serial1
#define debugSerial Serial // Replace
REPLACE_ME with TTN_FP_EU868 or
TTN_FP_US915
#define freqPlan
REPLACE_ME // VARIABLE TO HOLD
THE SENSORS DATA
int bpm;
int spo2;
float temp; // the sea level pressure in your
region
(***) Adafruit_BME280 bme;
```

```
// BME280 Sensor declaration unsigned
long currentMillis;
// hold the current time
// pulse oximeter time period (measurement
time period)
#define REPORTING_PERIOD_MS 1000
PulseOximeter pox; uint32_t tsLastReport =
0; // Callback (registered below) fired when a
pulse is detected
void onBeatDetected()
{
Serial.println("Beat!");
}
void measured_pulse()
{
pox.update();
if (millis() - tsLastReport >
REPORTING_PERIOD_MS)
{
bpm = pox.getHeartRate();
tsLastReport = millis();
}
}
TheThingsNetwork ttn(loraSerial,
debugSerial, freqPlan);
void setup()
{
loraSerial.begin(57600);
debugSerial.begin(9600); // Wait a
maximum of 10s for Serial Monitor
while (!debugSerial && millis() < 10000) ;
debugSerial.println("-- STATUS");
ttn.showStatus();
debugSerial.println("-- JOIN");
ttn.join(appEui, appKey);
Serial.println(F("BME280 test"));
Serial.println("Initializing MAX30100");
pox.begin();
pox.setOnBeatDetectedCallback(onBeatDete
cted);
bool status;
status = bme.begin();
if (!status)
{
Serial.println("Could not find a valid
BME280 sensor");
while (1);
}
pinMode(7, OUTPUT);
pinMode(A0, INPUT);
pinMode(8, INPUT);
pinMode(6, INPUT);}
```

```

void loop()
{
debugSerial.println("-- LOOP");
h_rate = analogRead(A0);
button = digitalRead(8);
temperature = pox.getTemperature();
spo2 = pox.getSpO2();
bpm = bpm;
humidity = bme.readHumidity();
movement = digitalRead(6);
byte payload[6];
payload[0] = highByte(bpm);
payload[1] = lowByte(temperature);
payload[2] = highByte(humidity);
payload[3] = lowByte(spo2);
payload[4] = lowByte(button);
payload[5] = lowByte(h_rate);
debugSerial.print("Temperature: ");
debugSerial.println(temperature);
debugSerial.print("Humidity: ");
debugSerial.println(humidity);
debugSerial.print("BPM: ");
debugSerial.println(bpm);
debugSerial.print("SPO2: ");
debugSerial.println(spo2);

```

```

debugSerial.print("H_rate: ");
debugSerial.println(h_rate);
debugSerial.print("Button: ");
debugSerial.println(button);
ttn.sendBytes(payload, sizeof(payload));
delay(20000);}

```

V. Conclusions

The proposed Embedded System is an effective way to monitor health of the patients in remote areas, specially in developing countries like, India where most of the people from rural areas are unfortunately deprived of an easy access to medical facilities.[5-6] The Embedded System technology helps has entered the lives of people making their lives easier and smarter. Use of Embedded system technology in the field of medicine is the need of the hour. In future, such Embedded System can also be used for live streaming of the treatment of patients for their family members who are present at far distance. The Embedded Systems and the IoT technologies find immense use in the field of medicine, specially in times of pandemics.

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A STUDY ON BUYING BEHAVIOUR TOWARDS KIDS BRANDED CLOTHINGS**C. Janefer**St Aloysius College, Mangalore
janefer_caroleena@rediffmail.com**ABSTRACT**

Growth in kids branded clothing has led to many international and domestic brands to expand their business in this segment. In the current days with increasing exposure children are likewise self-conscious and alert of their appearances and aesthetics. This study focuses on buying behavior toward kids branded clothing. The Random sampling technique is used for data collection and for the analysis of data SPSS 24 has been used. Friedman test, Mann-Whitney U, Kruskal Wallis test, Point biserial correlation test was used to analyze, compare and interpret the data. The results indicate a significant difference among mean Ranks for the factors affecting the purchase of branded kid's fashion. Factors on the purchase of branded kid's fashion are correlated with various demographic variables. However, there is a significant difference between various demographic variables with regards factors affecting the purchase of branded kid's fashion. The findings of the study help to serve as a tool to improve the quality of service and formulate appropriate strategy.

Keywords: Fashion apparel, brand, customer preference.

Introduction

A brand is an identity given for a product or a company. A brand is a 'name, term, design, symbol, or other features that distinguish one seller's product from those of others' (American Marketing Association Dictionary). It tends to be noticed that the brand goes beyond physical elements, it has some extra traits that although may be intangible yet significant to consumers deliberation (De Chernatony & MacDonald (2003). Through brand marketers, it tries differentiating its product from competitors' products. Marketers try to create a strong link and enhance the value or benefits to the customer (Keller, 1998). When there is positive association selection of the product becomes much easier. The best brand conveys a premium price and it becomes major assets to the firms, which are valued just like tangible assets. Brands ought to interact in actions to bond with consumers, so that consumers develop optimistic attitudes and favorable behaviors

A Swiftly growing segment in the Indian apparel market is the kids wear segment. Currently, with mounting exposure kids are equally self-conscious and aware of their appearances and aesthetics. It is anticipated that kids wear will significantly beat the growth of men's wear and women's wear by growing at a CAGR of 10.8 percent to reach Rs 1,65,120 crore in 2025. "The baby fashion sales are observing 100% year-on-year growth.

Tier-2 and -3 cities have been major growth drivers with Karnataka, Maharashtra, West Bengal and Uttar Pradesh among the top markets," said Dev Iyer, vice president at Flipkart Fashion. According to the global market review of the top ten global markets revealed that the US, UK, France, Germany, Italy, Spain, China, India, Russia, and Japan profusely spend on kids apparel. According to Euromonitor, the children's wear market for ages 0-14 years in India is projected to grow at 17.9% CAGR from 2018 to 2023, faster than dominant menswear and womenswear category's 14.6% and 12.6%, respectively. Today, due to entry of the foreign brands, there is a change in consumer behavior toward branded wear. Additionally, the influence of social media has a major impact on their decision-making process and have turned both parents and kids fashion conscious. The growth of purchasing power has also influenced this market along with emerging discount shops, import of clothes, and growth of malls and supermarkets.

Literature review

Durmaz and Yasar in their study opine that branding is one of the most significant indicators of competitive capacity. The brand value is perceived as one of the most important assets of the businesses. So many businesses take the gain of that value in their new products and services. So brand strategies are extremely important issues. Entire experience of marking

impacts brand love, with a higher pervasiveness of tangible and full of feeling measurements. Customer satisfaction is created both directly and indirectly through love o towards brand. (Ferreira, P., Rodrigues, P., & Rodrigues, P. (2019)).variables like price, faithful clients and low/medium cost, fundamentally fluctuate in post-purchase satisfaction. These factors can be used to measure brand loyalty among the personal care products customers in the future where this post - purchase satisfaction becomes unavoidable. (Jungmi and Susan (2002)).Well-designed tactics will provide advantages for businesses against their competitor in the compelling competition environment. The rising complexity of youngsters comparable to marking issues brings about them turning out to be substantially more brand-wise when settling on buy decisions. (Harradine, R. and Ross, J. (2007)).The social grade deliberated by expensive fashion wear act as a motivating factor to spend on luxury brands even if they had limited discretionary income. (Wu, M.-S.S. Chaney, I., Chen, C.-H.S. Nguyen, B. and Melewar, T.C. (2015)).In the initial stage itself if the marketer gives importance to brand awareness and recognition in the child, it provided ample opportunity to create stronger brand association and imagery when they become independent as consumers. (Ross, J. and Harradine, R. (2004)).Brands can be the reason for social division among youngsters, bringing about the arrangement of "in" gatherings and "outgroups. The individuals who don't claim the right brands might be ordered against and experience social effects, which incorporate being hassled, tormented, having low confidence and being socially barred.((Roper, S. and Shah, B. (2007)).The brands like choice components were more significant for more established kids and young men. More seasoned youngsters are additionally more regularly aligned with the ownership of (non) fitting dressing brands with unsafe reactions from different kids. ((Lovšin.F , Brina.L , Koch.V))To ensure consumer satisfaction, understanding the consumer, his likes, dislikes, shopping behavior, practices and reactions are key factors. Consumer behavior provides a comprehensive basis for identifying and

thoughtful consumer needs. ((Sayulu, K. and Surender, P.))Promotional variables like feature, display, price cut assume a solid part in buyers brand decision choices.((Gupta.S))

Aims and Objective

To study is intended To study & analyse the brand preference of kids branded apparels in Mangalore city. The study also analyses the factors which influence the buying behaviour of kids for branded apparels

Hypotheses of the Study

Hypothesis is developed in order to analyse whether demographic variable have significant difference in level of satisfaction on kids clothing brand and Factors on purchase of branded kid's fashion. It is formulated as follows;

H1: There is significance difference between various factors affecting purchase of branded kid's fashion

H2; There is a positive correlation between Factors on purchase of branded kid's fashion and demographic variable

Research Methodology

This study is focused on determining the buying behaviour towards kids branded clothing's in Mangalore City. Descriptive research design has been followed in this study and it aims to analyze the respondents' buying behaviour towards kids branded clothing'sBoth primary as well as secondary data is utilized. The primary information is gathered using a structured questionnaire administered through convenient sampling. There 130 respondents are selected for the study based simple random sampling. The study is covered in Mangalore City. In order to measure the factors affecting purchase of branded kid's fashion, a five-point Likert scale was used (1-Very low to 5-Very High) and for satisfaction a five-point Likert scale was used (1-Highly Dissatisfied to 5-Highly Satisfied) . The measurements instruments were constructed and extracted a more comprehensive questionnaire based on the items of interest for this study.

Data Analysis and Interpretation

Data collected was tabulated and analysis was carried out by using Simple percentage

analysis, Descriptive analysis using mean and standard deviation and inferential analysis such as factor analysis and Kruskal-Wallis test. Data was analyzed as follows;

Demographical Profile

Demographic were collected to know the background of the students such as Gender, Income and Age. This will help us to understand the diversity of respondents in research area. The details are given below,

Table no: 1 Demographic Variables

Variables	Category	Frequency	Percentage %
Gender	Female	94	72.3
	Male	36	27.7
	Total	130	100.0
Income	Below 30000	62	47.7
	30000-60000	43	33.1
	Above60000	25	19.2
	Total	130	100.0
Kids age (Boys)	Below 6	32	24.6
	6-12	54	41.5
	Total	86	66.2
Kids age (Girls)	Below 6	18	13.8
	6-12	52	40.0
	Total	70	53.8

Gender: It was found that 72.3% of the respondents were female and 27.7% were male.

Income: It was found that respondents whose income below 30000 were 47.7%, 30000-60000 were 33.1% and above 60000 were 19.2%.

Kids age (Boys): It was found that boys below 6 years were 24.6% and 6-12 years were 41.5%. **Kids age (Girls):** It was found that girls below 6 years were 13.8% and 6-12 years were 40.0%.

Other findings:

- It was found that 52.3% of respondents preferred branded kids clothing and 47.7% preferred non-branded.
- It was found that 33.1% of respondents preferred brand Allen Solly, 20.8% preferred brand Hopscotch, 29.2% of respondents preferred brand United Colours of Benetton, 46.2% of respondents preferred brand First Cry, 3.1% of respondents preferred brand Fame forever, 29.2% of respondents preferred brand Gini and Jonny and 13.1% of respondents preferred brand Global Desi.
- It is found that respondents satisfaction towards kids(boys) clothing brand are 10.8% highly satisfied, 54.6% satisfied and 6.9% neutral and respondents satisfaction towards kids(girls) clothing brand are 3.8% highly satisfied, 29.2% satisfied and 14.6% neutral.
- It was found that 13.1% of respondents were aware of the brand through hoarding, 42.3% through T.V, 33.8% through Reference by friends and family, 28.5% through window shopping and 64.6% through social media.

- It was found that responded purchased brand cloths very frequently were 33.1%, occasionally were 47.7%, rarely 13.1% and very rarely 6.2%
- Study reveals that influence of kids (boys) was higher that is 26.9% when compared to kids (girls) 12.3 %
- Study reveals that branded clothes were purchased by the responded was high during birthday that is 70% followed by festivals 63.1 % and weddings 40%

Hypotheses testing

- H0: There is significance difference between various factors affecting purchase of branded kids fashion

The table reveals the calculated Friedman test value and their significant difference in the mean ranking for the banking literacy variable.

Table 2: Friedman test for significant difference among mean Ranks for the factors affecting purchase of branded kid’s fashion

Factors	Mean	S.D	Mean Rank	Rank	Chi-Square and Inference
Availability of brand	2.1846	.83327	4.55	8	63.575 P<0.01** High Significance difference H1 is Accepted
Customer review	2.2000	1.15067	4.63	6	
Price	2.2308	1.24227	4.58	7	
Discount	2.5154	1.05091	5.32	4	
Location of store	2.5154	1.22781	5.36	3	
Media exposure	2.5077	1.05835	5.29	5	
Disposable income	2.6846	1.00414	5.68	1	
Fashion-conscious	2.6154	.91824	5.59	2	
Design of the product	2.0000	1.20077	4.00	9	

** Denotes significant at 1% level

The results showed that the mean ratings of the factor affecting purchase of branded kids fashion were in the range of 2.000 to 2.6846 with S.D 1.20077 to 1.0041.

The above table reveals the 9 factors considered to know the important factors in purchase of branded kids fashion.

The highest mean value shows Disposable income factors (2.6846) with first rank, followed by Fashion-conscious with 2.154 mean value with second rank and the lowest mean value shows in the Design of the product factor with mean value of 2.00.

The calculated Chi-square value is 63.575. The significant value which is less than 0.01. Hence, it can be inferred that there is a significant difference in the mean ranking between the variables. From the above table, it

is inferred that compared with all the factors, there is a significant difference in mean rank between factors as far as purchase of branded kid’s fashion.

Point biserial correlation

Hypothesis

H2: There is no correlation between the Factors on purchase of branded kid’s fashion and demographic variables.

Table 3 showing A point-biserial Correlation Coefficient between Factors on purchase of branded kid’s fashion and demographic variable

Demographical Variable	Availability of Brand	Customer Review	Price	Discount	Location of Store	Media exposure	Disposable Income	Fashion-Conscious	Design of the Product
Age Pearson Correlation	.008	-.129	-.195*	-.265**	-.315**	-.198*	-.393**	-.233**	-.348**
Sig	.926	.144	.026	.002	.000	.024	.000	.008	.000
Gender Pearson Correlation	.194*	.552**	.607**	.286**	.470**	.224*	.539**	.260**	.460**
Sig.	.027	.000	.000	.001	.000	.010	.000	.003	.000
Income Pearson Correlation	-.232**	-.312**	-.271**	-.172	-.409**	-.097	-.217*	-.035	-.101
Sig.	.008	.000	.002	.051	.000	.271	.013	.689	.255

A point-biserial correlation was run to determine the relationship between Factors on purchase of branded kid's fashion and demographic variables. There is a negative correlation between Factors on purchase of branded kid's fashion and age, which was statistically significant Price, Discount, Location of store, Media exposure, Disposable income, Fashion-conscious and Design of the product $r = -.195^*, -.265^{**}, -.315^{**}, -.198^*, -.393^{**}, -.233^{**}$ and $-.348^{**}$, $n = 130$, $p = .026, .002, .000, .024, .000, .008$ and $.000$. There is a positive correlation between Factors on purchase of branded kid's fashion and gender, which was statistically significant Availability of brand, Customer review, Price, Discount, Location of store, Media exposure, Disposable income, Fashion-conscious and Design of the product $r = .194^*, .552^{**}, .607^{**}, .286^{**}, .470^{**}, .224^*, .539^{**}, .260^{**}$ and $.460^{**}$, $n = 130$, $p = .027, .000, .000, .001, .000, .010, .000, .003$ and $.000$. There is a negative correlation between Factors on purchase of branded kid's fashion and Income, which was statistically significant Availability of brand, Customer review, Price, Location of store and Disposable income $r = -.232^{**}, -.312^{**}, -.271^{**}, -.409^{**}$ and $-.217^*$ $n = 130$, $p = .008, .000, .002, .000$, and $.013$.

Conclusion:

Along with the adults, even children are already in line with fashion trends. Little

youngsters are currently appreciating an assortment and broad scope of design garments. The present age kids have their own inclinations which call the design Clothing stores for youngsters to give a wide scope of dress decisions for young men and young ladies. Gone are the days where parents were the sole decision makers, we find even kids being actively involved in the shopping process. Awareness among kids about fashion branded apparels are also increasing not only among high income segment consumers but also among middle income consumers. With rising double earnings of the working population and better disposable incomes along with rise in international travel have influenced the purchasing behavior for branded fashion. Price of the product is not keeping the parents away from buying the fashion apparels but availability of branded clothes and design specially boys are the important factors that have to be considered in this segment of the market. Social media is the most important contributor for the level of awareness. Growth of e-commerce in India has created an upsurge of online shopping websites bringing fashionable clothes even more accessible to everyone. Online stores are now capable of providing discounted products as well as a wide variety of products. The brand should be committed to provide the best of digital and personalised shopping experiences across all platforms. It can be noted that Special

occasions, from festivals to birthday parties, offer immense prospects for the retailers. With rising family units, number of working ladies, ascend in brand and design mindfulness and companion pressure, Indian guardians are currently progressively moving their

inclination towards marked clothes . In this way, it is really obvious that the kidswear section has attracted retailers' attention, now the apparel retailers need to focus on factors such as pricing, supply chain, discount and design.

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COMMUNICATION & INNOVATION: UNDERSTANDING THE POTENTIAL & CHALLENGES IN CONTEMPORARY BUSINESS ISSUES

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ABSTRACT

Industry 4.0 has brought about a drastic change in the manner in which business is conducted in contemporary times. Along with new trends in business, communication as means of expression and a medium of reaching out to people has undergone major changes over the years. This is true not just in the context of personal communication but also communication in the business world. There has been a major shift in the communication channels from conventional methods of promoting business to unconventional ones. Therefore, a drastic change can be observed in mediums of communication in advertising, marketing and selling of products. The World Wide Web, social media platforms and online shopping have created a major switch for reaching out to consumers and for trading. In this changing business scenario it is therefore imperative to understand the changing trends in communication in the business world. The present paper attempts to identify, recognize and study the changes in communication which are followed by the industry for the promotion of their business through various platforms. While doing so, the paper would analyse the various new platforms of conducting business and how the relocation of communication has led to a major shift in commerce in the industry. The paper also attempts to analyse the impact of information and communication technologies and their challenges in the context of new business trend.

Key words: Business ideas, challenges, communication, online platforms, innovation.

Introduction

Zehen Mir Ali in his book *Industry 4.0 Position, Direction, Impact* (2018) has explained the term "Industry 4.0" to be considered a paradigm shift in business modules and to the numerous innovations in digital media and technologies. Increasingly business has sifted online and in future it will further lead to rise in this trend. There has also been a major change in the strategies of advertising products as the medium of reaching out to customers have changed to online modes. Most business companies have their online portal and social media handles through which they reach their potential buyers. It has therefore been observed that strategies in communication have also changed. The traditional methods of advertising have undergone a drastic change and are being replaced by online methods of advertising. Using these online platforms also ensures a wider spread of the business and an easy way of reaching out to different stakeholders who are an integral part of one's business. This alteration in trend from traditional to modern approaches of business requires a different approach in the communication systems which would aid the growth of a business.

The Impact of Information & Communication Technology on New Business Trends

With the rise in online business modules, the internet has gained utmost importance. Harry Bouwman, Bart Hoff, Lidwien Wijngaert and Jan Dijk (2005) in their book *Information and Communication Technology in Organizations: Adoption, Implementation, Use and Effects* have said that since physical support systems are being replaced by digital platforms; all the mediums of communication like social media, WhatsApp messages, app, YouTube, memes, reels etc. heavily rely on the internet. Even digital platforms of conducting meetings and virtual tours of facilities are made available for customers through the internet. Communication tools are being negotiated through the virtual platforms which were unknown in the business world a decade ago. Although digital support is not entirely new to the business world, yet its dependence for creating an array of goods and services has definitely increased. Think global and reach worldwide is the new motto of today's businesses. Therefore there is a need to re-look and re-think about the expansion of one's business but at the same time the remote control needs to be in the command of the

business owner. Smart communication tools can easily make this possible to connect to all the stake holders on a single platform. Integration of technology and communication tools in one's business will not just lead to the expansion of the business but will lead to a future vision of managing the business.

Christine John (2019) in his book *How to Start and Run an Online Business* has elaborately discussed about the essential communication tools for running a successful online business. He mentions that Since online trading and shopping is the present day norm, communication tools have enabled the product to reach from the factory directly to the consumer without middle-man, actual shops or factory outlets. The company's website is the basic platform on which its entire information is available. This website should be maintained and updated regularly as it is the most authentic medium of communication between a company and its stakeholders. Besides this, maintaining social media handles is another way of reaching out to them.

In the book *Social Media Success for Every Brand: The Five StoryBrand Pillars That Turn Posts Into Profits*, Charlie Diaz (2019) has discussed about the importance of brand building through social media is the contemporary business scenario. Some of the popular social media platforms are Facebook, Twitter, Instagram, LinkedIn, YouTube, Reddit, Pinterest and Quora. It is the easiest way to connect with the customers. It not just helps in connecting with new customers but also repeating existing ones. Through the number of views, comments and likes that the product gets, a feedback can be obtained by the company on that particular product. Through the questions that are posted in the comments, the company gets an opportunity to directly interact with its consumers. It also helps in bringing more revenue to the company.

Anthony Welfare (2018) in his book *Social Media Essentials for a Growing Business* has attributed the growth of e-commerce and the e-revolution to social media. Anthony says that the communication on Social media is more effective as it is less formal than a company's website. Videos, images and memes can make this communication appealing to people of all the strata of the society. The organizational

mind set revolves around technology, communication and innovation. Information technology and communication optimized models are faster, more flexible, have lower production costs and create safer working environments.

Intelligent technical communication systems are user friendly for the buyer and are based on the specific behaviour of its users. The tastes of their buyers can be easily traced by a seller through digital footprints that the users leave on various social media, online shopping apps or google surfing platforms. This helps the company to display advertisements to targeted audiences. It is not difficult for artificial intelligence to trace and integrate the buyers taste with the available products of a company. This can easily be done by noting the type of products that a buyer frequently surfs for or even the like for a certain product can be tracked by the time taken to view the product. Thereafter advertisements are flashed on every platform that the buyer visits. Many times the repeated flashing and pop-up advertisements of a certain product that the buyer has viewed several times prompts the buyer to order the product. Location based planning, maintenance and assistance of consumers is also done in a similar fashion. Physical assistance to customers has been replaced by digital assistance. Consequently, selling a product requires service oriented planning, but not in the traditional manner. Data mining and knowledge discovery, thus, become important business tools. App stores can easily gain the information of their customers name, age, location, requirements etc. An augmentation of technology and communication systems leads to a completely different modules of business and smart factories; giving rise to a new generation of workers smart factories. Thus, industry 4.0 has proved to be a game-changer for business.

Challenges in Implementing Information & Communication Technology

It would be worthwhile to consider some challenges in the implementation of information & communication technologies which are faced by the businessman as well by consumers. In the *Handbook of Research on Information Communication Technology*

Policy: Trends, Issues and Advancement (Volume II), Esharenana E. Adomi (2010) has discussed about these challenges. Some of the challenges that Adomi mentions are as follows:

1. Investing into information and technologies is an expensive affair. It requires the assistance of specialized staff which in-turn increases the budget of a company. For example, in order to maintain the website of a company, not just a technically sound staff but also someone who has good communication skills has to be employed.
2. The technical assistance for online platforms puts a pressure on the IT team. This has been particularly relevant during the pandemic when the entire business shifted online, especially during the lockdown.
3. Heavy dependence on the internet leads to its own problems like insufficient band width, slow Wi-Fi and hefty consumption of data on day-to-day basis. These problems in turn lead to other problems like frustrating consumer experiences which can cause low productivity for a business.
4. Communication tools are designed in a manner that they hack into the human mind and track activities through digital footprints. While the company benefits out of this constant hammering on the consumers mind; for the consumer this invasion of privacy can prove to be an extremely intimidating experience.
5. Social media sites have lost their original purpose of connecting people together. Rather they only manifest e-commerce, selling and advertising products.
6. Formal letters and emails are being replaced by informal patterns of communication. Social media and other informal platforms exhibit light, humorous and intelligible communication. The use of heavy jargons is replaced by language which is simpler and attractive for a common man.

Conclusion

To conclude, George Brand & Jim Work Jim in their book *E-Commerce Business Model 2020* (2020) have elaborated about the online marketing strategies, the use of social media and step-by-step techniques to make money

online through effective communication approaches. They reiterate the fact that Industry 4.0 has brought about alterations in the business, marketing, advertising and sales techniques. Information technology has gained immense importance in today's business world. Various platforms of online business have brought about a shift in communication and a transformation in many sectors. Modern day business sustainability and growth necessitates smart planning as well as smart communication strategies. As industry 4.0 is aligned to online marketing and sales of products and services; enormous potential lies in effective communication. Complex business procedures can be explained in a simple manner through lucid communication; thus, making it available for all. In order to optimise performance and improve efficiency, it is the need of the hour that each businessman keeps himself abreast with the latest developments in communication and technology. Business establishments which lag behind in adapting to these changing systems will either limit their business growth or might fade away in the long run.

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A STUDY OF MIGRATION OF DIAMOND BUSINESS FROM MUMBAI TO SURAT: AN ALARM FOR THE GROWTH OF INDUSTRY 4.0

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ABSTRACT

In Mumbai, Bharat Diamond Bourse is a famous location for the diamond industry, especially some giant diamond firms have situated in Bandra-Kurla Complex (BKC), where the cost of rent is Rs. 1.2 Lakhs to 2 lakhs monthly. It is a very costly affair for small-scale firms, and everyone cannot afford such expensive rent. So, few diamond merchants want to migrate from Mumbai to Mahidharpura and Varachha market in Surat on the monthly rent of Rs. 10,000 for an office space. On the other hand - the Municipal Corporation of Greater Mumbai (MCGM) charges 2% octroi on cut and polished diamonds. The Maharashtra Government is levying taxes, such as octroi and local body tax. Surat does not have such taxes or octroi. It shows that the diamond business from Mumbai is migrating to Surat slowly because of many reasons. So, the question arose, "Is it alarm the reduction in the growth of the diamond industry?". The research study has been thrown a light on the growth and problems of migration of industry. It shows whether the diamond business is migrating from Mumbai to Surat, and creating various problems for the growth of diamond industry 4.0.

Keywords: Problems, Growth, Diamond Merchant, Migration, Mumbai, Surat

Introduction:

India has captured nearly Rs 70,000 crore in the diamond business, and the six diamond merchants are influential in India and handle this business most aggressively. Most of them are from Mumbai. Nirav Modi, Mavji Bhai Patel, and Mehul Choksi are from Mumbai. We have Dharmesh Shah, Ashok Gajera & Russell Mehta from the other parts of India. Mumbai is an economic hub for every industrialist; therefore, Diamond merchants also start their business from this historical place. Today Mumbai has its \$43 billion worth of diamond business, spread all over Mumbai along with more than 2,500 offices here, where 45,000 conduct business and over 50 big diamond companies, owned by Palanpuri Jains and Saurashtrian Patels. They are controlling nearly about 70% of the diamond business in Mumbai, with a turnover of Rs 2.6 lakh crore a year.

The problem of the study

In the last few years, it has been observing that many of the small traders in the diamond business are struggling to retain in the Mumbai diamond market. Many of the large-scale diamond industries have been migrated to BKC which, is known for expensive rent. It is a very costly affair for small-scale firms, and

everyone cannot afford such expensive rent. So, few diamond merchants want to migrate from Mumbai to Mahidharpura and Varachha market in Surat on the monthly rent of Rs. 10,000 for an office space. Surprisingly Municipal Corporation of Greater Mumbai (MCGM) charges 2% octroi on cut and polished diamonds. The Maharashtra Government is levying taxes, such as octroi and local body tax. Surat does not have such taxes or octroi. It shows that, due to various reasons, the diamond business from Mumbai is migrating to Surat, slowly. Now the question arises that, "Is it alarm for the growth of the diamond industry?" The following questions are raising regarding the problems:

1. Is Mumbai has not given a place for these diamond Merchants?
2. Are state Government policies unfavourable for diamond merchants?
3. Is in Mumbai no future for the diamond industry?
4. Will diamond business completely migrate to Gujarat?
5. What about the economic growth of Mumbai?
6. What is the future of diamond workers?

These are the main problems now occurring in the diamond industry hence, the research paper is focusing on the migration of diamond

merchants from Mumbai to Surat and the conditions of diamond workers.

Literature Review

The author has highlighted the story of Kirtilal Mehata and his sons. They have entered Mumbai and start a company called Dimexon. In 1975 Dimexon received manufacture's sight from the Diamond Trading Company (DTC), the selling arms of De-Beers, a very famous brand in diamonds. The author has penned down that in 1981 a crisis started in the diamond business. They want to cut down their prices drastically. It shows that in this business from the 1960s, ups and downs were happening, and international migration started, as these people were shifted to Antwerp and start company Eurostar Diamond (Devesh Kapur: 2010:101). Another author told the story about Laxmi as a Jain diamond trader who has migrated in 1970 from Mumbai to New York and spread her business. (Maritsa Poros: 2011:4) According to Banerjee, workers are being neglected in the diamond industry. The diamond industry has given revenue not only to the businessman but also to the nation. But the workers from the diamond industry are exploited due to poor wages and various diseases like lung diseases or make them half-blind. (Debdas Banerjee: 2005:35).

Objectives of the study

1. To scrutinize the situation of diamond merchants in Mumbai
2. To find out the reasons for the migration of the Diamond industry
3. To scrutinize the problems of the growth of the diamond industry 4.0
4. To evaluate the present and the future of the diamond workers
5. To recommendations to avoid this migration and the growth of the industry in Maharashtra.

Hypothesis

- H_0 : There is no significant relation between migration and the growth of the diamond industry in Mumbai.
- H_1 : There is a significant relation between migration and the growth of the diamond industry in Mumbai.

Research Methodology

- **Data collection:** Data has collected by the questionnaire given to the workers and the customers. Also, interviews have taken of the various merchants.
- **Sample size:** The total respondent numbers were 100 from the related business. It includes 50 employees, and 30 customers have chosen for the questionnaire. Interviews of 20 Merchants have been conducted from the Mumbai division.
- **Secondary data:** It has been collected by various sources like E-books, e-content on websites, blogs, articles, etc;
- **Statistical based:** Nominal levels of measurement for more than one variable are used in the research, which shows the significant relationship between the two different groups. The hypothesis has been justified with the help of the Kruskal-Wallis test for the groups of proportions.
- **Limitations of the study:** Study is limited to Mumbai area only; Respondents might not be given complete and true information;

Facts and findings:

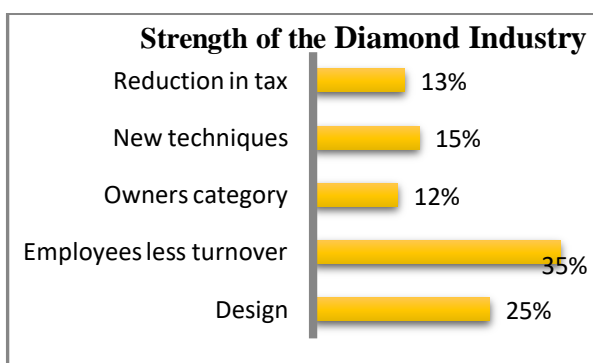
Kaushik Mehta, former chairman, Gems and Jewelry Export Promotion said, "Globally, Mumbai is perceived to be a world-class marketing and diamond export hub with a highly skilled and educated manpower." He agreed about the infrastructure, world-class airport, high-class hotels, and services, large-scale banking, insurance facilities, etc; which makes the business viable, as importers from Hong Kong, the US, Belgium, and the UAE are frequent visitors to the BDB at BKC. But similarly, he has agreed about having a parallel market, which can complement Mumbai's diamond export trade. According to him, Surat

is the best option for this is currently, it processes 10 out of 12 diamonds mined globally. Further, he added Mumbai does not have a world-class display and distribution place henceforth, Surat can convert into a display center, which is right side just polishing market, then global miners like Rio Tinto, Al Rosa, De Beers may think of setting up shops in India.

Today's 80,000 crores (Rs 800 billion) diamond industry has been supported by our Prime Minister Narendra Modi, who was Chief Minister of Gujrat. The diamond traders from

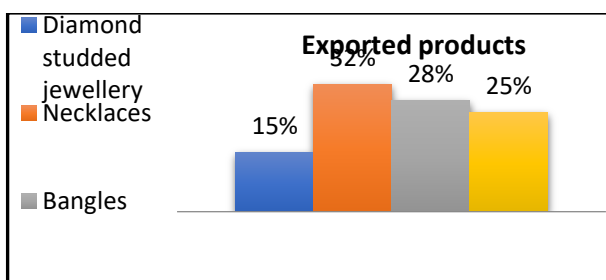
Gujrat are also supportive as they have 2,500 diamond polishing units and consider the settlement of a world-class trading center. They are justified that Gujarat Government has given them 1 lakh sq. mt. of private land, barely 270 km from Mumbai. The traders are harassed by the customs, unreasonable real estate prices, cost of transporting diamonds, expensive labour in the city, most of the labours like cutters and polishers for the diamond business are living in Surat. Restrictive business policies of the Maharashtra State Government are also one of the reasons for their migration.

1. The strength of the Diamond Industry- Figure 1



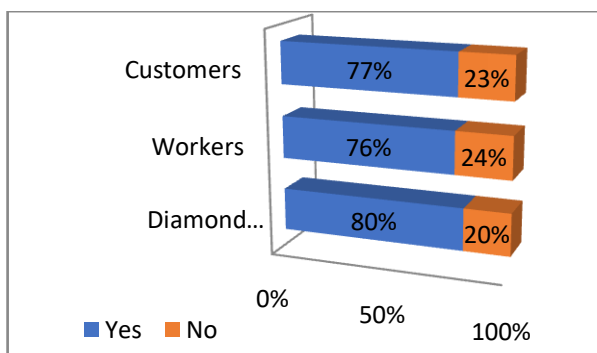
35% of respondents agreed about employees' less turnover, which is a strength of this business. 25% agreed that various designs and designer of the diamond jewellery is the strength of this business. 12% of the respondents are agreed that the owner's category likes Jains and Patels know about the business. 15% and 13% agreed for new techniques, and reduction in taxes in the companies is also a strength in this business. Many respondents think that due to the Mumbai region, this business is getting powerful strength. Such strength they won't get any other place in India.

2. Exported product from Mumbai to another country- Figure 2



The respondents felt that 15% Diamond studded jewellery, 32% Necklaces, 28% Bangles, and 25% exported from the Mumbai market. It shows opportunity for such products in the industry, as well as in a city like Mumbai. It provides an improvement in the Indian economy and the State of Maharashtra. The numbers of designers are available, and export is quite possible in a sufficient amount from Mumbai.

3. The migration of diamond businesses creating a problem for the growth of industry 4.0 – Figure 3



80% of diamond merchants agreed about the migration of the diamond business from Mumbai to Surat can create problems for their profit and thereby the economy. 76% of workers are worried about this migration as it can snatching their settled job. It creates unemployment as well as reducing the economy of Mumbai. 77% of customers agreed that the migration of diamond industry can create problems for the growth of industry 4.0.

4. The problems that will create in Mumbai after the migration of the diamond industry – Table 1

Problems	Workers	Merchants	Customer
Migration is tedious	38	16	25
The job will be lose	42	18	28
Cut-throat Competition	41	12	15
State Revenue lost	25	19	22
High cost of jewelry	48	20	25
Competition	45	20	18
Problem of export	20	02	04
Politics	42	16	22
Total	301	123	159

Kruskal-Wallis test- Table 2

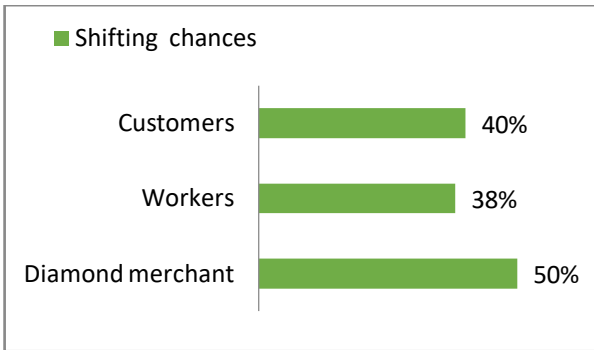
Groups:	Workers	Merchants	Customers
Skewness:	-1.142	-1.89	-1.418
Skewness Shape:	Potentially Symmetrical (pval=0.129)	Asymmetrical , left/negative (pval=0.012)	Potentially Symmetrical (pval=0.059)
Excess kurtosis:	0.0614	3.771	2.19
Tails Shape:	Potentially Mesokurtic , normal like tails (pval=0.967)	Leptokurtic , positive kurtosis, long heavy tails (pval=0.011)	Potentially Mesokurtic , normal like tails (pval=0.139)
Normality	0.0972	0.0232	0.197
Median:	41.5	17	22
Sample Problems (n):	8	8	8
Rank sum (R):	156	53.5	90.5
R^2/n :	3042	357.781	1023.781

- With the help of the Kruskal-Wallis test, and using Chi-Square (df=2) distribution considering right-tailed where $p\text{-value} < \alpha$, H_0 is rejected.
- The p-value equals 0.00115, ($p(x \leq 13.542) = 0.999$). It shows the chance of type I error is small: 0.001147 (0.11%) as the p-value is small means supporting the alternate H_1
- Here the **H** frequency shows 13.542,
- It shows clearly P-value 0.00115 is less than the H value 13.542 ($0.00115 < 13.542$) therefore, Null hypothesis H_0 : There is no significant relationship between the

migration of the diamond industry and the problems of the growth of the diamond industry in Mumbai is rejected, and alternative hypothesis H_1 : There is a significant relationship between the migration of diamond industry and the problems of the growth of the diamond industry in Mumbai is accepted.

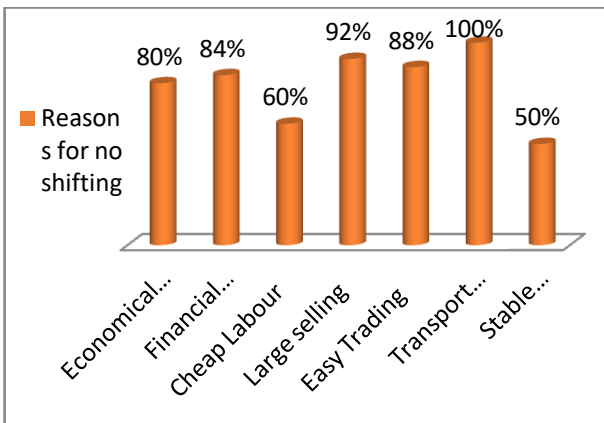
Hence, it shows that the migration of the business can create various problems for customers, workers, and the diamond merchants in Mumbai and hence, the State of Maharashtra.

5. The chances for migration of the diamond industry- Figure 4



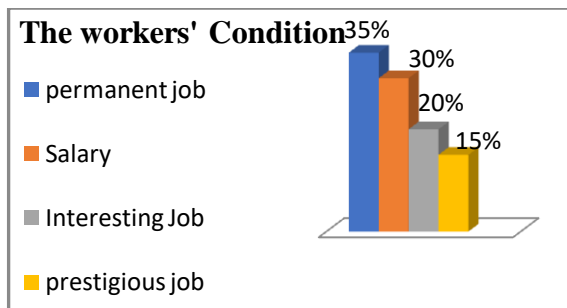
50% of diamond traders agree that such migration is possible, only 38% of workers agree to such migration, and 40% of consumers have heard of such migration from the diamond industry.

6. The reasons for the poor chances of migration of the diamond industry – Figure 5



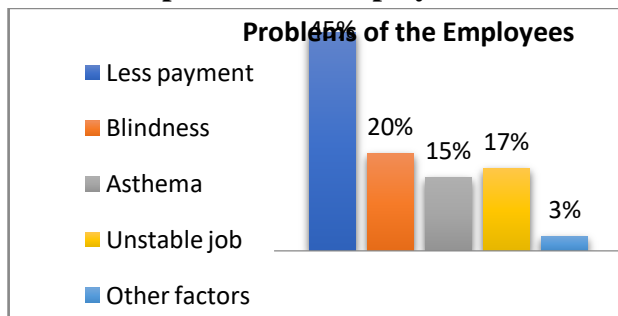
It shows that 80% agreed for poor migration as Mumbai is an Economic hub, 84% of respondents agreed as it provides financial benefits, 60% accepted that they are getting cheap cost labour here only. 92% know in Mumbai large-scale selling has been taking place. 88% thought it provides easy selling. 50% agreed for stable business, which they don't want to disturb, and surprisingly 100% agreed for the availability of transportation means.

7. The Job condition of the workers – Figure 6



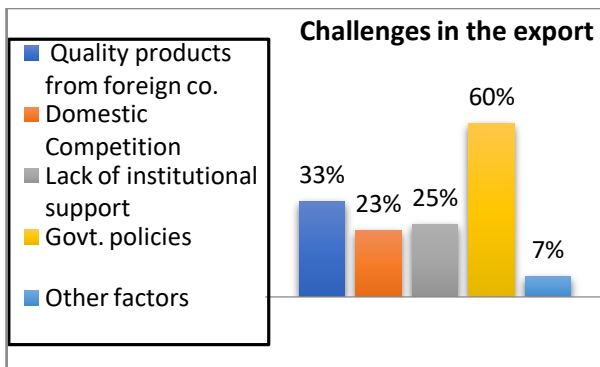
Only 35% of workers have a permanent job 30% are happy with wages and occasional bonuses. 20% of respondents are interested in working in the gems and jewellery business, 15% of respondents felt it was a prestigious job. It shows that very few employees are happy with the permanent form of the job and salary. But after migration, they may lose their jobs.

8. The problems of employees in the diamond industry – Figure 7



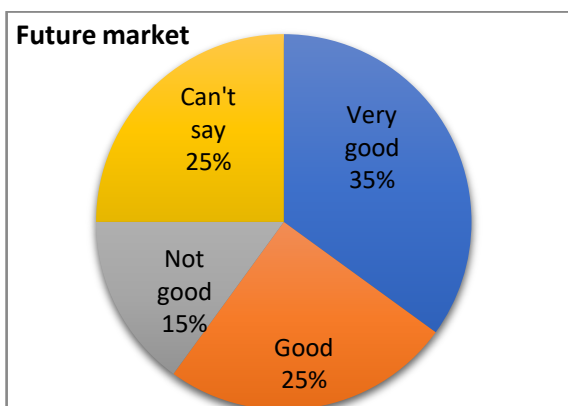
Various problems were shared by respondents such as 45% of respondents agreed to a lower salary, 35% (20 + 15) agreed that they suffer from diseases such as asthma, blindness, 17% agreed that they have an unstable job. The diamond industry is shifting from Mumbai to Surat due to wrong owner policies.

9. The challenges facing by exporters in the diamond industry 4.0 – Figure 8



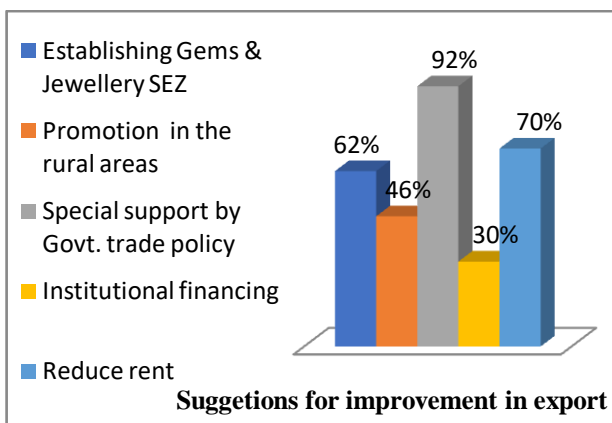
33% of respondents agreed about the qualitative and designer products from foreign companies. The Maharashtra State Government puts various restrictive policies for diamond Exporters, 60% has given acceptance. 23% of respondents are agreed with the domestic competition but did not frighten about competition, and 25% agreed about lack of institutional support and other reasons.

10. The future of the market in Mumbai of the diamond Industry 4.0 – Figure 9



35% and 25% respondents agreed for the best and good market opportunities to the Gems and Jewellery business respectively. They are optimistic. 15% of respondents are pessimistic about the diamond market. Surprisingly, 25% of the respondents did not talk about the market as the policies of the state government are always changing. They have good hopes in the budget from this new government.

11. The suggestive steps are taken by the merchants for improving the diamond industry for 4.0 (Recommendations) – Figure 10



62% of respondents are agreed to SEZ or Export Oriented Unit establish especially for diamond business. 92% agree that they will need the help of the government and their favourable policies. 46% of respondents have given suggestions to promote the rural market broadly to attract the untapped market. 70% of respondents suggested that the state government should be conducive to the diamond business and reduce

Conclusion

According to the views of diamond merchants, workers, and, customers there are fewer chances to shift the diamond industry from Mumbai to Surat. But it is a fact that if the diamond industry will migrate, it is for sure that the growth of this industry will be slower though it was relocated in the diamond city like Surat. Also, it has created many problems for

the customers, workers, and merchants of Mumbai as well the state of Maharashtra. Undoubtedly Surat has its mining system, huge cheap cost place, cheap labour, and support from the Ministry. But no one merchant can deny the large-scale market, Bollywood presence, transportation modes, custom clearance, ease for export, and such facilities are not present in Surat. It is the weaker point

of Surat, and hence it is clear that very few merchants want to leave Mumbai due to the basic reason i.e. cost of the place. Hence, State Government must concentrate on a variety of measures like reducing taxes, rebates in the located place, special diamond hub, etc; for the growth of industry 4.0.

Chairman, Gems, and Jewellery Export Promotion Council, Vipul Shah told, "Nothing

is impossible, but it is a long process of migrating the diamond industry from Mumbai to Surat. One can't ignore the importance of Mumbai as the financial capital of the country. Surat is practically a diamond manufacturing centre, but the non-existence of an international airport could be a big hurdle."(Source: Times of India).

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SUSTAINABLE TIMBER TRADE: AN APPROACH TOWARDS SOCIAL RESPONSIBILITY

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ABSTRACT

In contemporary times, illegal timber trade is one of the potential factors leading to global warming and climate change. The doctrine of sustainable development is blatantly violated in case of illegal timber trade. The requirement of timber for infrastructural needs and industrial growth is stupendous and is increasing day by day. Since, legally controlled and regulated trade is not able to meet the market demand for timber, illegal timber trade is flourishing. There is a well-known route through which illegally felled timber reaches the world market. It is to be noted that the international instruments or the WTO and Foreign Trade Mechanism miserably fails to address the issue, thereby, the gap between timber trade and social responsibility has been an on-going concern. Thus, there is an urgent need to realize the importance of sustainable development as both the factors are equally significant in the modern era, on one hand, trade induces economic growth and meets public satisfaction and on the other hand, ecological balance assures the balance in the natural resources. For an effective approach we first need to analyse the various doctrines, theories and existing legal framework to identify the root cause of the illegal felling of tress and environmental degradation. This paper is therefore a sincere attempt to explore the issues, doctrines, theories, legal framework and critically analyse the same suggesting suitable remedies for curbing this menace so as to ensure sustainable development boosting social responsibility and secure environmental justice.

Keywords: *Timber Trade, Environment, Sustainable Development, Social Responsibility, Ecology, Natural Resources.*

Introduction: Timber Trade and Social Interests

Timber trade has always affected the societal interests. It meets the positive demands of the society through the supply of timber adapting itself to the economic factors like demand, supply, promotions, pricing, profits, growths and others. And on the other hand it is expected that they need to meet the societal cost borne by the society as a whole for the environmental degradation caused due to the demand for timber industry. Trade finds its significant importance in existence and growth of the society. Therefore, trade must be such that it retains its importance and social acceptance with due regard to its respective objectives and social responsibility. In fact, the major area of concern is the tension between the social responsibility which is to be borne by the timber industry and the market forces so that the gap between the demand for timber and its social responsiveness can be minimized otherwise the timber trade would lose its social credibility and sustainability (Sethi, 1979). Thus, there requires a parity in the internal resolution making process of the timber companies and in their external affairs. Social responsibility comes under the ambit of both

law and economics. Wherein economics mainly focus on the market and non-market forces for securing social responsibility, law concentrates on the codification of the policies and norms for better enforcement of social responsibility. However, it is agonizing to observe that even though we have codified laws and regulations, illegal felling of trees, logging and transit of timber continues making the definition of social responsiveness and the long term objectives of timber industry meaningless. Off late, the timber industries have shown radical departure from the standard corporate social responsibility which is accelerating environmental degradation (Kibert et al., 2012).

Felonious Encroachment by the European States

The colonization practice of the European States had initiated the indiscriminate environmental degradation. Their urge for capturing the aboriginal and indigenous land for the extraction of raw materials therein and satisfy the comforts and needs of the western world resulted in the indiscriminate felling of trees victimizing the environment as a whole. It was then various doctrines were developed by them justifying their stand to occupy such

lands for their colonial markets and extraction of raw materials.

1. **Doctrine of Conquest** – The doctrine held acquiring land and exercising the sovereignty by the use of armed forces vanquishing the existing sovereignty or native control (Myneni, 2021).
2. **Doctrine of Discovery**–The doctrine says the discoverer would have sole right to acquire the land so discovered by him and establish settlements therein. The existing dwellers would retain their possession; however, they would not possess any right to ownership which has actually passed to the discoverer of the land by the virtue of its discovery(Myneni, 2021).
3. **Doctrine of Occupation** – The doctrine of discovery was believed to be incomplete as it lacked the concept of terra nullius meaning an uninhabited land. Thus, a land without having the effective occupation right limits the uninterrupted permanent possession which was ultimately lying with the original inhabitants of the land. Thereby, by this doctrine it was construed that if the natives of the land so discovered denies living an civilized life or shows unwillingness to adapt the western civilized culture would fall within the meaning of ‘uninhabited’ and such land would be under the total ownership and possession of the discoverer(Myneni, 2021).
4. **Doctrine of Adverse Possession** – This doctrine states that if any person occupies any owner’s land for a considerable extended time and the actual owner of that land acquiesces to such presences and thereby the intruder’s occupation and exercise of power over that land goes unchallenged and uninterrupted then the intruders acquires sovereignty and the right of ownership over the land by exercising adverse possession over such land(Myneni, 2021).
5. **Doctrine of Cession**–Under this doctrine any party can cease the ownership and possession rights of the native people of an area through any international agreement like treaties and bilateral agreements(Myneni, 2021).
6. **Doctrine of Sovereignty** – This doctrine refers to the situation wherein a State or an

individual exercises unchallenged independent right over the land(Myneni, 2021).

7. **Doctrine of Eminent Domain**–Under this doctrine the State has the inherent power to transfer the title of the property and usurp the lawful ownership from the rightful owner to its own name without the consent of the owner(Myneni, 2021).

There were two fold motives of the usurpation through these doctrines, firstly, excavation of raw materials and secondly, finding markets for their final products. Thus, while exercising these ownership rights, it extended to forest cover too and indiscriminate felling of trees for raw materials were inevitable. Since, they were driven by profit maximization motives, their sentiments for the land and the environment due to indiscriminate felling of trees were negligible and they did not concentrate on sustainable development.

Theories in Context of Timber Trade and Environmental Policies and Management

It is noteworthy to apply the different types of theories for the management of timber trade because the theories aim to eliminate the complexities by focusing on the problems and thereby compare them with the present scenario and eventually concludes with proper explanations.

1. **Theory of Common Pool Resource** – This theory says that men are dependent on a fixed pool or base of resources wherein they have common understanding. Thus, it is pertinent to hold common trust on a particular leader to organize and manage the resource base so that all gets the benefit of the resources without jeopardizing the rights of the others as well as keeping the environmental degradation under control. For timber trade the resource base is the trees. Thus, felling of one tree would require planting of the other so that deforestation is under control. Furthermore, under the leadership of a particular person would eliminate the ego-based competition in timber trade and excess profit driven motives and would enable cooperation among the traders and sharing of process of trade and infrastructure. This would ultimately reduce the burden on the traders

for social responsibility and the cost borne by the society to keep forest cover in its optimum level. This theory helps to maintain the proper balance between trade and forest cover (Saunders, 2014).

2. **Theory of Reformation**—In 1980s, the active participation and voices of the NGOs movement became very popular which addressed the on-going and emerging environmental problems and the drastic failures of the institutions to conserve the environment. The State was mainly criticized for the failure of the environmental protection even though it had set up ministries to address the environmental issues at all level- national, state and local as the State is structurally perceived as the institution to monitor, regulate and compensate the environment. Thus, it is expected that the State must plan effective design both for the growth of timber trade and environmental protection policies and reforms for the best interest of the society and nation. However, the various environmental protection schemes and integrated models failure to achieve its purposes due to ineffective implementation and weak enforcement motives. Thus, the need of the hour was to first focus on the factors that that contributed continued environmental degradation and then address reforms by analysis them at the core itself. It was realized that a greater level of participation is required from the civil society to uproot the fundamental environmental crisis which is only possible if one starts at the local level itself. This can be affected by lobbying and mass campaign against the polluters which could be the last resort. As there was a demand for privatization and open market, structured socialist reforms were yet to be formulated and implemented. Viewing the strong protests, the burden shifted to the civil and the political society to contribute constructive contribution for the environmental reforms for the sustainability of the timber trade rather than lamenting on its failures. Thereby, the reformative attitudes stringing gained its momentum for the effective implementation of the environmental

reforms for proper conservation and sustainability (Ackerman & Stewart, 1985).

3. **Theory of Ecological Modernization**- The reformative theory had sowed the seed of sustainable development. Thereby, after 1980's a handful of empirical studies were conducted to access whether a reduction in the use of natural resources would bring reformation and conservation of environment. It was manifested that parallel growth of the economic development and environmental conservation immediately needed a break. This was also known as decoupling of material flows in economics. As there was a sharp decline of utilization of natural resources regardless of the GDP of the nation. The main objective of ecological modernization was centripetal societal movement concerning ecological interests by developing an institutional design which was ecologically inspired. This induced transformation in the environment by bringing central institutional reforms in the modern society. This theory involves an analytical approach of ecological restructuring wherein it seeks to rationalize ecological autonomy and differentiation viz as viz other rational factors such as timber trade. Thereby separate governmental departments were set up addressing the environmental issues. Consequently, environmental laws encompassing the systems of environmental impact assessment and 'green' ideologies emerged having an independent status and were no longer interpreted within the old ideologies of socialism, politics and liberalism. Soon after the ecological rationality was independent of political and sociological ideologies and intruded into the economic domain in 1990s. Widespread environmental management system developed within the corporate sector so that production and consumption could be rationalized and it becomes discernable in the economic domain. Different schemes and policies like eco taxes, recycling, eco-labels, insurances and others became very popular. Thus, under the ecological modernization transformation and reformation was institutional based with

semi-permanent ecological ideologies (Berger et al., 2001).

4. **Theory of Network And Flow** – This theory in context of environmental protection has a four-fold dimension. Firstly, it seeks to contrast time and space which takes globalization into account. Secondly, it removes the steep distinction between social sciences and material base and ascertained that hybrid socio technical systems fade away institutional development. Thirdly, new emerging arrangements were welcomed pushing aside the conventional market, state policies and civil society. And fourthly, it proposed a serious question whether the new emerging management and governance would drastically change the sociology of flows specially in terms of losing the sovereignty and power of the State. Thus, applying the concept of network and flow theory in the context of environment would mean firstly, analysing flow of capital and goods from the ecological rationality approach and secondly, analysing the flow of environmental concepts such as natural resources, wastes, energy, biodiversity and others in perspective of environmental change. Now, these flows have never been assessed for environmental degradation or reformation. Thus, a systematic scientific approach was extremely necessary rather than addressing the environmental issues from the social sciences point of view. What exactly required was a better focused conceptualized reform specifying environmental networks and flows (Gonzales, 2012).

Major Doctrine/Theory/Principle Concerning Environmental Justice

Every government faces a continuous question whether or not they should continue the same laws and regulations and if there is a need to modify them as the burden and benefits of the natural resources can be inflicted by the government to benefit the economic activities. Herein, the doctrine of distributive justice is applied to realize the utilization of the natural resources by the people. The doctrine of distributive justice guides the government to make practical approach avoiding such

constant choices. It proposes that ideally every human being shall have the equal right to utilize the natural resources and material goods or services. Rawls interpreted the doctrine of distributive justice as equality cannot be strictly conferred to the allocation of natural resources, the last advantageous group must be given an opportunity to derive the maximum from the environment. In other words, Rawls proposed reasonable classification (Freeman, 2021).

Ronald Dworkin designed the theory of model fair distribution wherein he said that people are born with equal resources but they end up having unequal economic benefits out of these natural resources due to their choices. People must plan just and equitable choices for the material distribution and experiment to design a model fair distribution. He said that if people had equal purchasing power and they auction the best highest bid for the resources which would suit them the best, then time would come when they would have depleted the resources for their selfish economic benefit or choices. Thus, Dworkin suggested a compensatory scheme to wither away these inequalities in choices and proposed that it would be justified to distribute the natural resources morally that would contribute to the welfare of the people. Therefore, distribution of resources must not be done as per the materialistic value but on intrinsic value so as to increase the welfare of the society (Dworkin, 2021).

The principle of compensation and rehabilitation is yet another substantial aspect for environmental justice. Compensation is the price paid for the loss incurred or sustained. And rehabilitation is restoration of the status quo ante. Although, it is tough to calculate the loss or injury sustained by the environment and also to restore to its status quo ante, moreover, if identified they are difficult to implement. However, the principle must be strictly adhered as far as practicable as it would amount to denial to human rights, so they must be implicitly recognized and implemented. The word environmental justice cannot be termed as a political coinage as it includes social and economic importance too as its interdependence cannot be denied. And timber has always been vandalized. Thus, the burden

of its depletion needs to be evenly shared and borne by the society as a whole, thereby, it requires a proper planned scheme to protect the environment and secure environmental justice (Nozick, 1974).

International Timber Agreement

To ensure technical regulations as well as standards to timber trade, the WTO Technical Barrier to Trade Agreement (TBT) was especially designed to avoid distortions in trade. TBT Agreement emphasizes on the transparency and the relevancy of the use of international standards in realizing the sustainable forest management within the national boundaries of the States. The saving clause in TBT Agreement under Article 2.2 identifies the right to undertake necessary steps for the fulfilment of the legitimate objectives pertaining to the protection of animal and plant life or environment (Brack, 2013).

In 2001, Doha Development Round (DDR) focused on four major agendas along with the others, competition, government procurement, investigation and trade facilitation. This envisaged liberation of trade particularly in agricultural products among the developing countries (Brack, 2007). However, the failure of DDR were realized in WTO ministerial in 2003 at Cancun, wherein it was realized that there were disagreement among the various negotiating blocs or groups of developing countries in terms of agricultural trading interests. In 2005, another ambitious attempt was taken to give effect to the agendas of DDA. This time the primary stress was laid on the agro-based trade liberalization extensively although the developing countries were primarily interested in the liberalization of non-agricultural products. However, this rift required streamlining to address market access for both agricultural and non-agricultural products especially for the developing countries (Brack, 2013).

Finally in 2006, the new International Tropical Timber Agreement (ITTA) came into existence

replacing the 1994 ITTA. This time it had more dedicated attention for the promotion, expansion and diversification of the tropical timber forests that were sustainably managed and harvested legally for the international trade of the forest products and the sustainable development of the forest cover (Brack, 2007).

Conclusion: Environmental Politics

Environmental conservation does not only mean preserving the endangered ecosystem, it includes the entire ecosystem where life subsists. In fact, development, be it agricultural or industrial depends upon the environment as a whole. Thus, development at the cost of the environment can only be short-term development and if it is permitted longer it would be anti-development which would bring immense pain to the human existence. Therefore, it is extremely necessary to have the sense of social responsibility and responsiveness for the preservation and sustainable management of the forest cover otherwise it would like the foolish man who was trying to chop the same branch of the tree on which he had sited.

The major reasons of the failure of WTO in terms of illegal felling and logging of trees were lack of funds for better implementation of guidelines or laws, lack of reliability and source of data and analyse the same. Moreover, none of the WTO agreements exclusively address the issues and challenges of timber trade wherein free timber trade can never be an agenda itself as it requires cautious attention in terms of political, economic and social responsibility to preserve the environment and promote sustainable forest development and management. However, perceiving the state of forest cover and activities of the States, the world has reached at the brink of the precipice which demands the immediate need to address sustainable timber trade wherein especially the international timber trade cannot be side-lined any further.

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TITLE- A STUDY ON PROBLEMS OF ASPIRANT EMIGRANTS IN GULF COOPERATION COUNCIL COUNTRIES FROM INDIA DURING THE COVID-19 PANDEMIC PERIOD.

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ABSTRACT

India is the country that is received the world highest remittance from the emigrant workforce especially from GCC countries in the last 10 years. The Covid-19 pandemic creates a negative effect on emigration and the world economy. The world economy is in the recovery phase at the covid-19 pandemic period. The vaccines and other corrective action against Covid-19 are minimizing infections and deaths of this disease. The slow and painful recovery of world economy create different challenges in front of policymakers and aspirant emigrants to GCC countries from India. In this research the find out problems of aspirant emigrants in covid-19 pandemic from India and try to provide recommendations for fruitful, safe and effective emigration policy for India.

Keyword: *Emigrants, covid-19 pandemic, remittance, economy, GCC countries.*

Introduction

The emigration act 1983 define emigrant mean the departure out of India as any person to take up any employment in any country or place out of India. Any Indian who travels out of India for employment person with or without agreement and with or without the help of recruiting agent consider the emigrant by this act. The Indian diaspora of emigrants is in a wide range and more than 2 crore Indian emigrate in more than 200 countries in the world. After the booming of the oil sector, Indian emigration is increased in large numbers and resulted in a significant impact on the Indian economy, and socio-culture as well as geopolitics.

In the last ten-decade world had face the pandemic as Spanish flue in 1918-20, SARC in 2002-04, Swine Flu (H₁N₁) in 2009-10, MERS in 2012, Ebola in 2014-16, and Covid-19 and all this pandemic create negative impact on world economy, labour work hours and remittance. The Covid-19 is a viral disease which causes by the novel coronavirus which is first detected in China in December 2019, this virus disease is spread in almost all developed and developing countries. As per World Health Organization (WHO) up to 23 Aug 2021 more than 8 lack death in all over world and more than 23 million was affected and still, it is spreading and affecting to the world economy and livelihood.

India is an under developing country which is one of the major emigrant labour force

suppliers all over the world. The oil sector boom in the 1970 decade and out of some Persian Gulf countries established the Gulf Cooperation Council in the year 1981 which is commonly known as GCC. The six countries name Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates are members of GCC. The Indian emigrant diaspora is achieved employments in large numbers and they remit the remittance to India in large quantities in the last four decades. This remittance has a significant role in the development of India as well as employ the migrant workforce.

The Covid-19 pandemic make a very serious and unpredicted effect on the world economy. This pandemic makes border closed and enforce lockdown for business and workplace. This resulted in a sharp decline in work hours and the world economy facing the problem of recession. The many emigrants' workforce supplying countries evacuate their citizens from emigration location. India also stated the evacuate their emigrant workforce and give the name of this evacuation as "Vande Bharat Mission". This mission is started in the Covid-19 pandemic and run in 12 Phases. As per the Government of India, Ministry of civil aviation press notes up to 16 Sept 2021 by 16972 flight more than 25 lack Indian emigrant come back to India.

The International Labour Organization (ILO), Asian Development Bank Institute (ADBI), World Bank, and other international institutions

published their report and working papers on the effect of the Covid-19 pandemic. The economic slowdown and increased unemployment are major issues in the Covid-19 pandemic.

The vaccine on Covid-19 is allowed (restricted use in an emergency) by WHO for some selected vaccines. The countries wise different vaccine is using all over the world. The Indian Government allowed Covid-19 vaccine as named Covaxin (BBV 152) which is developed by Bharat Biotech with the help of ICMR and NIV, Covishield (AZD 1222) which is developed by Oxford University and Astrazeneca and manufactured by Siram Institute India, and Sputnik V (Gram-covid-vac) develop by Gamaleya national research institute of epidemiology and microbiology and manufacture by Dr. Reddy's Laboratories, Virchow biotech. As per the world bank group flagship report in June 2021 on Global economic prospects say after mass vaccination the risk of the Covid-19 pandemic is decline and the world economy slow and painful recovery from recession. This recovery phase is had a big opportunity for aspirant emigrants to get employments from different sectors especially in GCC countries. This recovery phase has its threat and obstacle for rejoining or find new employment after the covid-19 pandemic.

In this research, the researcher tries to find the problems of aspirant emigrants to GCC countries from India in a covid-19 pandemic. The research is based on primary and secondary data which is trying to find out the solution for fruitful and safe emigration from India in a covid-19 pandemic.

Literature Review

Publications from ILO, World Bank reports, ADBI and OECD reports, and several books, research papers, research articles are referred for this research and some selected pieces of literature are explained in the review.

Nilim Baruah, Jonathan Chal off, Philippe Herve, Hironori Honsho, Shabri Nair, Pitchayo Sirivunnabood (2021)¹ The researchers explain the covid-19 impact on Asian countries and the post-pandemic future of migrant workers and labour migration. This chapter also connects the migration with economic benefit to the Asian countries and challenges to emigration is

explain by researchers. The international labour work hours reduction and impact on unemployment were also highlighted by the researcher.

World Bank Group (2021)² The World bank group highlight some fact and figure of the recovery phase of covid-19 pandemic and their challenges also predicted the future as the high level of inflation and slow recovery in employment in different sectors and regions. This report is explained different out looks and region bases. The inflation of foods stuff and economic slow and painful recovery of different sectors in the world economy is highlighted. The upcoming challenges after the covid-19 pandemic periods are explained to policymakers in this report.

World Bank Group (2020)³ The world bank group have published the report by KNOMAD on the covid-19 crisis through a migration lens especially on migration and the world economy. The lockdown and travel ban created a negative impact on employment and remittance by migrant workers. The economic slowdown predicated up 20% sharp decline in employment and remittances. The sharp decline of remittance and suddenly increased unemployment, evacuation of migrant labour negative impact on the world economy and international labour market.

Sharun Khan, Kuldeep Dhama (2021)⁴ The researcher enlightened the covid-19 vaccine manufactures details and vaccine diplomacy. India's role in Covid-19 vaccine diplomacy is the biggest supplier and diplomate for the vaccine. This research explained the vaccine facts and details for different vaccine manufacturers and their types, efficiencies and other technical details of covid-19 vaccines.

Muhammed Refeque, P. Azad, P. K. Sujathan (2021)⁵ The researcher explained the impact of a covid-19 pandemic on the labour market, emigration and livelihood of labour with evidence of Kerala state of India. The researcher is collecting the data from different sectors of three districts of Kerala state and did a vertical analysis of the impact on the economy. The economics-based study connecting the Covid-19 pandemic with global economy shrink and their impact on rural areas of Kerala state. The research is the enlightened

impact of remittance with a covid-19 pandemic, slowdown the world economy.

Research Methodology

Objective-

- 1) To understand the problems of aspirant emigrants in GCC countries from India.
- 2) To explore the impact of the Covid-19 pandemic on aspirant emigrants in GCC countries from India.
- 3) To present a recommendation to minimize the impact of the Covid-19 pandemic on aspirant emigrants in GCC countries from India.

Hypothesis

H^0 – There is no significant relationship between problems of aspirant emigrants with the Covid-19 pandemic.

H^1 – There is a significant relationship between problems of aspirant emigrants with the Covid-19 pandemic.

Data Collection

The primary data is collected through questionnaires and interviews methods from aspirant emigrants online and offline both ways. The secondary for this research used from world bank reports, international labour organization reports, research articles, research papers and books regarding the subject.

Sample Size

The data collection tools are used a closed-ended questionnaire and collected data from aspirant emigrants in GCC countries from the Ratnagiri district of Maharashtra state. The simple random sampling method is used in this research. The obtained sample size is 105 inclusive of both online and offline replies from aspirant emigrants.

Statistical Tools

The statistical tools are SPSS software is used for this research. The collected data has been analyzed by using Friedman Test mean ranking used the impact of problems, for hypothesis test use Chi-square Test for this research.

Limitations

- 1) The study is indicative and express the viewpoints and experiences of aspirant emigrants in GCC countries only.
- 2) The other affecting factors on emigration to GCC countries from India and their impact on aspirant emigrants are not covered in this research.

Finding

The review of literature and primary data collected for the research is enlightening some facts and finding as remittance from emigrant workforce is continuously increased and it has a significant role in Indian GDP as well as in Indian economy. The Covid-19 Pandemic is started in March 2019 and its impact on the world labour market and GCC countries labour market also. The Indian Government evacuate the emigrant in starting phase of the covid-19 pandemics for protecting the interest of emigrants under mission Vande Bharat. The ILO enlighten loss of work hours playing negative impact on remittance and which is one big source of income for under developing countries. The ILO also suggest for policymakers need to develop a policy to grab the opportunities in the recovery phase of the covid-19 pandemic because the recovery is much slow and painful after the pandemic and the slow economy will have a long impact on the world labour market.

Table no-1 India's remittance in GDP with worker's out flow

India's remittance in GDP with workers outflow			
Year	Remittance inflow in the US \$ Million	% Of GDP	Workers outflow in thousand
2010	53480	3.2	641
2011	62499	3.4	627
2012	68821	3.8	747
2013	69970	3.8	817
2014	70389	3.5	805
2015	68910	3.3	781
2016	62744	2.8	521
2017	68967	2.7	391
2018	78609	2.9	340
2019	83332	2.8	368
2020	83149 (E)	3.1	NP

Note- (E) = Estimated, NP= Not Predicted by ILO.

Table self-compiled

Data Source: 1)World Bank data on <https://www.knomad.org/>, See Migration and Development Brief 28, Appendix A for details.

2)ILO, ADBI and OECD joint publication “Labour Migration in Asia, the impact of the covid-19 crisis and post-pandemic future

Table no 1 shown in this decade India receive alarge number ofremittances from all over the

world and it hasa significant contribution to GDP as well as play important role in the Indian economy. The economic importance of remittanceof Indian economy and tried connected with Indian migrant worker’s outflow.

Chart No-1 Respondents reply in % on Problems of aspirant emigrants in GCC countries from India in covid-19 pandemic

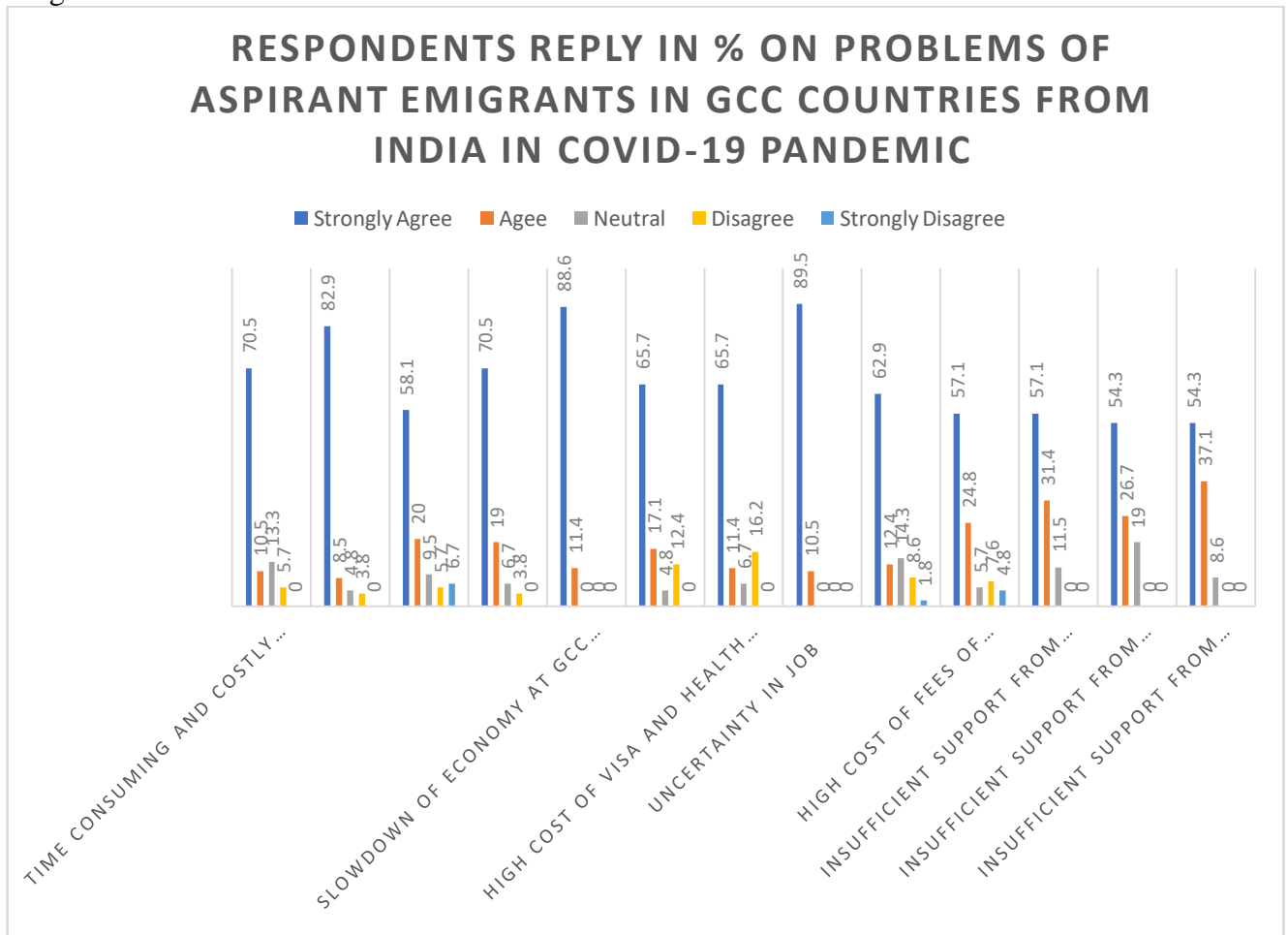


Chart no 2 shows the respondent reply in percentage on problems of aspirant emigrants to GCC countries from India in the Covid-19 pandemic. It is shown as the major effect of uncertainty in jobs and lack of knowledge about job opportunities at GCC countries at a covid-19 pandemic. The other’ problems as like insufficient support from the Government of India’s authorities like PBSK, OWRC, MRC and risk of disease, high cost of medical check-up, visa and recruiting agents also have a significant impact on aspirant emigrants from

the respondents. The slowdown in the economy of GCC countries, improper vaccine diplomacy and travel policy also impact emigration to GCC countries.

Statistical data analysis explains in Table no 2 and 3 as follow inthe Chi-square test and Friedman mean rankingtest for justification of hypothesis.

Table no -2 Friedman test for mean ranking on problems of aspirant emigrants to GCC countries from India in Covid-19 Pandemic.

Friedman Test Mean Ranking					
Sr. No	Problems of Aspirant Emigrants to GCC countries from India in Covid-19 Pandemic	N	Mean	Stand Deviation	Mean Rank
1	Time-consuming and costly documentation procedure at emigration	105	4.4571	0.93056	6.999
2	Lack of knowledge about job opportunities in GCC Countries	105	4.7048	0.7328	8.03
3	Lack of information about travel policy in GCC Countries	105	4.1714	1.22048	5.96
4	Improper Covid-19 Vaccine Diplomacy	105	4.5619	0.78353	7.4
5	Slowdown of economy at GCC countries	105	4.8857	0.31968	8.82
6	Risk of Covid-19 disease at travel and employment locations	105	4.3619	1.0389	6.67
7	High cost of visa and health insurance in GCC countries	105	4.2667	1.14578	6.38
8	Uncertainty in job	105	4.8952	0.30772	8.85
9	High cost of medical check-up before travel	105	4.2571	1.10965	6.22
10	High cost of fees of recruitment agents	105	4.219	1.15176	6.1
11	Insufficient support from PravasiBharatiyaSahayata Kendra (PBSK)	105	4.4571	0.69377	6.66
12	Insufficient support from Overseas Workers Resource Centre (OWRC)	105	4.3524	0.78423	6.14
13	Insufficient support from Migrant Resource Centre (MRC)	105	4.4571	0.65087	6.78

Table no -3 Chi-square test for hypothesis testing on problems of aspirant emigrants to

GCC countries from India in Covid-19 Pandemic.

Friedman Test Statistics

N	105
Chi-Square	227.732
df (Degree of Freedom)	12
Assumption Significant	0.000

The Chi-Square Test value is 227.732 and P-Value is $0.000 < 0.05$ which is significant at a 5% level and statistically prove that the null hypothesis is rejected which is "There is no significant relationship between problems of aspirant emigrants with Covid-19 pandemic." And the alternate hypothesis is accepted which is "There is a significant relationship between problems of aspirant emigrants with Covid-19 pandemic."

The Friedman mean ranking test Table no ... show that means are different which support the rejection of the null hypothesis. Hence to find out where the differences in the problems of aspirant migrants in the Covid-19 pandemic. The Friedman test has shown the highest mean as sequence as first is uncertainty in the job, second is the slowdown of the economy at

GCC countries third is lack of knowledge about job opportunities in GCC Countries. Other problems also have a significant impact on emigration to GCC countries from India.

Conclusion

The research on primary and secondary data concluded as the Indian aspirant emigrants to GCC countries are facing problems in travel, training, health care and insufficient support from Government India authorities who contribute for fruitful and hassle-free emigration from India. The Government of India needs to develop a policy to grab opportunities for aspirant emigrants in the recovery phase of the covid-19 pandemic. The confrontation of economic slowdown in GCC countries and other economic and geopolitical

challenges need to develop the new policy for fruitful emigration from India.

Recommendations

The recommendations as per the finding and conclusion are as follows.

1) The Government of India need to focus on aspirant emigrants and develop a new policy for fruitful and easy emigration from India.

2) The price control actions and financial assistance needs to provide for minimizing the cost of health insurance, medical check-up before of emigration for aspirant emigrants. 3) The special travel policy and training for aspirant emigrants to grab opportunities in GCC countries in the recovery phase of the Covid-19 pandemic need to develop. 4) Vaccine diplomacy of Covid-19 needs to connect with the emigration policy of India.

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A STUDY ON IDENTIFYING THE PRIORITIES OF THE COMMUTERS FOR TRAVELLING BY BEST BUSES IN MUMBAI CITY DURING COVID-19 PANDEMIC

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ABSTRACT

COVID-19 pandemic is leaving its imprint everywhere. There are radical changes in the lives and the mindset of everyone. People started travelling by public transport as the services resumed. The motive of the study is to analyse the factors considered as a priority by the commuters for travelling by BEST (public) buses in Mumbai city during the pandemic. The data was collected from 100 respondents and analysed using the SPSS. The Exploratory Factor Analysis technique identified three factors 'mandatory essentials', 'hygiene and protection' and 'strict compliance' as the priority of the commuters. The study suggests that the service provider needs to adopt the latest technology, provide amenities that help reduce the spread of the virus in the buses and compulsorily follow all the COVID protocols to reinstate the trust of the commuters in the services.

Keywords: BEST buses, Commuters, COVID-19, Public Transport, Priorities

Introduction

COVID-19 was declared a pandemic and is still disrupting various aspects of life. Though things have eased now, the situation remains unpredictable. India had witnessed a spike in cases in 2020 and is still making efforts to fight this pandemic. Mumbai was one of the badly affected cities of India and was under a complete lockdown. The past outbreak of infectious diseases has proven that restricting mobility limits the spread of the infection, which turned out to be the main reason for the government to impose a strict lockdown and suspend all the activities except essentials. All the sectors were severely affected. Even public transport, one of the essential services, was operational only for frontline employees and emergency services.

With the relaxation in the lockdown in Mumbai and the partial opening of the workplaces, people started moving again. The local trains continued to operate for essential workers, and Brihanmumbai Electricity Supply and Transport Undertaking (BEST) buses were allowed to carry only fifty percent capacity with no standing commuters. There was a change in the behaviour of the people. On the one hand, there was a rush for the BEST buses, and on the other hand, there was an increase in private vehicles. The behaviour seemed justified in the pandemic as those who had no option other than public transport had to rely

on the buses, and those able to afford their vehicles preferred traveling by themselves. Mumbai thrives on its public transport. Various studies have justified that public transport is less risky than private gatherings. The risk in public transport is low with all the advisories implemented (Tang, 2020)¹. So, as the local trains resumed for fully vaccinated in Mumbai, people are back to their favourite travel lifeline, which has eased the pressure on the buses as well. The only difference is that travel continues but with caution.

BEST buses have been serving Mumbai since 1873 and have bailed out the city on several occasions. The lockdown has further intensified its relevance. The virus may dissuade a few to stop using public modes, but a large chunk of the population in Mumbai cannot do without the trains and the buses. A need is felt to study how people are at ease while travelling by buses, even amidst the pandemic. With this background, the researcher intends to identify the factors which

¹Public Transport is COVID Safe (2020, October). Official Policy Brief of UITP <https://cms.uitp.org/wp/wp-content/uploads/2020/10/Policy-Brief-PTisCOVID-Safe.pdf>

have become a priority by the BEST bus commuters while travelling during COVID-19.

Literature Review

Muhammad Abdullah et al(2020) conducted an online survey of 1203 respondents across various countries to analyse the changes in travel behaviour during COVID-19. The findings of the study reported that people were travelling for shopping of essentials, average travelling distance reduced, essential service workers continued with their routine and usage of public transport declined. It was also observed that public transport users started prioritising face masks, hygiene, social distancing, and personal safety while travelling.

Muhammad Abdullah et al (2021) study results stated the respondent's preference towards social distancing, willingness to pay for less crowded vehicles, availability of sanitisers, online payment method, proper ventilation, and hygienic conditions for travelling during Coronavirus.

The Centre for Disease Control and Prevention (2020) recommends public transit users to wear a face mask, use sanitizer, follow respiratory etiquette, avoid street food, maintain the recommended distance and avoid touching surfaces. It also insists on washing hands for twenty seconds immediately once back home.

Traveller Sentiment Survey (2020) respondents stated they felt reassured with face masks, social distancing, regular disinfecting and limited occupancy in the vehicle. However, priorities differ in different countries as each country has a different level of risk.

Research Gap

The people of Mumbai underwent various hardships for travelling during the lockdown. Those dependent on public transport started travelling by it once the services resumed irrespective of the situation. The government and service providers of public modes are leaving no stone unturned to make the commute safe, but responsibility also lies on the people travelling by it. Thus, there is a scope to study the critical factors which are playing a crucial role for the commuters to

travel by BEST buses in Mumbai during the present times.

Significance of the Study

Safety and security in public transport were referred to as an accident-free and smooth journey. Those travelling by public transport are ensuring that they are protected and even keep others protected. This study will make an attempt to identify the factors that are given priority by the commuters of BEST buses during the COVID -19 pandemic. The results may provide input to the service providers, which they can implement to keep serving their customers more safely even during the pandemic.

Scope of the Study

The study covers responses of only the BEST bus commuters in Mumbai city and focused on identifying the factors considered a priority for travelling during the pandemic.

Objective of the Study

To identify the factors considered as a priority by commuters while travelling by BEST buses during COVID -19 pandemic.

Research Methodology

Research methodology is the groundwork on which research is based.

Research Design: Research design is the outline for conducting the research. The research has adopted the descriptive research design.

Data Collection Method: The study is based on both primary and secondary data. The primary data was collected through google form and sent through email and WhatsApp groups. The people were requested to fill the form only if they were travelling by BEST buses. The secondary data has been collected from available online resources.

Questionnaire Design –The first section inquired personal details of the respondents. The second section consisted of 17 questions to identify the priorities of the commuters for travelling during pandemic based on the literature and focus group discussions with commuters travelling by BEST buses. The 17 statements were reduced to 14 during the analysis because 3 statements (monitoring of queues at the bus stops, more frequency of

buses for less crowding, less waiting time at the bus stops) had to be dropped as the factor loadings of those statements were less than 0.40. Commuters' priorities were measured by asking them to rate their priority level on a 7-point Likert scale ranging from "not a priority" to "essential priority".

Sampling Method: The method selected was convenience sampling, and anyone travelling by BEST buses and willing to participate in the research was chosen as the respondents for the study.

Sample Size: 100 commuters using BEST buses for travel purposes.

Statistical Tools and Techniques: The statistical tool used for the study is SPSS, and the statistical technique used is Exploratory Factor Analysis (EFA).

Limitations of the Study

The data was collected through an online form; hence people with access to electronic devices could only be considered. The questionnaire was in English, so those unable to understand the language had to be excluded. The results cannot be generalised as the research is conducted on the responses of a small sample size.

Data Analysis

Table No – 1 Age Group

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 19-30	43	43.0	43.0	43.0
31-60	52	52.0	52.0	95.0
Above 60	3	3.0	3.0	98.0
Below 18	2	2.0	2.0	100.0
Total	100	100.0	100.0	

Source: Collected from survey

Table 1 indicates most of the respondents followed by 43 respondents in the age group of belonged to the age group of 31-60 years, 19-30 years.

Table No – 2 Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Female	55	55.0	55.0	55.0
Male	45	45.0	45.0	100.0
Total	100	100.0	100.0	

Source: Collected from survey

Table 2 indicates that out of the total respondents, 55 were females and 45 were males.

Table No – 3 Educational Qualification

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Doctor	1	1.0	1.0	1.0
Graduation	39	39.0	39.0	40.0
Post Graduation	42	42.0	42.0	82.0
Professional upto HSC	14	14.0	14.0	96.0
upto SSC	3	3.0	3.0	99.0
1	1	1.0	1.0	100.0
Total	100	100.0	100.0	

Source: Collected from survey

Table 3 indicates that the majority of the respondents were post graduates and graduates.

Table No – 4 Monthly Income

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Above Rs. 50,000	15	15.0	15.0
	less than Rs. 10,000	7	7.0	22.0
	Not Earning	19	19.0	41.0
	Rs. 10,001 to Rs. 30,000	43	43.0	84.0
	Rs. 30,001 to 50,000	16	16.0	100.0
	Total	100	100.0	100.0

Source: Collected from survey

Table 4 indicates that maximum respondents were earning between Rs. 10,001 to Rs. 30,000 and 19 respondents were not earning.

Table No – 5 Trip Purpose

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Education	14	14.0	14.0
	Others	25	25.0	39.0
	Shopping	8	8.0	47.0
	Work/Office	53	53.0	100.0
	Total	100	100.0	100.0

Source: Collected from survey

Table 5 indicates that the purpose of the trip of the majority of the respondents was for work purposes.

Table No – 6Reliability Statistics

Cronbach's Alpha	No of Items
.860	14

As per table6, it is seen that Cronbach’s Alpha is .860, which is more than the cut off criteria of 0.70 (Nunnally, 1978 and Pallant, 2005) and the instrument is suitable for analysis.

Table No – 7 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.913
Bartlett's Test of Sphericity	Approx. Chi-Square	1356.039
	Df	91
	Sig.	.000

As per table 7, it is concluded that the data is sufficient for further analysis as the value of KMO = .913, indicating that the present data has an adequate sample. Also, the value of Bartlett’s test = .000 indicating that the

correlation matrix is distinct from the identity matrix and an adequate correlation exists between the variable.

Table No – 8 Communalities

Communalities		
	Initial	Extraction
Compulsorily wearing face mask inside the buses	1.000	.781
Maintaining Social distancing (not allowing standing commuters and one person per seat)	1.000	.801
Contactless payment	1.000	.760
Strict rules for commuters (fines and penalties for not following COVID protocols)	1.000	.715
Proper ventilation	1.000	.841
Open windows and non- air conditioned buses	1.000	.707
Provision of GPS for tracking of buses to avoid rush	1.000	.877
Provision of booking of the ticket through the mobile application	1.000	.859
Availability of sanitiser bottles in the buses	1.000	.851
Temperature checking of the commuters before entering the buses	1.000	.783
Allowing only vaccinated commuters	1.000	.890
Plastic shield around the drivers area	1.000	.751
Staff with gloves, face mask and shield	1.000	.772
Regular disinfecting of the buses	1.000	.723
Extraction Method: Principal Component Analysis.		

Table No – 9 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.698	62.128	62.128	8.698	62.128	62.128	7.014	50.099	50.099
2	1.212	8.655	70.782	1.212	8.655	70.782	2.620	18.715	68.814
3	1.200	8.570	79.353	1.200	8.570	79.353	1.475	10.538	79.353
4	.548	3.912	83.264						
5	.478	3.411	86.675						
6	.376	2.682	89.358						
7	.334	2.386	91.743						
8	.287	2.049	93.792						
9	.262	1.871	95.664						
10	.198	1.411	97.075						
11	.135	.963	98.038						
12	.120	.858	98.895						
13	.087	.623	99.519						
14	.067	.481	100.000						

Extraction Method: Principal Component Analysis.

As per table 8 all the values of communalities are between .707 till .890, which is above the cut of criteria of .50

Communalities are the sum of squares of factor loading horizontally.

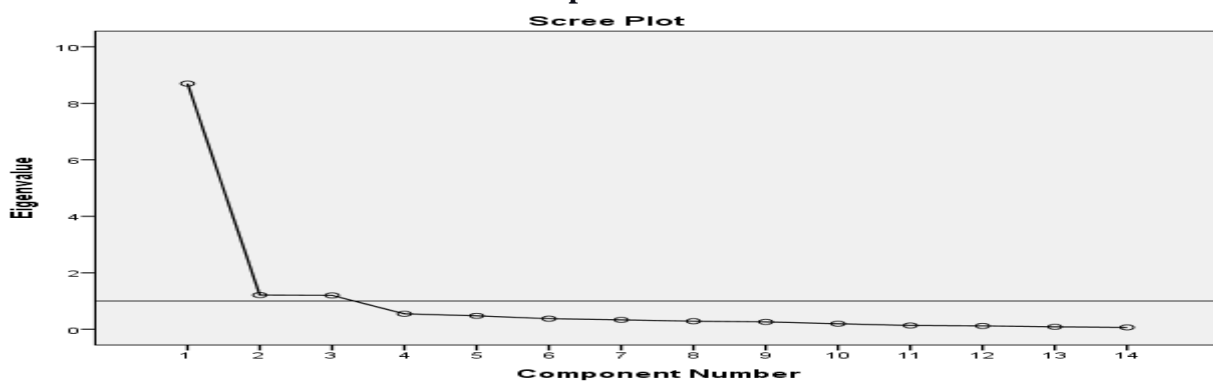
As per table 9, Column **Eigenvalue** indicates the sum of the square of factor loading vertically, and all the factors having an eigenvalue value of more than 1 are retained. It is seen that the first three factors have eigenvalue as 8.698, 1.212 and 1.200, and therefore all the three factors are retained.

Column **Total** indicates the eigenvalues. The first factor accounts for the maximum variation, and the following factors contain the remaining variation. So, it can be said that all the successive factors will extract lesser variance than the first factor.

Column **Percentage of Variance** indicates percentage of variation explained by each factor. It is Eigenvalue / total items x 100.

Column **Cumulative Percentage** indicates the sum of variations explained by all the factors. The result shows that the total three factors extracted **79.353% of the total variance**.

Graph No – 10



The above graph 10 is a graphical method of determining of the number of factors that can be retained. As per Catell’s (1966), the eigenvalues are plotted on the Y-axis and the number of components extracted are plotted on

the X-axis. It is seen that 3 factors have an eigenvalue above 1, and from the 4th factor onwards, the shape of the curve is uniform, so it is concluded from the Scree test that total 3 factors can be retained.

Table No – 11
Rotated Component Matrix^a

	Components		
	Mandatory Essentials	Hygiene and Protection	Strict Compliance
Compulsorily wearing face mask inside the buses		.837	
Maintaining Social distancing (not allowing standing commuters and one person per seat)		.864	
Contactless payment	.794		
Strict rules for commuters (fines and penalties for not following COVID protocols)			.607
Proper ventilation	.838		
Open windows and non- air conditioned buses	.783		
Provision of GPS for tracking of buses to avoid rush	.916		
Provision of booking of the ticket through the mobile application	.910		
Availability of sanitiser bottles in the buses	.879		
Temperature checking of the commuters before entering the buses	.815		
Allowing only vaccinated commuters			.943
Plastic shield around the drivers area	.814		
Staff with gloves, face mask and shield	.807		
Regular disinfecting of the buses		.633	

As per table 11 Rotated Component Matrix, it can be seen that there are 9 items in factor 1, 3 items in factor 2, and 2 items in factor 3.

The rotated component matrix table gives the correlation between the variables and the dimensions. The values of the component matrix are known as factor loadings. These are the correlation values, and hence possible values range from -1 to +1. It is seen that a total of 14 items has been clubbed into 3 independent factors. The 3 factors are named **Mandatory Essentials, Hygiene and Protection and Strict Compliance**.

Findings

The study identified 3 factors that have become the priority of the commuters while travelling by BEST buses in Mumbai during the pandemic.

The first factor, '**Mandatory Essentials**,' is the principal factor with the maximum variance and comprises nine items. The commuters want these factors to be mandatorily available in the buses as the provision of them makes the travel safe and less stressful.

The second factor, '**Hygiene and Protection**,' consist of three items. The commuters stated that adhering to such hygiene measures helps protect them and reduce the spread of the infection.

The third factor, '**Strict Compliance**' composed of two items, which results from the commuters wanting stringent punishment for those not following the COVID norms and the service provider allowing only vaccinated commuters to board the bus as it reassures them for travelling by public buses.

Conclusion and Suggestions

The study fulfils the objective of identifying the essential factors that have become the priority of the commuters for travelling by BEST buses during the pandemic. Public buses are meant to carry a large number of people but now the situation has changed. However, the service provider should upgrade to contactless payment and booking of tickets through the mobile application. Efforts towards ensuring the safety of the staff by providing them with face shields and masks also need consideration. The strict implementation of the necessary COVID protocols will help contain the spread

of the virus. Public transport is indispensable for Mumbaikar's, and people cannot stop using it as it provides access to employment. The pandemic has further explained the essential role of public transport. It's been correctly said that public transport is safe with all the measures taken. (Ardila 2020)². The global fight against COVID - 19 is still on, and to overcome this, the situation demands that we remain vigilant and act responsibly for everyone's safety.

²Public Transport is COVID Safe (2020, October). Official Policy Brief of UITP <https://cms.uitp.org/wp/wp-content/uploads/2020/10/Policy-Brief-PTisCOVID-Safe.pdf>

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EFFECTS OF STRESSORS ON PERFORMANCE OF FEMALE EMPLOYEES WORKING IN PRIVATE AND GOVERNMENT SECTOR ORGANIZATION IN NASHIK CITY

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ABSTRACT

Today's world is of cut throat competition, for working and surviving in such competition it becomes obvious that people will experience stress. Stress becomes a part of life, especially for working women because they are carrying dual responsibilities; first responsibility is towards home and second is towards working place. This research is devoted towards studying various factors of stress working as stressors and second part of research is about effects of stress on performance, health and relations. Female employees working in private sector organization and government sector organization from Nashik city are the respondents. Additional to this, comparison of stressors, most effective factor of stress analyzed in this research and then comparison of effects of stress on both categories of respondents is mentioned. This study found that how stress is unconstructively working and effecting on female employees and for facing this stress and for minimizing effects of stress basic principles of management i.e. Planning, organizing, directing and controlling can be used. As principles of management comprehensively deal with areas of decision making, problem solving, communication, leadership and human behavior, it will be definitely helpful for managing variety of tasks without heaviness of stress.

Keywords: stress, stressor, organizing, controlling, leadership, communication

Introduction

According to Indian mythology, Manu explained position of Woman as she doesn't deserve independence, during childhood she need to listen her father, in the period of youth she should listen her husband and at old age she need to follow instructions of son. In the ancient period (also) father was the head of the family and so lots of importance was given to the birth of boy. During Dharmashastra and Puranas era the status of women declined gradually, education was not the right of women, husband got status of God. Conversely now condition of women is improving which is result of fight and lots of struggle. But still today's status of Indian women is not so admirable as literacy rate of women was 64.63%, mortality rate of all ages women was 6.2, workforce participation rate of women was 25.51% at all India level as per 2011 census [1].

Country gets formed, developed and grow with the combine affords of men and women. Contribution of women in social, economic, cultural, political area is irrefutable. With the help of education, empowerment programs, women are proving themselves dynamic, effervescent and earnest in number of sectors like management, education, health, tourism, entertainment.

Every day, working women need to balance

workplace related task and household related task. Every day is like a new challenge for them as they are carrying these two responsibilities simultaneously. They are continuously struggling for meeting demands of two parties that is home and workplace. By keeping all above mentioned things in mind this research is focusing on number of facets of work-related problems, house related problems and how are these problems creating stress and effecting on health, performance of working women. For stress management generally people suggest Yoga and meditation, no doubt these methods are proven for managing stress but this research is suggesting use of principles of management for stress management.

Respondents of this research belongs to Nashik city (Maharashtra). Nashik city considered for this research because it is one of the fastest growing city of India and it is selected for development as a smart city in India. Nashik is third industrial hub of Maharashtra state. Nashik has many government companies as well as undertakings, such as; Hindustan Aeronautics Ltd. (Defense Ministry) at Ozar-Mig., Security press of India, Nashik Street, Press of currency Note, Nashik Street., Thermal P. Plant at Eklahare, Artillery centre at Nashik Street camp., Artillery school, Deolali. On other hand Large-scale industries are present in Nashik district like, Atlas Copco,

Robert Bosch GmbH, CEAT Limited, Crompton Greaves, Graphite India, Schneider Electric, ThyssenKrupp, Epcos, Everest Industries, Gabriel India, Glaxo Smith Kline, Hindustan Coca-cola.

Literature review

Researcher focused specifically on women working in finance sector and education sector. Reasons for stress get divided in to some categories like general reasons of stress, stress because of colleagues, stress because of uncertainty and relocation. Results of in-depth study is most of the working women are getting affected because of uncertain future and because they are worried about future of their children. (Tiwari 2015) In the given research psychological aspects of working women and stress are defined very appropriately. It has been observed that working mothers are more stresses and if these mothers are in the possession of renouncing the job then they will definitely do it. Working women are more stressed as compare to working men because working women are doing two jobs that is paid job and unpaid job (Tripathi 2012). Another research through light on reasons and effects of stress on working women. Workload, low salary, job insecurity is some causes of stress and on other hand Depression, sleeping disorder, back pain, frustration, and low confidence are the major effects of stress on working women. Watching TV, yoga, meditation, shopping etc are the methods used by respondents for managing stress (Das 2016). First role of women is of homemaker and second role is at office as an employee. Working women is actually full-time employee at two places and at the same time. In 90s work stress was the major problem of working women in the United States of America. In recent studies it is concluded that working women face higher level of stress than working men. (Swathi 2016). The major finding of another research is about talent leakage, female candidates are getting opportunities for entering in organizations but because of marriage, family issues, relocation and children they cannot reach to the top level of the organization. Another part of research explains importance of innovation in business. More female employees are encouraged by

IBM for earning patents. (Ramanathan 2014). Another research talks about Progressive Muscular Relaxation Technique (PMR) and Mindfulness Breathing, researcher consider fifty working women and fifty house wives as respondent and he found that working women face more stress than house wives. Researcher concluded that there is a significant decline in the stress level of Experimental group of employed women (Kernane 2016).

Objectives

- 1.To find out the most effective factor of stressor on female employees working in private sector organization and government sector organization.
- 2.To search the most effecting area caused due to stress on female employees working in private sector organization and government sector organization.

Hypothesis

- H1. There is significant correlation between all the factor of stressor for female employees working in private sector organization and government sector organization.
- H2. There is significant correlation between the most effecting area caused due to stress on female employees working in private sector organization and government sector organization.

Research methodology

Exploratory research design is selected by researcher for this study. For data collection researcher developed structured questionnaire and get filled from 100 respondents of Nashik city. Out of 100 respondents 50 are from government organization and 50 are from private organization. Random sampling method is used for selecting samples. The Pearson product-moment correlation coefficient (or Pearson correlation coefficient, for short) test is used to analyze the data. Aim of this study to compare factors of stressors effecting on women employees from government organizations and private organizations.

Data analysis

Table No. 1 Factors Of Stressors (Result of PMCC Test)
 Respondents Faces Experience Stress Because Of Following Mentioned Factors

Sr. No	Supervision problems	Government Sector Female Employees					Private Sector Female Employees					Pearson Product moment correlation coefficient (PMCC)
		1	2	3	4	5	1	3	3	4	5	
1	Discrimination at work	25	14	2	6	3	31	11	5	3	0	r = 0.95
2	Non acceptance of talent	21	19	4	3	3	16	20	1	12	1	r=0.81
3	Ego of male senior/colleague	36	10	3	1	0	27	18	1	2	2	r =0.92
4	Lack of recognition	20	24	2	3	1	18	3	22	7	0	r=-0.007

Sr. No	Career problems	Government Sector Female Employees					Private Sector Female Employees					
		1	2	3	4	5	1	3	3	4	5	
1	Lack of career growth	27	19	3	1	0	19	23	5	3	0	r= 0.9278
2	Unrealistic performance standards	10	6	2	27	5	25	19	4	2	0	r= -0.1981
3	Inequality in opportunities	1	3	4	21	21	22	18	5	5	0	r= -0.7823

Sr. No	Job related general problems	Government Sector Female Employees					Private Sector Female Employees					
		1	2	3	4	5	1	3	3	4	5	
1	Work culture	23	16	8	3	0	12	8	14	9	7	r= 0.3897
2	Safety at work place	2	9	2	25	12	5	4	1	24	16	r=0.9291
3	Job insecurity	1	2	2	34	11	14	29	2	2	3	r= -0.4894
4	Lack of job satisfaction	2	1	1	36	10	24	19	1	4	2	r= -0.4169
5	Competition	8	7	4	19	12	28	21	1	0	0	r= -0.4007

Sr. No	Child related problems	Government Sector Female Employees					Private Sector Female Employees					
		1	2	3	4	5	1	3	3	4	5	
1	Parent teacher meet	6	4	2	29	9	18	21	4	5	2	r= 0.3558
2	Home work/ studies	23	6	8	7	6	23	16	8	3	0	r=0.7587
3	Ill health	36	14	0	0	0	19	23	8	0	0	r=0.7539
4	Lack of child care facility at home	30	4	12	4	0	26	18	0	4	2	r=0.8819
5	School time and office time adjustment	31	13	6	0	0	32	13	4	1	0	r= 0.9961

Sr. No	Husband Related Problems	Government Sector Female Employees					Private Sector Female Employees					
		1	2	3	4	5	1	3	3	4	5	
1	Lack of time for husband	10	11	21	4	4	17	22	2	4	5	r= -0.0402
2	Lack of mental support from husband	5	7	2	23	13	20	15	4	4	7	r= -0.4361
3	Lack of recognition about hard work (responsibility of office work, responsibility of household work)	24	13	8	5	0	22	14	7	5	2	r= 0.9913
4	Not allowing continuing present job	1	2	1	32	14	21	13	11	3	2	r= -0.7555
5	Not accepting extended schedule of work	0	3	6	26	15	19	14	5	8	4	r= -0.5952
6	Not accepting working on Sundays/ holidays	1	1	0	36	12	36	10	1	2	1	r= -0.4013

Sr. No	Home responsibility	Government Sector Female Employees					Private Sector Female Employees					
		1	2	3	4	5	1	3	3	4	5	
1	Family functions	7	4	0	26	13	19	17	9	2	3	r=-0.6567
2	Old age person care	24	12	9	5	0	26	11	7	6	0	r=0.9889
3	Household work	34	9	7	0	0	24	19	7	0	0	r=0.8672
4	Shopping of household things	22	19	2	7	0	27	21	2	0	0	r=0.9595
5	Servants are not allowed/ accepted	13	8	5	19	5	17	16	12	5	0	r=0.0227
6	Observation of rituals	12	23	9	6	0	18	23	8	1	0	r=0.9277

Table No. 2 Effects of stress (results of PMCC test) Effects of stress on different aspects of respondents

Sr. No	Effects on Performance at work	Government sector female employees					Private sector female employees					Product moment correlation coefficient (PMCC)
		1	2	3	4	5	1	3	3	4	5	
1	Increased Mistakes	13	11	16	10	0	19	11	8	4	8	r=0.2654
2	Repetition of work	19	13	9	4	5	28	9	7	6	0	r=0.9023
3	Can not complete work on give dead	27	19	4	0	0	26	7	9	8	0	r=0.7834
4	Poor coordination	24	9	16	1	0	25	12	7	3	3	r=0.8660
5	Poor communication	32	11	7	0	0	27	16	1	6	0	r=0.9088

Sr.No	Effects on Health	Government sector female employees					Private sector female employees					
		1	2	3	4	5	1	3	3	4	5	
1	Sleeping disorder	21	17	7	5	0	15	19	7	4	5	r=0.8949
2	Hair fall	12	9	2	16	11	18	11	4	7	10	r=0.4167
3	Fatigue	18	13	1	16	2	30	18	1	1	0	r=0.6776
4	Headache	26	18	1	5	0	22	14	4	7	3	r=0.9931
5	Sugar	4	9	8	11	18	14	16	9	11	0	r=-0.8374
6	Blood pressure	14	12	5	19	0	19	18	11	2	0	r=0.2833

Sr.No	Effects on Family relation	Government sector female employees					Private sector female employees					
		1	2	3	4	5	1	3	3	4	5	
1	Loneliness	13	19	4	11	3	25	11	2	9	3	r=0.6131
2	Differences in spouse	16	13	17	4	0	19	17	6	8	0	r=0.6630
3	Lack of attachment with children	19	17	2	8	4	9	18	8	8	7	r=0.6136

Sr.No	Effects on Psychological	Government sector female employees					Private sector female employees					
		1	2	3	4	5	1	3	3	4	5	
1	Low motivation	36	14	0	0	0	17	22	4	7	0	r=0.7253
2	Low confidence	24	16	1	4	5	18	23	1	7	1	r=0.8592
3	Depression	31	11	4	4	0	29	21	0	0	0	r=0.9091
4	Anger	39	7	4	0	0	26	11	7	4	2	r=0.9818
5	Mood swing	24	10	12	4	0	13	12	8	6	11	r=0.4865
6	Lack of interest	18	17	8	3	4	18	19	7	4	2	r=0.9844
7	Poor concentration	20	18	2	3	7	33	7	8	2	0	r=0.6854

Results of analysis

H1. If the value of “r” is ranging from +0.90 to +1 then there is significant correlation between the factor of stressor for female employees working in private sector organization and government sector organization

H2. If the value of “r” is ranging from +0.90 to +1 then there is significant correlation between the most effecting area caused due to stress on female employees working in private sector organization and government sector organization

1. Discrimination the work place and ego of male senior or colleague are the most effective stressor for female employees at workplace.
2. Female employees are more stressed because of lack of career growth in the organization. Growth in career is one of the motivators for employees which is missing in for types of respondents and it is working as stressor.
3. Maslow’s need hierarchy theory tells us about different needs of every person and one of the needs is “safety need”. In this analysis is clear that female employees don’t feel safe at workplace which one the most effective stressor.
4. Working women need to equally treat their office work and household responsibilities and because of such double duties female employees feel stressed and adjustment of their office time and children school time is difficult to manage.
5. Support of husband is essential factor for female employee to work stress-free. And this study tells that lack of recognition from

husband about hard work is affecting as most effective stressor. Another factor working as stressor is consent of husband to continue present job, the effect of this factor is moderately high on female employees.

6. Working women are more stressed because of struggle between work life balance and this study talks about effects of stressor like responsibilities towards old age people is one of the most effecting acting as stressor in female employees. In our culture observing rituals is another important responsibility need to be carrier by women and this responsibility needs to pay proper attention and time which would be little difficult for working women and that is why it acts as stressor. Stressor are many and it if effecting on female employees in many ways. Stressors are affecting on different aspects of life of female employees and this study focuses on the area got affected because of stress.
7. Operations management tells us about seven types of waste and one of the wastes is repetition of work. Most effective area of stressor is seen in the category of effects on performance is repetition of work, they also could not manage to maintain effective communication at workplace because of stress.
8. Effect of stress is not only visible on job related performance but is visible on health too. Headache is most common effect of stress seen in female employees.
9. Another area of study was effects of stressor on different aspects of life of female employees and “effects on family relation” is least affected area of stress, analysis tells that there is weak positive correlation between

stressor and effects on family relation.

10. Psychological effects also considered in this study which tells that stress is making female employees losing their temper and they are facing problem of becoming angry. Stress is affecting in such a negative way that female employees are losing interest in doing the work.

Findings and conclusion

Working women from government sector organization and private sector organization must have some goals in life related to development of the career. They are always trying to have work life balance, but it becomes difficult as they are facing number of problems and these problems are working as stressors. Working women are not only spending life under stress but also, they are physically and mentally getting affected by such stress. So, let's assume that stress is inevitable but one can go for stress management. Stress can be managed with principles of management; planning organizing, directing and controlling.

Planning is about deciding in advance about future activities. Here we need to give answers of some questions like, what work we are going to do, when are we going to do that work, how are we going to do that work, where are going to do that work. Answers of above-mentioned questions are equal to planning. Working women need to go for planning their work/activities, it will help them know about number of future work/activities, priorities of work/activities, they can easily track progress of work/activities done. Planning will help working women for accomplishment their goals. Planning enables us for bridging gap between our current state and our future desired state. Efficiency and effectiveness of working women can be improved with the help proper planning of activities at home and at workplace.

Another principle of management is organizing. Organizing is about making available all needed resources at right place and on right time and also it is about division of work, delegation of authority. Organizing is about development of coordination among all parts system. Working woman need to organize things at appropriate time and in

proper manner so that they will be able to follow predetermined plan without interruption. If there is a person or there are people who can assist, then one should go for requesting for help and with delegation of work working women can move towards their ultimate goal.

Directing function of management is based on some factors like, communication, leadership. Communication facilitates developing understanding of both involved parties and leadership is about giving motivation and inspiring other for execution of objectives. Working women need to develop effective communication at home and at workplace which will results in better understanding about issues. And leadership will provide encouragement. Directing function can be taken as self-direction also, working women should become self-directed. They can adopt attributes of self-directed person like, high commitment, conflict resolution, decision making, problem solving and self-contained. All above characteristics would help working women for managing their life with less stress. Final function of management is controlling. Controlling function inform about what needed to be done and how thing actually happened and what is the gap between expectation and current outcome of performance. Working women can use this function for finding where they actually need to improve themselves. Controlling function can enable them for improving orderliness and discipline.

In this manner working women can go for observing functions of management for managing and even reducing their stress / stress level.

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