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RESEARCH PAPERS ***Page No.***

Jugaad: Searching for opportunities in adversities *6-15*
Dr.Ankita Agarwal

A study on impact of Covid-19 on eduction sector in india-A Roadmap ahead *16-28*
Dr. Neha Gupta

Understanding alignment of organisation culture and knowledge Management for organisational success litterateur review and future research agent. *29-42*
Mr. Nishant Gaur
Ms. Latika Sharma
Dr. Sukhvinder Singh

A study on supply chain resilience: A strategic from work for formative elements *43-67*
Er. Manoj Kumar Rout

Impact of Covid-19 in foreign direct investment (FDI) in India *68-77*
Ms. Subhashree Samal
Mr. Sudipta Rout
Mr. Suryanata Panigrahi

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About the Journal

The BIITM Business Review provides an academic forum for encouragement, compilation and dissemination of research on various aspects of management and business practices. It includes original empirical research as well as theoretical and conceptual works related to the field of management. It also publishes case studies, critical evaluation of existing business models and theories, and reviews of the latest books relevant to the corporate world.

The information and opinions expressed in the papers / articles are the sole responsibility of the respective authors and in no way reflect the opinions of the Chief Editor or the Institute.

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Executive Director's Message

I am happy to note that the BIITM Business Review has completed its 10th year of publication with the release of its volume 10-12, which is specifically focused on post pandemic changes in business and management. This research journal of the institute has provided a platform for publication of research articles written by management faculty members, professionals from different higher education institution of the country.

More importantly, it has made its contribution to the advancement of knowledge in the field of management.

I hope the journal continue to maintain its tradition of progressively enhancing and updating knowledge in the field of management, especially in respect of the profound changes occasioned by the recent pandemic.

Mr. P. K Balabantaray
Executive Director

Principal's Message

It is with immense pride that I introduce to you the recent edition "BIITM Business Review" VOL 10-12, 2021, the bi-annual research journal of our institute. This edition is focused on resilience during Covid times and post Covid scenario".

I must congratulate and thank all the dynamic team members of the editorial board for approving thought provoking articles which have found a place in the journal. The articles in this special issue have been contributed by in-house intellectuals and students.

It is my pleasure to mention here that the article written by our MBA Students with the Title "The impact of Covid -19 on FDI in India" was presented by them in an International Conference organised by MAIMS, Delhi on 30th Sept 2021.

I congratulate the contributor's, editorial board and all well-wishers of the Journal. I hope the readers will appreciate the endeavour behind the publication of this issue, especially in the context of the post pandemic situation.

Prof.(Dr.) P.K Tripathy
Principal

Editorial

Greetings from the Editor's Desk! It is my pleasure to bring you the first issue of the journal after taking over as Editor-in-Chief. I take the opportunity to thank the outgoing editor Prof. Dr. Saraju Prasad for his immense contribution to the journal as we look forward to continuing our journey from here on. This issue is peer reviewed and will combine vol 10-12.

This issue will be a mix of research papers contributed by people from diverse background. In this issue we will be publishing five research papers; four are contributed by Academicians, Professors, and research scholars.

Here at BIITM we encourage MBA students to write research papers and this issue will be publishing one article written by our students which was presented at International Conference by them.

This issue is focused on resilience during Covid times and post Covid scenario, so first article by Dr. Ankita Agarwal has a very interesting take on BUZZ word in India "Jugaad" which basically refers to innovative solutions to overcome adversity and how this Jugaad has helped India in cutting through covid times.

Impact of covid 19 on education sector is researched by Dr. Neha Gupta. This paper is focused on studying the impact of pandemic on education sector from worlds perspective with special reference to India. Area of research is on identifying unique strategies which great world economies have adopted for smooth continuation of education among students' fraternity.

Paper by Mr. Nishant Gaur, Ms Latika Sharma and Mr Sukhvinder Singh is a literature review paper on "Understanding alignment of Organisation Culture and Knowledge Management for Organisational Success". Study deliberates on various attributes and components of culture that stimulates learning, knowledge creation,

knowledge sharing and advancement of knowledge and also suggests a theatrical model which can be put to empirical testing for future research. It will be a good input for researchers in this field.

Next paper by Mr. Manoj Kumar Rout which focuses on the area of supply chain disruption management and aims to make a contribution by studying how firms can manage supply chain disruptions by (i) becoming resilient and by (ii) reducing the risk of supply chain disruption arising out of innovation.

Last paper of the issue is paper written by BIITians MBA 2 year's students Ms. Subhashree Samal, Ms. Sudipta Rout and Ms. Suryasnata Panigrahi. The research explores the impact of Covid -19 on FDI in India and came up with interesting findings on how developing economies like India and China have managed to attract more FDI even during pandemic time. Study found out sectors which attracted more FDI during pandemic time and stated reasons for the same.

This issue caters to diverse interest of stakeholders and provide insights that help in better understanding of different business sectors. Feedback of readers is welcome on mentioned email id. editor@biitm.ac.in

Thank You

Neha Gupta

Dr. Neha Gupta

Editor

Jugaad: Searching For Opportunities in Adversities

* **Ankita Agarwal**

Abstract

Lately, "jugaad" has become the corporate buzzword with major businesses across the nation using it to face challenging times in view of economic adversities. In the layman terms, jugaad is picked up from the Hindi language and refers to an innovative fix or improvised solution born out of ingenuity. With tough situations as a result of economic instability, technological changes and growing scarcity of resources, adversity is slowly becoming the new normal in India. But, it is this very adversity that is leading top Indian corporates as well as entrepreneurs to look for opportunities and come up with revolutionary solutions that yield great value for themselves and the world at large. "Jugaad", a word now associated with the Indian mindset is everywhere. From Tata's Nano to Anand Mahindra's innovative solution to deal with shortage of masks amidst the coronavirus pandemic, jugaad is being used immensely. India's jugaad is being hailed as a powerful way to transform lives globally with solutions to face almost any kind of adversity. This article looks at the concept of "jugaad" and how it is playing a role in transforming adversities into opportunities across the Indian business ecosystem.

Keywords: Jugaad, adversity, opportunity, Covid-19, Indian business ecosystem, jugaad innovators.

Introduction

"Jugaad" today is a word which is not only popularly being used in India but in the west also. A word which is frequently used in the day-to-day conversations of people across

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India, its origins can be traced back to a colloquial word of Indian origin derived from the dialect 'Jugat' (Shakespeare, 1834) having one of the meanings as contrivance which can further be traced back to its Sanskrit form 'Yukti', a comprehensive term meaning union, connection, combination, also means, contrivance or to contrive something, expedient, artifice, trick, etc. (Monier-Williams, 2005).

Put simply, Jugaad is a Hindi word meaning a makeshift solution or creative improvisation. It basically specifies an idea that is used for quick problem solving. Initially, jugaad was used to refer to the eponymous vehicle plying ubiquitously in North India: a diesel engine, typically used as a pump set for irrigation, fixed on a cart to create a rudimentary means of motorized transport. But slowly, the meaning of the term 'jugaad' evolved. Today, jugaad is also referred to as "frugal innovation", especially while explaining the meaning to non-Indians. It means simple, low-cost fixes. The American version of a jugaad is a "hack". Although the concept of "hack" has existed for a long time, awareness about the term jugaad has seen a rising trend in recent times in India. It is like the jugaad mindset is being associated with Indians. Jugaad has shaped the way Indians think and deal with a variety of everyday situations. Many a time, management experts and academics have sung praises of India's jugaad way of finding solutions to problems that enterprises are unable to address. There have been many books written on the topic and many academicians have mentioned that jugaad offers a powerful way to solve not only India's major problems but also the world's.

Jugaad in the face of adversities

An adversity in simple terms means a difficult or unpleasant situation. Adversities are not new to India as the country has time and again faced many unpleasant and difficult situations. But the country has always managed to come out stronger and tackled every adversity boldly. In fact, taking the latest adversity faced by the Indian economy, Covid-19, the PM of India, Mr.Narendra Modi said that India has always transformed adversities into stepping stones to success and mentioned how the Covid-19 situation

acted as the trigger to unlock various sectors like mining, space and agriculture which would eventually lead the country towards self-reliance.

Jugaad has always had a key role to play in the way the Indian business ecosystem has dealt with adversities. There are many shining examples of the way jugaad has been used to stand up against adversities. The low-cost Tata Nano car developed by Tata Motors is one of the best examples of jugaad. Its approach to developing the Nano car, backed by a vision in Ratan Tata's mind to be able to provide a Rs.1 lakh car to help small Indian families travel better and safely has been applauded time and again. Tata's response to uncertainties regarding the use of land in West Bengal's Singur to house a factory and its last minute decision to pull out of the state and relocate its plant halfway across the country in Gujarat showcases its flexibility and ability to deal with adversity.

In the late 80s, Tulsi Tanti, a young entrepreneur who wanted to start his own textile unit, realized that he was staring at many infrastructural loopholes. The main problem that he was facing was the supply of power, which comprised 40% to 50% of the operating cost. Another inconsistent and costly expense was electricity. It was not affordable, considering a profit margin of 5%. Rather than quitting, he decided that he would experiment with different generators and boilers, but ultimately came to the conclusion that these would need some type of fuel in order to give the desired results.

So he again started searching for other possible sources of power that would be both reliable as well as sustainable. In the year 1990, he put his money into two wind turbines that would supply electricity to his textile unit. Thereafter he understood that this was the solution he had been looking for. This fuel came at no cost and was sustainable too. He also realized the immense potential that wind energy had to meet the global demand for a steady supply of affordable and renewable source of energy. Seeing this as an opportunity, he began manufacturing wind mills under the name "Suzlon Wind". Today, Suzlon is the fifth largest wind energy solution provider in the world. It is Tanti's innovative ideas that transformed his adversity into opportunity.

Apart from this, jugaad has also been applied in many forms by Indian hawkers at the Bottom of the Pyramid, which refers to the 4 billion people who live on less than US$2 a day (C.K.Prahalad, 2009). Their lives have become much easier with various jugaad solutions to address their basic needs.

Jugaad during Covid-19

In March 2020, when India was hit with the Covid-19 crisis and had to go for a nationwide complete lockdown, the finance ministry found itself facing an unusual problem. As per the normal protocol, the government printing press needed written orders in physical form in order to publish the amended finance bill. In order to deal with this, the ministry came up with a solution. A DO (Demi Official) letter was generated under a rule change that carried the phone number of the signatory. The official was called to complete verification and the finance bill was finally printed well in time.

Other innovative practices have also been adopted by the government of India during the lockdown situation. Some relief measures announced by the government in the wake of the lockdown required ordinances to be signed by the President. It was decided that the paperwork would be done remotely but since the final stage will need the President's signature, a "fully sanitized" messenger would be sent to Rashtrapati Bhavan to present and receive the documents.

Other government departments too have been using "jugaad". The Smart City Mission of Urban Affairs ministry held seven official meetings through Zoom conference for over six and a half hours. A total of 86 people took part. Renewable energy minister R.K.Singh chaired a review meeting through video conference with officers and ministry officials who are working through e-offices from home. Movement of files and notings are being done online to ensure no necessary work suffers.

Jugaad is has also been used in other sectors such as healthcare during the Covid-19 crisis. Pankaj Gupta, Managing Director of Singapore based EthAum Venture Partners started a nationwide collaboration to design, builds and donate 10,000 plus 4-way

ventilator splitters to Indian hospitals. A splitter is a simple mechanical device that can split oxygen flow upto four patients at a time, thus making this jugaad machine a cost-efficient, scalable and quick way to save Covid-19 patients.

Recently, Anand Mahindra was in the news for having found a jugaad for shortage of masks amid the Covid-19 pandemic. Taking to twitter on March 11, 2020, Mahindra shared an easy way to make masks at home. He shared a GIF which showed a woman creating a face mask out of tissue paper roll, two elastic rubber bands and a stapler. In the GIF, the woman can be seen making the mask by folding the tissue paper and stapling the rubber at the two ends of that paper. Mahindra wrote, "Voila. No more shortage of masks?? And I thought Indians were masters of jugaad". The tweet received an impressive response with people flooding the post with comments and likes. It garnered more than 9.8K likes and more than 2.1K retweets.

India's wealth of trained engineering talent has helped foster jugaad during these trying times. Entrepreneurs and innovators across India have quickly devised new apps, robots and ventilators to help overcome the pandemic. Asimov Robotics, a start-up based in Kerala has deployed robots at entrances to office buildings and other public places to dispense hand sanitizer and deliver public health messages about the virus. The company has also deployed robots in hospital isolation wards to carry food and medicines, which eases pressure on the medical staff. In early April, the government of India launched a Covid-19 tracking app called Aarogya Setu which uses GPS and Bluetooth to inform people when they are at risk of exposure to Covid-19. Start-ups including KlinicApp and Practo are providing Covid-19 tests at home and online consultation with doctors through their platform. To deal with shortage of ventilators, start-ups such as Nocca Robotics (incubated at IIT Kanpur), Aerobiosys Innovations (incubated at Hyderabad) and AgVa Healthcare have been developing low-cost, easy-to-use and portable ventilators that can be deployed even in rural areas of India. The Kerala state government launched an app called GoK-Kerala Direct using a platform developed by QKopy. It sends Covid-19 updates and travel information via phone notifications, and via SMS to older phones for

the less than half of India's population without smartphones. These messages are delivered both in English and Malayam, the local language. Start-ups such as Aqoza Technologies and PerSapien claim that they have developed chemical formulations that disinfect public spaces. Another start-up, Droom, has come up with a special anti-microbial coating called Corono Shield, which inhibits the growth of microorganisms such as bacteria, algae, yeast, moulds and mildew on the surfaces of vehicles. It is being tested by police in Gurugram (Haryana, India). Start-ups such as Marut Dronetech have partnered with state governments to test the use of drones to monitor adherence to social distancing rules. Drones are also being used to deliver medical supplies and even check people's temperature using thermal imaging.

Jugaad innovators

Jugaad is a concept that starts from a reflection: is it possible to transform crisis into the best opportunity for growth? And if so, how? It is necessary to transform the half-empty glass into a half-full one. Jugaad innovators is a term used to refer to the Indian entrepreneurs and corporations who practice jugaad to develop market-relevant products and services that are inherently affordable and sustainable. They are modern-day alchemists who transmute adversity into opportunity, and in doing so, create value for their organizations and communities. Jugaad innovators are able to find opportunities in adversity in three ways: transforming difficulties into opportunities for growth; ensuring that constraints work for them; and constantly adapting to an environment in continuous change due to their ability to improvise appropriate solutions for the challenges that they meet along the way.

A resilient jugaad mindset can also enable corporate leaders to systematically turn adversity into opportunity for innovation and growth. Entrepreneurs and managers in emerging economies face adversity at every turn. For example, starting a new business in India is a daunting task because of the long time that it takes to obtain the necessary licenses and also because of political upheavals. Armed with resilience, perseverance and a willingness to learn, jugaad innovators strive to respond to the harsh world they face

and find opportunities for growth and expansion in it. In doing so, they are able to create a better world, not just for themselves but also for their communities.

Sometimes when faced with tough challenges, businesses tend to commit certain mistakes like: not considering or ignoring adversity until it is too late; facing difficulties head on instead of influencing them; facing new problems with old points of reference and thinking small when having to face great challenges. Demonstrating resilience in the face of adversities and turning them into advantages is a skill that business leaders must urgently develop today.

Turning challenges into opportunities

Jugaad innovators like Kishore Biyani and Jeff Bezos have been spontaneous in many ways and have had the courage and desire to take risks, trusted their intuition and been passionate about what they do. In order to truly turn challenges into opportunities, there are six principles which need to be followed:

1. Choose opportunity in adversity:

Companies and their leaders can profit from opportunities in adversity following different paths:

- Recognizing that the glass is always half full
- Realizing that extreme conditions are fertile ground for extreme innovations
- Building psychological capital to develop resilience
- Facing great challenges with an attitude of development
- Exploiting the power of the network to face the threats of the market

2. Understand that less is more:

Jugaad innovators are very resourceful in times of scarcity. Jugaad practitioners work with what they have got. This simple principle is a lesson for us to make optimal use of scarce natural as well as financial resources, while delivering huge value.

3. Ponder and act with flexibility:

Jugaad innovators need to have a flexible mindset that keeps questioning the status quo, considers all options to be open and works towards transforming the existing products, services and business models.

4. Learn to maintain simplicity:

Jugaad is never about trying to gain sophistication or perfection through over engineering of products, but it is about coming up with a solution that is good enough to get the job done.

5. Consider the margin:

Though the usual norm is to serve the mainstream, jugaad entrepreneurs knowingly look out for marginal, underserved customers and pull them into the main stream.

6. Do what your heart says:

Jugaad innovators do not depend on focus groups or formal market research in order to choose what products to make. Also they do not worry about how the investors will react to their new product strategies. They have in-depth knowledge of their customers and products intimately and ultimately, they trust do what their heart says.

Conclusion

As global perception and expectations about innovation are changing, jugaad is emerging as a strategy of survival, and not just as a form of providing immediate and low cost solutions to problems. Though some people are of the opinion that jugaad products and processes do not emphasize much on safety, yet it is laudable that jugaad products are helpful for the large Indian population that cannot afford too many sophisticated machineries. Rather than viewing jugaad as a form of innovation that will inevitably disappear, we must embrace the diversity that this approach brings. Firms, consumers and governments in both developing and developed

countries stand to benefit from practicing, applying and supporting frugal, flexible and inclusive (i.e.jugaad) innovation. Jugaad can indeed be used as a tool to create opportunity in adversity. A clear example of this has recently been observed in the way jugaad has been used in the Covid-19 pandemic.

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A STUDY ON IMPACT OF COVID - 19 ON EDUCATION SECTOR IN INDIA- A ROADMAP AHEAD

∗ **Dr. Neha Gupta**

Abstract:

Paper talks about challenges posed by Covid 19 on education sector globally with special reference to country like India which is divided with so much disparity related to wealth, resources, technology availability and technology adoption and reach.

This has pose a serious threat to career of students and sustainability of educational Institutes as well. This paper aims at providing an insight into how disruptive innovation in education sector can lead pour during and after pandemic covid-19 and will discuss what will be new normal in education sector.

Research methodology: Paper is based on secondary data and information collected by author by attending webinars where heads of esteemed higher education institutions like IIM and AICTE has expressed their views on how to cope up with this uncertain environment and attain new normal in education sector.

Keywords: COVID-19 Pandemic, Flipped classroom, Technology in Education sector.

Introduction:

World is going through what is potentially one of the biggest threats in our entire lifespan to global education, a gigantic educational crisis. As of March 28, 2020, the COVID-19 pandemic is causing more than 1.6 billion children and youth to be out of school in 161 countries (World Bank 30 April 2020), this is close to 80% of the world's enrolled

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students. World is going through a global leaning crisis, as many students are missing the basic learning of skills required for life. As per world-bank "Learning Poverty" indicator the percentage of children who cannot read and understand at age 10 is measured at 53% of children in low and middle-income countries – before the outbreak started. So we all can imagine well what can be the situation once outbreak is over it can fetch more devastating results.

Most worrying fact about this crisis is its impact on education and students career which can lead to, Loss in learning, Increased dropout rates, lack of skills among students. Moreover, for countries like India who have varying spread of education systems and resource availability these negative impacts will be far more devastating for poor children.

Education sector is no different in these Covid times and is suffering equally. As per a report by UNESCO, as of 23 March 2020, over 1.3 billion learners are out of school due to school closures in response to COVID-19. The sudden closure of the schools, colleges and universities have put a full stop on the flow of learning of the students and has raised many questions on existing method of imparting knowledge of the educational institutes across the world and specially among developing and underdeveloped countries.

Objectives of the study:

1. **To study about challenges faced by Education system during Covid times.**
2. **To learn about new techniques available to overcome the problem of dissemination of education during Covid times.**
3. **To study about steps adopted by different countries to run education sector smoothly during lockdown or shutdown.**

Research Methodology:

Study is exploratory in nature and is totally based on secondary data. Data was collected from various published and internet sources and analysed to put in an article form. Time of writing this paper was during pandemic times when whole world is under complete lockdown.

Challenges posed by COVID in front of education sector

1. Impact on economy and society as a whole

The sudden closure of all educational institutes including schools will have a far reaching impact on not only impact students, teachers and parents but also on whole society. As far as schools are concerned 11.59 crore children (MHRD, Government of India) of the country are enrolled in the mid-day meal scheme. This has led to an additional strain on the parents of the children who comes from weak economic backgrounds. The sudden closure will also impact economy as many State Govt. has asked schools not to charge fees for months when school were close which will ultimately impact the financial performance of schools and may unemployment and firing of existing staff to loosen the burden.

2. Approaching students

Many schools and higher education institutes started online classes for students but in country like India where most of the population lives in rural areas with no connectivity of internet and absolutely no access of laptops and computers. It is indeed a challenge to quickly change mode of education from offline to online.

2.Course completion and examination deadline

At the time of lockdown in India and many other parts of the world, school new session has just started and in colleges and other higher educational institutes end term examination was round the corner. So main challenge which institutes were facing is how

to complete course and conduct examination keeping in mind the state of technology which prevails in country like India.

4. Shift from offline to online mode challenge for both teachers and parents.

A sudden shift from offline to online mode has become a trouble for students, teachers and parents. For school children it has caused a lot of trouble for parents for instantly arranging internet and laptops for their children adapting to online virtual class environment. For teachers as well it was a challenge to learn how to teach online, share notes and presentation and engage students without any eye contact with them. In already advanced countries it is a practice to teach in online mode and conduct online test they work on private LMS system software.

5. Paying attention to all students

All students in class are not same, everyone has different understanding level, so paying attention online is difficult to all students, it is also difficult for teacher to judge how much each one of them has understood. Moreover, students while taking classes at home may get distracted at times with the activities going around them n lead to less attention and understanding.

6. Potential Technological Barriers

The challenges of online education are unequal access to internet, reliable internet connectivity and availability of computer at home. This pose challenges for students who belong to rural areas and far flung areas.

Roadmap Ahead

The Covid-19 crisis means a huge upturn in online activity by the teaching and students fraternity. Most academic institutions will now have to think and act innovatively as people use more technology and swap to digital platforms. The current impact of covid-19 outbreak tends to be twofold; on life and livelihood.

Role of technology is going to be very crucial as a differentiating factor for beating competition in the segment. It will definitely help them to cope with the current disruption. Greater emphasis on Digital media will be a game changer in reaching out to students both current and prospective.

To give our youth a post-coronavirus future, our education system must be prepared to find solutions by upgrading the IT skills of its faculty and staff and improving infrastructure. It is also important that in the present corona times colleges and schools stay connected with their students and show empathy. Student motivation should be the top priority of colleges and schools.

Many educational experts assume that student numbers especially through foreign exchange programmes will be hit in response to the current problem. So while international student numbers may be sharply down, a greater proportion of enrolments in the domestic higher education market may upsurge since skill enhancement will be on priority among students.

For the same reason, many job seekers will also simultaneously upgrade their qualification by enrolling in online courses creating a good opportunity for higher education institutes to transform themselves in the online age. The end result of all this may be a more highly skilled workforce at the end of the current crisis. That would at least be seen as an opportunity by higher education sector to rise above the occasion.

Hence, there is a huge challenge ahead, as well as room for innovation. Challenge is to overcome disruption and scope for innovation to create regular engagement with students and other stakeholders. Challenge is also to keep the continuity of work uninterrupted and meet deadlines. Relationship with our students is of paramount importance and should be taken care well in the present situation.

At the same time, there is tremendous opportunity for institutes to look into the possible usages of technology for facilitating students' engagement and interoffice working.

Forming deeper relationships with peers and other stakeholders online will be key to success in the COVID-19 crisis.

The most technologically developed educational institutes will be preferred by students in future. This presents a huge learning curve for institutes to invest in technology. In the post corona world, platform based business models in higher education sector like Facebook, Airbnb and Uber etc. which are highly technologically advance will drive institutions forward. The ones having intensive preparedness to upscale and mobilize digital resources will be incentivized in the longer run.

From here, academic institutions should therefore be more curious to migrate and transform from traditional set ups to survive in a Platform economy.

Few measures and steps which educational institutes can adopt to build a new normal in education sector are:

1. Applied blended learning pedagogy

The most important step which institutes should take is to introduce blended learning pedagogy. Blended learning pedagogy is a mix of online and offline teaching pedagogy, where teachers engage students in a mix of online and offline teaching pattern. In blended learning students still attend usual brick and motor classes but content and delivery can be mediated by technology.

2. Remote Learning

Remote learning is a situation where teacher and students are not physically present face to face. They will be connected through technology with each other at their own places. It will become an integral part of curriculum now; it will become new normal. We live in a world which is constantly changing and to remain connected with students has become the need of an hour. Traditional pedagogical methods in current times seems irrelevant so its high time to devise new curriculums which have more reach and is flexible, can be accessed anywhere and have no time constraint. As a result, this necessity to rely on

MOOCs learning options will have to be enhanced in the days to come, and will become an integral part of curriculum offered by the teaching fraternity.

3. Use of AI for pedagogical advantages

Artificial intelligence (AI) has a major influence on education as it has the potential to empower members of faculty and learners alike. It can even impact competitiveness of educational institutions. Founder of EdTech unicorn Squirrel says that "Using AI, in three hours they understand students better than the three years spent by the best teachers". Such is the power of AI in education. At Edtech unicorn squirrel students are first put to a diagnostic test to assess their weak areas and subjects and then every student is provided by personalised lessons developed by algorithms to focus on the areas of weakness, reducing the amount of time spent on unneeded tutoring by 80 per cent.

Professor Ashok Goel of Georgia Tech is well known for the use of Artificial Intelligence to respond to queries raised by students' in his online Knowledge-Based Artificial Intelligence (KBAI) class. Known as Jill Watson, Professor Goel's AI Teaching Assistant was based on the technology developed at IBM's Watson platform. Goel developed Jill to handle the large number of posts from his students with doubts for a course in Computer Science for Master of Science. Not just engineering colleges, AI Business Schools will also become a reality all over the world and revolutionize the entire ecosystem of such institutions. Higher education institutions will soon have to be curious and open to adoption of AI, be ready for its impact and ability to alter the entire pedagogy.

4. Experiential learning through VR

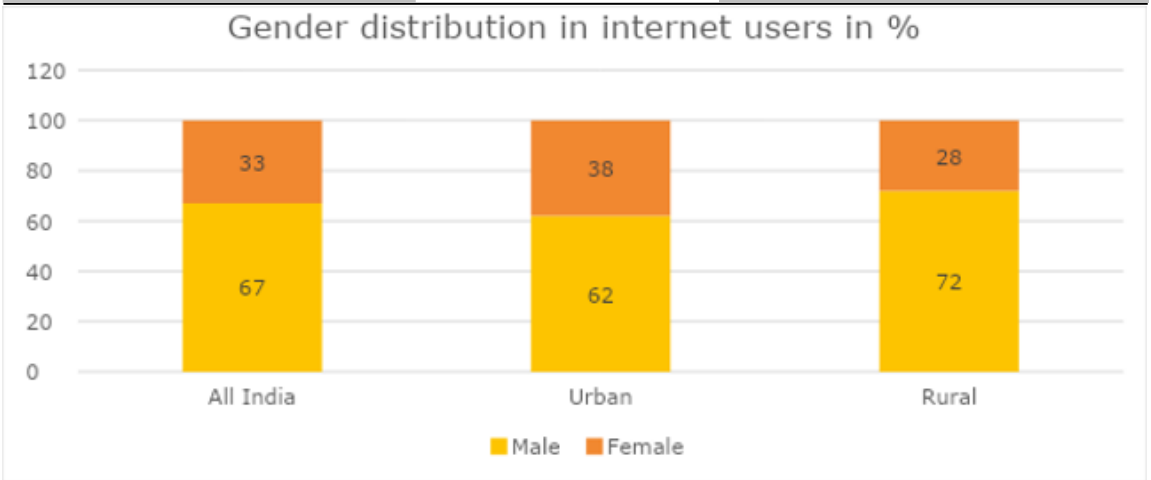
These days' students attend classes not just for knowledge, but experience too. As education remains the main edifice for a thriving world, experiential learning has become crucial for effective transfer of knowledge. Virtual & Augmented Reality (VR & AR) technology for deep and immersive learning will naturally become the next step for higher education institutions too. One of the first uses of VR in higher education is using the technology to improve students' soft skills. VR is a great tool for training these skills,

as a large percentage of people have speech anxiety – practicing in VR provides a safe environment that allows you to desensitize from a real-life audience. HE institutions will have to work in this direction to stay ahead of the curve.

Virtual processes: Admission processes, teaching mode, internships and final placements will change in days to come. While admission teams will embrace online outreach to prospective candidates, MOOCs will democratize higher education, and make traditional orientation programmes redundant. Similarly, time and space will no longer be the constraints for internships which are an integral component of holistic learning in higher education institutions. WFH (Work from Home) format of internship will dramatically increase the capacity for an organization to support internships, they will also have all the advantages for flexibility and creativity. Virtual internships will extremely diversify and create immense opportunities for innovative solutions in social media and content writing.

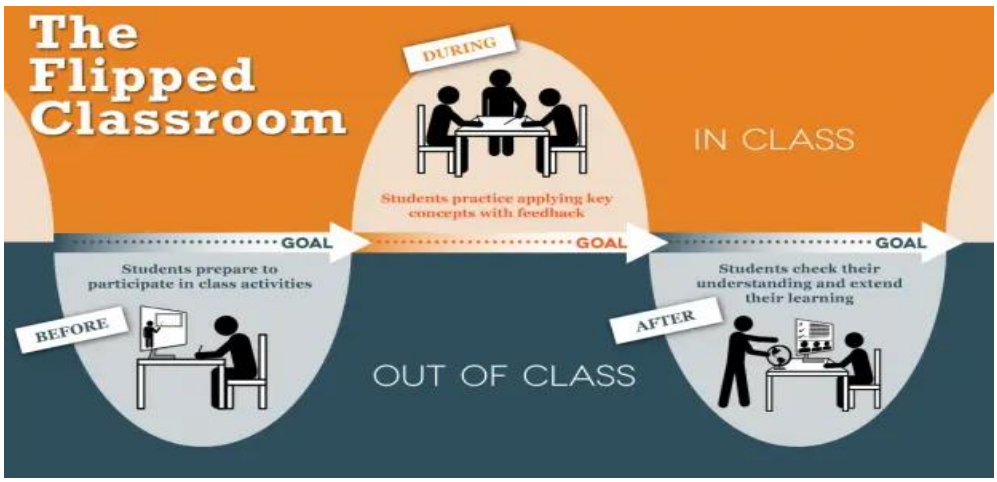
Higher education institutions will now have to invest heavily in creating digital infrastructure which help them to democratize education, and improve its accessibility.

5. Adoption of social media in academics: These days social media like FB, Instagram, YouTube play a vital role in promotion of any business and spreading awareness. As per "Statista reports 2019 and Kantar IMRB ICUBE Report" with the ease of internet access, the number of active social media users in India stood at 330 million in 2019 and it is expected to reach 448 million by 2023. 290 million active social media users in India access social networks through their mobile devices. Median age of India is 27.1 years. Millennials and Gen Z are the main contributors for social media usage in India. 52.3 % of social media results come from millennials. 28.4 % of social media conversations are from Gen Z and 15.1 % from those aged 35-44. 97 % of Indians who are connected to the internet watch videos online. Facebook and YouTube are the most popular social media networks in India, almost every 2 Indian out of 3 who use smart phones are on one or other social media.



During covid times social media has played very important role in spreading awareness among people. People have also understood its importance not only for entertainment but for academic purposes as well.

6. Flipped classroom- Flipped classroom is based on inverted traditional style of classroom. In traditional classroom system concepts were taught in classroom first and then students were given homework on those topics. But in flipped classroom its opposite concepts are not taught in classroom rather they are sent to students in form of online notes or video tutorials to students before class they come prepared and then and in class students deliberate upon their doubts and application of those concepts. First IIM to introduce this is by Dr M.P Jaiswal IIM Sambalpur in India.



7.**Simulation activities/ virtual reality**- virtual training and simulation have become a thing of vital importance specially in certain specific professions like military, medical services, sports, aviation, miners, drivers, gaming etc. Virtual reality gives real life experience training to students so when they face reality they don't find it difficult to adjust.

3.**Live projects-** Working on live projects gives hands on experience to students and it also works as an asset for them while placement as companies consider work on live projects as equivalent to work experience. Live projects are most commonly used in the field of Engineering, IT and Management studies.

4.**Video based learning-** It is most highly adopting method of teaching and learning these days and you tube has become the most valuable weapon in this. Students resort to YouTube videos to learn about any topic even teachers from top institutes run their online video classes on YouTube. It has served as a great tool in this pandemic.

5.**Online exams and assessment using remote proctoring process** - Online remote proctoring is a feature that enables proctors to extend their reach beyond geographical boundaries, allowing them to assess candidates from any location, and that is subject to the availability of the computer and a high-speed internet connection. Combining technologies like online monitoring software and video streaming with the conventional methods of invigilation can work wonders to keep cheating and other unfair activities at bay. During pandemic crisis all educational institutions has resort to this system of examination.

6. Chatbots- This can be of great help in education where students just go to chat bots of different subject areas and will ask doubts and can extract the already fed most relevant information from it without wasting time. That can be specially of great help in admission related queries of students.

7. Podcasting- New technology always has a heavy impact on education, and Podcasting is no different. Many learning institutions are cutting back on textbooks and investing in

technology enhanced learning. Podcasting, as one of the latest mediums to emerge into the mainstream, is one of the forefront technologies in this change. In this article, I'll show you how podcasting in education can increase accessibility and encourage engagement.

Podcasting offers the opportunity for lecturers to easily broadcast engaging audio content, which students can then listen to at any time and wherever they are. A student only needs to subscribe to a podcast feed and suddenly you can push educational content to them, rather than wait for them to come. Podcasts can easily be used in Schools, universities or colleges to engage students, and improve your teaching and learning practise. Many learning institutions which have incorporated podcasting in their education system, have reported really positive results. This can be attributed to the ease of creating and consuming podcasts as well as the various ways in which education podcasts enhance the students' learning experience.

How countries are managing (World Bank)

Many client countries are implementing various forms of these strategies, including: Enhancing preparedness while keeping schools open: This involves enforcing and supporting preventive actions in schools (Afghanistan); establishing protocols for schools' handling of illnesses and potential cases (Egypt, Russia, Belarus); using the education system's infrastructure and human resources to address the spread of infections in communities (Liberia and Sierra Leone); and limiting physical contact by reducing social and extra-curricular activities (Singapore, Russia)

Selective closing of schools: Choosing to isolate treatment areas, some governments have opted for localized school closures as an interim measure (for example India). In half the cases thus far, we have seen these localized approaches subsequently expand geographically (Brazil, India, Canada, Australia).

National closing of schools (the most used option globally): As the virus has spread, many countries are announcing national school closures. Many are concerned that

children and youth, while seemingly less susceptible to the virus and have a much lower case-fatality ratio, may serve as carriers for the disease, putting at risk older family members in communities across the globe where multi-generational households are the norm.

Using remote learning and education resources to mitigate loss of learning: Many countries have turned to distance learning as a means of mitigating for lost time in school (fully online in China, Italy, France, Germany and Saudi Arabia; mobile phones or television in Vietnam, Mongolia). In addition to infrastructure and connectivity, teachers' and administrators' familiarity with the tools and processes are also key factors in providing distance learning (Singapore). Other countries send kids home with lessons as homework (Lebanon). In Bulgaria, more than 800,000 accounts have been created for all teachers and parents, publishers have been mobilized to open the digital textbooks and learning materials for grades 1 to 10, and two national TV channels will broadcast educational tv. As more countries close schools, more creativity will be needed. For instance, adapting existing platforms for use in smartphones, and/or agreeing with telecom companies to eliminate the cost of accessing material from a Ministry of education site could be part of the mitigation efforts.

Conclusion & Findings

Higher education institution which can quickly adapt to changing technology and would be able to implement it effectively can build a reputable brand in the higher education field. Brands of higher education institution would be recognized due to technology implementations and traditional physical infrastructure investment may come second to technology. Higher education institutions should focus on changing trends and start adapting to new technologies to make education interesting, relevant and practical. Higher education institution can improve their brand image with quick adoption of the latest trends in technology. Step by step approach of adopting those technologies can help a long way for improving higher education integration with the industry-relevant knowledge base.

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Understanding alignment of Organisation Culture and Knowledge Management for Organisational Success: Literature Review and Future Research Agenda

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Abstract

Purpose: The paper aims to examine the literature on culture facilitating knowledge creation and sharing and making a knowledge culture in an organization. The paper attempts to explore on various attributes and components of culture that stimulates learning, knowledge creation, knowledge sharing and advancement of knowledge.

Design/methodology/approach: A systematic and orderly review of peer-reviewed journal articles has been carried out to understand the culture that fosters knowledge management(KM) activities from Pro Quest, emerald, EBSCO host and other e-databases. Various components of culture have been extracted from the literature that impacts KM in an organization. An integrated conceptual framework helps to explore and understand the relationship between culture and KM.

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Findings: This study provides a conceptual model on impact of culture on knowledge creation, sharing and advancement. The paper contributes to the organizations by helping them understand how culture plays an important role in KM.

Research limitations/implications: This paper suggests a conceptual model. The proposed conceptual model needs to be tested empirically. The proposed model can be practiced to create knowledge culture in an organization.

Originality/value: This paper attempts to contribute to knowledge culture literature by adding the fact that culture not only affects human resource activities but also plays a prominent role in KM.

Keywords: Knowledge Management, Organizational Culture, Knowledge Culture

Paper type: Literature review

1. Introduction:

In this era of incessant and rapid changes in economy, competition is getting tough where organizations fully utilize all the resources and assets to maximize the return on investments. But it is most arduous to exploit the intellectual capital, the resource which is embedded within individuals and groups of individuals in the form of knowledge. Knowledge is considered to be the most valuable asset of the company (Stankosky, 2005; Albors-Garrigos et al., 2010). The organizations struggling for sustainable competitive advantage should fully utilize their intellectual assets (Marta Mas Machua et al., 2012). The world economy is experiencing an impact full change as companies are competing to provide value addition to customers, suppliers and employees. This change has led to a paradigm shift that signals a shift from Industrial Era to the Knowledge Era (Charles Savage, 1996). Knowledge era is era where products and services include more of intellect level then capital, material and labor.

The agenda in KM era should be to form an organization with the culture and structure that can unlock the potential of these intellectual assets. The culture should facilitate creativity; having a flexible and adaptable structure contributing to KM. The sustenance of organizations is entirely dependent on the ability to unlock and exploit intellect and creativity of its employees and to further create knowledge. KM recognizes the intellectual capital as the most valuable resource. The intellectual capital serve as an aggregate and integral of knowledge, tacit or explicit of everyone in the organization. The knowledge contributes to learning and resulting from shared interactions within the organization including customers and suppliers. This learning contributes in developing innovative products, improved business process, establishing new distribution channels and newer markets. All these new creations, improved processes require knowledge, experience and sharing. Thus KM should be embedded in the culture of the organizations. The role of culture in KM is usually treated as a "black Box" (Marta Mas Machua et al., 2012). Information technology plays an important role in KM but is facilitated by the culture in the organization. As technology helps in gathering, analyzing and disseminating information; humans can use, exploit and implement for betterment. The state of art technology will not ensure organizational competences as there is no correlation between investment in technology and performance of business . Information technology should supplement the culture by being the integral part and utilizing creative and innovative strength of human resource. KM is not constrained to tapping the expertise of intellects in expert systems or building databases but it involves developing a framework and structure for communication, sharing and transfer of knowledge. Although expert system is beneficial for knowledge culture as the tacit knowledge of experts can be documented or transformed in explicit form promoting knowledge sharing. In knowledge sharing, culture programmable information systems plays vital role (Eric Banks, 1999). The tasks which are routine and repetitive in conduct can be delegated to these information systems and the human resource can be utilized for value addition by performing analytical and interpretative tasks. Also basic technologies like e-mail and video conferencing allows individuals to share their knowledge.

In this paper we present a conceptual model that showcases dependence of knowledge management on organizational culture. The significant outcome of the dependence of KM on Organizational culture is creation of knowledge culture. This dependence is studied through the intensive literature survey. The framework of this paper is as follows. First, we analyze the literature pertinent to KM and Organizational culture. There is availability of vast literature on KM and organizational culture but literature linking the two concepts is limited. Second, we develop the model that reflects the components of organizational culture impacting knowledge management. Finally we conclude with some reflections and lessons extracted from literature.

2. Literature Review

Culture is referred to as composite entity of values, beliefs, ethics, conduct and behavioral models (HO, 2009). Culture has been resulted from the continuous negotiations about values, beliefs and conduct among the members of the organizations (Douglas, 1985). There are four attributes of culture cooperativeness, consistency, effectiveness and innovativeness (chang and Lin, 2007). Values refers to the appropriate behavior that individual in organizations should persist (King, 2008). The culture of an organization always reflects the value system of that organization. In the organizations which are categorized as knowledge driven organizations, it is the value system that drives what knower views, understands and interprets from his observations (Marta Mas Machua et al., 2012). The power of knowledge for perceiving, organizing, interpreting and learning is more attributed to the values than data, information and analytical ability. The dissemination of knowledge is highly promoted by open and innovative culture (Mas et al., 2004). The culture that recognizes and provides incentives or rewards the individuals for their contribution and exchange of knowledge is critical for the success of KM in organizations (Alavi et al., 2006). The culture where trust does not exist between the individuals and groups hampers the smooth flow of knowledge (O'Dell et al., 2001). Flexibility and adaptability in culture promotes open communication channels and free flow of information throughout the organization The ability to learn and relearn,

willingness to share tacit knowledge, accepting change, flexibility, creativity, motivation and tolerance to mistakes are attributes of knowledge culture that encourage knowledge sharing and creation in an organization. The feeling of collaboration among employees leads to sharing of in-depth insights and expertise with each other. The motivation is essential for sharing knowledge within the organization (Malhotra and Galletta, 2003). The individual do not offer to share knowledge for free, there is a trading expect in which employee expects pecuniary and non-pecuniary components which includes rewards, incentives, recognition and appreciation. The factors contributing towards success of knowledge sharing are rewards; recognition and appreciation for knowledge sharing (Al-Alawi et al. 2007).The knowledge workers are professional, smart, competent and efficient people, who seek autonomy and flexibility in order to accomplish their routine tasks. It has been examined that sharing of information, team oriented work and cohesive groups are essentials for successful implementation of KM (Park 2005). The organization which reflects transparency of communication among its employees creates a culture of knowledge sharing.

Researchers have concentrated on exploring the culture that promotes KM implementation in organization (King,2007; Suppiah and Sandhu 2010). The components of organization culture contribute to smooth transference of knowledge (Davenport, 1998). Park (2005) has identified the attributes of organizational culture that facilitates successful knowledge sharing. Knowledge is not incorporated only in information systems and databases but it is also found in organization's process, practices and routine work as it is embedded in organizational culture. Reuse of knowledge and providing knowledge to the people who need it in organization reflects the knowledge culture of an organization (Jennex and Olfman, 2006). Knowledge culture refers to making knowledge sharing as norm in the organization. (David Gurteen, 1999). Knowledge culture encourages people to collaborate and to share, in order to make organizational knowledge more effective and productive. The ultimate objective of knowledge sharing is attainment of business objectives. Knowledge management is taking care of organization's knowledge both explicit and tacit for value creation and meeting

functional and strategic objectives. KM constitutes of ideas , initiatives, systems and strategies to maintain and upgrade storage, creation, transference and dissemination of knowledge. Organizations are busy creating enormous amount of data and information for pursuing routine activities. This routine business information is needed to be managed in order to supplement its value and for its reuse to solve new occurring problems. Knowledge creation requires an environment that encourages open communication, innovation and creativity. Knowledge is dynamic as it keeps on evolving through the interactive process of learning and sharing. The individual knowledge is not much impactful as compared to collective knowledge that creates synergy. The knowledge with in an organization might be limited but more knowledge can be obtained from other organization who are disseminating the knowledge. The stored knowledge and the knowledge created when used to design and manufacture a product or deliver a service refers to application of knowledge. The knowledge can also be commercialized through dissemination as inventor of the technology may provide the license to other firms to provide product or services on the basis of their technology.

Table 1: Proposed Constructs and Respective Indicators (Compiled by authors)

Proposed Construct	Brief Description	Source
Organizational Culture	Open Communication	Skyrme and Amidon (1997), Davenport et al. (1998), Liebowitz (1999), APQC (1999), Holsapple and Joshi (2000), MeDermott and O'Dell (2001), Stankosky (2001), Hassanali (2002), Yahya and Goh (2002), Ribiere and Sitar (2003), Wieneke and Phylpo-Price (2003), Wong and Aspinwall (2005),Al-Busaidi and Olfman (2005), Hung et al.(2005), Alavi et al.(2006),Chong (2006), Akhavan and Jafari (2006), Akhavan et al. (2006), Bozbura (2007),chang and Lin (2007), Jafari et al. (2007), du Plessis
	Incentives & Rewards for KM	
	Publicly recognizing people for their contributions to KM	
	Motivation	
	Tolerance to mistakes	
	Collaboration	
	Creativity	
	Innovation	

	Flexibility and Adaptability	(2007), Foot and Hook (2008), Foss and Minbaeva (2009),HO, 2009, Zacket al. (2009), Prieto-Pastor et al. (2010), Foss et al. (2010), Xu et al.(2010), Kianto(2011), Andreeva and Kianto(2012), Frost (2014)
Knowledge Management	Knowledge Sharing	Davenport (1998), Eric Banks(1999), Mas et al.(2004), Malhotra and Galletta (2003), Park (2005), Jennex and Olfman (2006), Marta Mas Machua et al.(2012)
	Knowledge Creation	
	Knowledge Dissemination	
	Application & Reuse of Knowledge	

3. Research Approach

To study impact of organizational culture on KM, needed data is gathered from literature. This study has performed detailed analysis of literature and articles to develop a indepth understanding of the underlying concepts. Data for this research was gathered till January 2020 through series of searches through extant literature. Research papers regarding Organizational culture, KM and Knowledge culture were examined utilizing social sciences databases. The databases used for research are: Emerald, ProQuest Central, Business source complete (EBSCO), SAGE.

The searches were conducted using these key words: knowledge management, organizational culture, knowledge culture, organizational culture and knowledge management, knowledge sharing culture. These searches were replicated using above mentioned search strings in these databases. A systematic and orderly literature review was conducted and a selection criterion for papers was well specified. The research papers shortlisted for the study used the term: knowledge culture or knowledge management and/or organizational culture in their title. Moreover, references of all research papers selected were scanned to identify relevant research on topic. All research papers were analyzed from the perspective of the theme of the study. This is followed by the abstract scanning of all the papers. If the abstract didn't match the theme of the study,

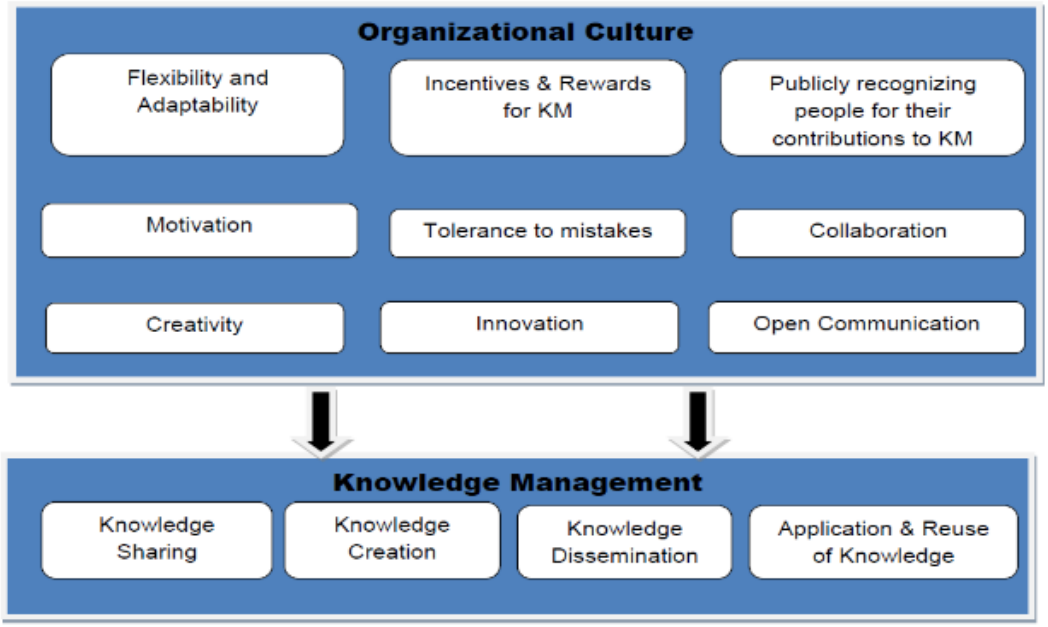
they were eliminated for further study. This has led to 104 papers. The succeeding step was detailed examination of papers. After the thorough examination, 30 papers were shortlisted and were further examined and analyzed. After executing this process, various aspects of organizational culture and KM were identified (Refer table 1).

4. Conceptual Framework

The success of organization to a higher extent depends on the culture pertaining in that particular organization. The culture drives the success of an organization as KM efforts and initiatives will stall if company's culture does not reflect creation and exchange of knowledge. It has been stated in literature that success of KM is contributed 80 % to culture and 20 % to technology (Liebowitz, 1999). The paper is an attempt to identify the various components of organizational culture that facilitates smooth knowledge management in an organization. In this paper, authors have tried to examine diverse elements of organizational culture from literature that facilitates knowledge sharing, creation, dissemination and use. The proposed framework attempts to derive the relationship between organizational culture and knowledge management so that they can develop a knowledge culture.

The proposed framework studies the impact of organizational culture which is an independent variable on knowledge management in an organization which is a dependent variable. The critical success factors for implementing KM are organizational culture (Dalkir (2005); Hung et al (2005)). Also, the culture not supporting knowledge creation and sharing is considered to be the obstacle for the organizations whose portfolio is completely based on knowledge (chase,1997). Knowledge culture entails establishing structure and process for knowledge sharing, transfer and advancement of knowledge from existing knowledge.

Figure1: Knowledge Management dependence on Culture (Compiled by authors)



5. Conclusion

The aim of the paper is to examine the impact of organizational culture on KM of an organization. The study endeavor to develop knowledge culture from the ongoing organization culture which fosters and facilitates KM activities in the organization. Thus authors have tried to encapsulate various factors in culture that can lead to successful knowledge creation, sharing, application and reuse. The various factors explored from the literature survey are open communication, flexibility and adaptability, incentives & rewards for knowledge sharing, recognition for contribution, motivation, tolerance to mistakes, collaboration, creativity and innovation. When all these components are embedded in an organization, it fosters knowledge creation and sharing. This paper conveys that culture lay downs the foundation for transforming individual knowledge of employees into synergy of knowledge in organization. This paper has tried to fill up the gap in literature linking organizational culture and KM. The authors had a realization that

literature acknowledges the importance of culture in KM but a framework linking the two concepts have never been an area of focus. The conceptual framework proposed in the paper deliberates specifically on cultures that have impact on knowledge creation, sharing, application and reuse. The culture that reinforces knowledge management in an organization definitely results in organizational success.

6. Study Implications, limitations & future Research

This research aims to contribute in the area of study by exploring the culture that leads to success of KM in organization. There has been emphasis of culture in KM of an organization by many authors (Luu Trong Tuan 2012), but the current research deliberates on developing a conceptual framework in which culture impacts KM of an organization. This paper provides a deep insight into the culture required for successful knowledge creation and sharing in organization. This research can have managerial as well as theoretical implications. Establishing and implementing link between culture and KM will lead to conceptualization of knowledge culture. Managerial implications can be initiated by developing an understanding in managers, that knowledge management won't lead to success until supported by the culture. Managers should realize that knowledge creation and sharing needs a culture that is open and flexible; motivates the employees for knowledge sharing by rewarding and recognizing; acceptance for mistakes; giving space for creativity and innovation. The theoretical implication implies contribution to literature, especially for the research scholars. The conceptual model proposed in the current research can be further tested empirically. The research findings provide deeper understanding to individuals as well organizations. KM can be successful in organizations if supported by enabling culture. In future, managers can assess the role of culture in the success of KM in organizations.

The KM activities like knowledge creation, sharing, dissemination totally relies on behavior and attitude of people (Ajmal et al., 2009). Thus it is necessary to check the alignment between organization culture and KM of an organization. Managers should consistently work on creating a knowledge centric culture. A knowledge friendly culture

is one that values knowledge and its creation, sharing and application (Migdadi, 2009). The current research may lead to the new shape in company's culture that values knowledge. This research is limited to conceptual model and is not tested empirically.

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A Study on Supply Chain Resilience: A Strategic Framework for Formative Elements

* **Manoj Kumar Rout**

Abstracts:

The aim & objective of the text is to focuses on the area of supply chain disruption management and aims to make a contribution by studying how firms can manage supply chain disruptions by (i) becoming resilient and by (ii) reducing the risk of supply chain disruption arising out of innovation. Firm resilience is the ability of the firm to: be alert to supply chain disruptions, to adapt and quickly respond to changes brought by a supply chain disruption and the ability to recover and return back to a state of greater competitiveness. In the text the conceptualize Supply Chain Resilience (SCRes) and identify which supply chain capabilities can support the containment of disruptions and how these capabilities affect SCRes. The next part of text emphasize the role of firm resilience in mitigating the effects of a supply chain disruption and focus on understanding factors that enhance firm's resilience with suitable cases study. At first, develop the concept of firm resilience, explore its antecedents and consequences and empirically establish its nomological and predictive validity. After that, look at supply chain disruptions that result from firm's strategic focus on innovation and consider the role of a risk management infrastructure that a firm has in place in reducing the risk of these disruptions. As a result "the ability to proactively plan and design the Supply Chain network for anticipating unexpected disruptive events, respond adaptively to disruptions while maintaining control over structure and function and transcending to a post-event robust state of operations, if possible, more favorable than the one prior to the event, thus

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gaining competitive advantage". Finally, a critical examination of conceptual frameworks for understanding the relationships between the SCRes concept and its identified formative elements, is taking place.

Keywords: Supply Chain Resilience (SCRes); Supply Chain Management; Supply Chain Disruptions.

Introduction:

The modern supply chains are at greater risks than their supply chain managers recognize. "In today's uncertain and turbulent markets, supply chain vulnerability has become an issue of significance for many companies and appropriate researches on resilient supply chain are yet to be conducted" and as "the numbers and types of threats that can undermine a supply chain are now greater, organizations are facing greater challenges in managing risks than ever". These risks including natural disasters, terrorism, cyber-attacks, credit crunch and many more could yield to a drastic loss in productivity, revenue, competitive advantage, profitability etc, if not managed appropriately, and that is why a resilient supply chain is of great importance. The objectives of the research is to develop a supply chain resilient strategy to "govern" the upper stream and lower stream of the supply chain including the supply chain partners in order to help organizations bounce back after deformation along the supply chain. This article is divided into four parts namely, the supply chain, the supply chain management, the supply chain risks and the supply chain resilience. The first part which is the supply chain, analyses the supply chain in which the authors have integrated the stages of the supply chain with the flow of materials, information and money into a diagram to illustrate how dynamic the supply chain is. The next section, which is the supply chain management, discusses the importance of the supply chain management where the flow of materials etc, needs to be effectively and efficiently managed by various business functions. These business functions include research and development, operations, finance department, distribution, customer service etc from the upper to the lower levels

of the supply chain. The supply chain risks section portrays the risk involved in managing the supply chain, and emphasizes the vulnerability of the supply chain whereby risk is still a concern and should not be neglected in today's uncertain and turbulent markets. The last section, the supply chain resilience, recommends appropriate strategies that could be used to "combat" risks and deformities along the supply chain so that organizations will be able to bounce back after any deformation along the upper stream and or lower stream of the supply chain. Creating a resilient supply chain could be the answer; however, this is a new area of study that still needs to be properly investigated. Although, "resilience" could be defined as the ability of a substance to get back to its original state after deformation, there is still no concrete definition of a "resilient supply chain" or "supply chain resilience". This paper therefore analyses the supply chain and the risks it faces, investigates the resilience of the supply chain, and gives appropriate strategies and tools that would help avoid these risks, and as a result, an organization would be able to bounce back after any deformation along its supply chain.[1,2 & 3]

The Supply Chain:

Before reflecting on the "supply chain resilience" it is necessary to grasp a better understanding of the supply chain itself. In other words "a group of inter-connected participating companies that add value to a stream of transformed inputs from their source of origin to the end products or services that are demanded by the designated end-customers", or "a general description of the process integration involving organizations to transform raw materials into finished goods and to transport them to the end-user" etc. Supply chain is a sequenced network of business partners involved in production processes that convert raw materials into finished goods or services in order to satisfy the consumers' demand". A simple supply chain includes raw materials suppliers' suppliers, raw material suppliers, manufactures, distributors, retailers and customers as shown in Figure 1 below.

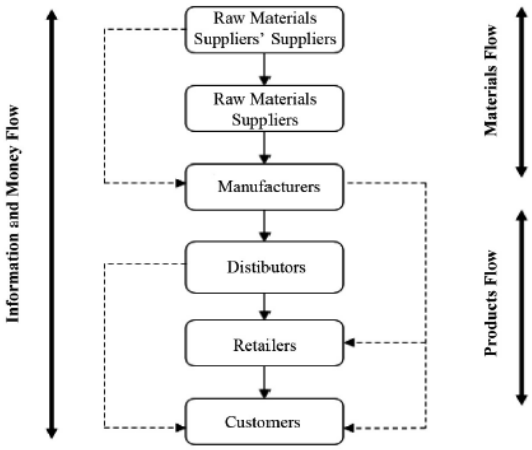

Figure 1. Stages of Supply Chain

With reference to Figure 1, in the upper level of the supply chain, the manufacturers receive their raw materials from their raw materials suppliers or the raw materials suppliers' suppliers. Value is then added to the materials which are converted into goods to be exploited in the lower level of the supply chain. This is made possible by the manufactures passing on the value added products onto the distributors that distribute the products to the appropriate retailers that can easily reach the target customers. [1, 2 & 12]

The Supply Chain Management:

The "supply chain management is aimed at examining and managing supply chain networks", thus the stages discussed in the former chapter if not managed accordingly, organizations would find themselves underperforming that can lead to a loss in competitive advantages and profitability. The Council of Supply Chain Management Professionals states that "supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers". Consequently, from figure 1, taking the manufacturers into consideration, various business functions including research and development,

operations, etc should be capable enough in order to effectively manage the materials, products, money and information flow between the upper and lower levels of the supply chain. [5 & 13]

Managing the Supply Chain:

According to Institute for Supply Chain Management three factors namely, decision making, strategy and tactics (DMST) are essential when managing the supply chain. These factors are illustrated in Figure 2 below.

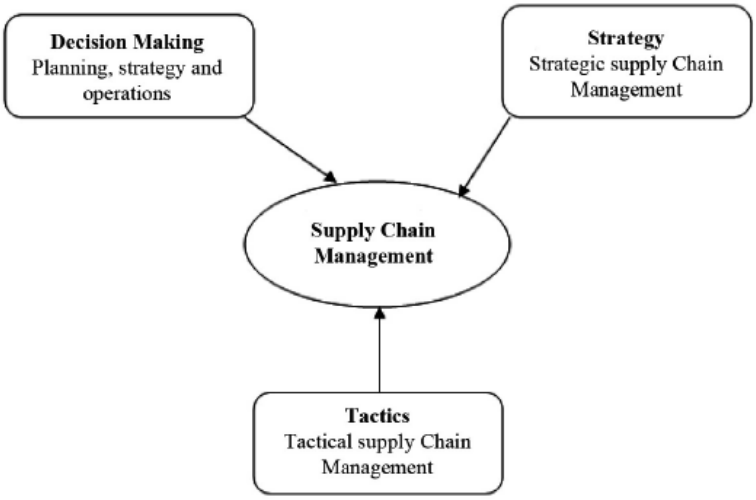

Figure 2. Managing the Supply Chain – DMST

Decision Making: The decision making involves planning, strategy and operations which are given below;

Planning: The planning consists of defining the organization's goals, establishing a strategy to achieve the necessary goals, and on the other hand integrating and coordinating activities through proper arrangements. All of these lead to the development of an appropriate strategy for the supply chain.

The strategic decision making: After planning, the supply chain has to be designed, crafted and developed for the production of particular goods or services. As top managers are responsible for decision making about the mission and direction of the organization, and establishing policies that affect all organizational members, they will have to take the responsibilities of crafting the appropriate cost effective supply chain that is responsive to customers' demand, whilst facilitating product development, manufacturing and logistics.[6, 13 & 14]

Operations: The application of the transformation process where organizations add value by converting inputs into outputs along the supply chain is known as operations. its vital to create an integrated supply chain management where all the parties involved are well informed about the processes, developments and changes.

The strategic supply chain management: The strategic supply chain management is essential as it has to achieve its main goal which is most probably the customer's satisfaction. In order to achieve this goal, the organization should have the necessary competencies and skills to select and link reliable suppliers so that value is added on materials, products and services along the supply chain that would lead to profitability and competitive advantages.

Tactical supply chain management: The tactical supply chain management involves the continuous monitoring of activities along the supply chain using appropriate IT software while sharing information as well as being engaged in continuous planning and making necessary changes. Although effective strategies have been introduced to govern the supply chain, it is still vulnerable to disruptions in which some of the risks involved are unavoidable.[6,7 & 8]

Supply Chain Risks:

There are many risks to be analysed in the supply chain from high profile risks such as disasters like earthquake, terrorism, tsunami, SARS etc, to the more common risks which are mainly operational". These common risks include demand, supply, materials and information flow. If there is a delay in the flow of materials and information in the upper level, it would yield to a problem of visibility where confidence in the supply chain is weakened as "the time it takes for materials to move from one end of the supply chain to the order is long" and the information flow along the supply chain is not accurate enough. As a result, this would cause a delay in production and supply which could "ridicule" some of the business functions especially the marketing and sales department as they would lack adequate knowledge to respond to customers' demand. Understanding Supply Chain Risk Areas, Solutions, and Plans ,the risks in operational supply chain are many and they include the following: [9 & 15]

A variety of supply interruption risks

- Demand and supply planning and integration risks
- Purchase price risks
- Inventory and obsolescence risks
- Regulatory and compliance risks

Information privacy and security risks

- Customer satisfaction and service risks
- Contract compliance and legal risks
- Process inefficiency risks
- Employee and third-party fraud risks
- Product introduction and cycle time risks
- Human resource skills and qualifications risks
- Project management risks
- Corporate culture and change management risks
- Information integrity and availability risks.

The probability of dealing with or managing all the above risks especially in a small organisation is quite low,
and a few according to their importance, namely:

1) Demand and supply planning and integration risks
2) Inventory risks
3) Customer satisfaction and service risks
4) Information integrity and availability risks

The Supply Chain Resilience:

The dictionary definition of "resilience" states that it is the ability of a substance to return to its original shape after it has been sent, stretched or pressed. Although "resilience" could be defined as the ability of a substance to get back to its original state after deformation, there is still no concrete definition of a "resilient supply chain" or "supply chain resilience". The disruptions discussed here are major and high profiled, and if occurred, the results could be catastrophic for organizations and they might end up in bankruptcy or terrible loss in profits. Additionally, "in today's uncertain and turbulent markets, supply chain vulnerability has become an issue of significance for many companies and appropriate research on resilient supply chain are yet to be conducted".[10, 11 & 14]

Developing a Resilient Supply Chain:

The resilient supply chain could be developed by organizations, through planning and implementing lean production, six sigma practices, flexibility and a strong corporate culture. As a result, these organizations would have the capabilities to speed up the process of bouncing back after deformation on any part along the supply chain. [9]

Case Study-1: Applying Lean Production in Kurl-on Limited, , Bhubaneswar,

Kurl-on's journey is a fine lesson of entrepreneurship. During a visit to Germany, Mr. Ramesh Pai discovered that high-end motor car seats were made of rubberized coconut-coir fibre manufactured from Sri Lankan base material. Mr. Pai knew that India was one of the largest producer of coconut in the world and so, Mr. Pai discovered there was a new business to be pioneered. Charged with this thought, he returned home to start his journey of discovering how best he could take advantage of the coir husk produced by India. Mr. Pai found that coconut coir was being used only by the cottage industry to manufacture retted fabric, from here Mr. Pai's idea took shape and became Karnataka Consumer Products Limited which was further known as Kurl-on. Mr. Pai brought in Austrian technology to extract fibre from the husk and curl it into ropes. Rather than restricting himself to mattresses he also developed an ancillary range of products such as cushions and mats. In 2004, it ventured beyond providing just a better sleep experience and extended its product range into the home comfort segment.

In fact, the Toyota Production System (TPS) and lean manufacturing are commonly used as synonyms to lean production. There are many definitions today defining lean production, "the definition of lean production is highly elusive". One of the definitions that the authors of this article prefer, states that, "lean production is 'lean' because it uses less of everything compared to mass production, half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the needed inventory on site, results in fewer defects, and produces a greater and ever growing variety of products". It is quite clear from the definition that waste is avoided in all the functions of the organization. Furthermore, lean production consists of four major parts namely awareness, quality assurance, level production and just in as portrayed in figure below:

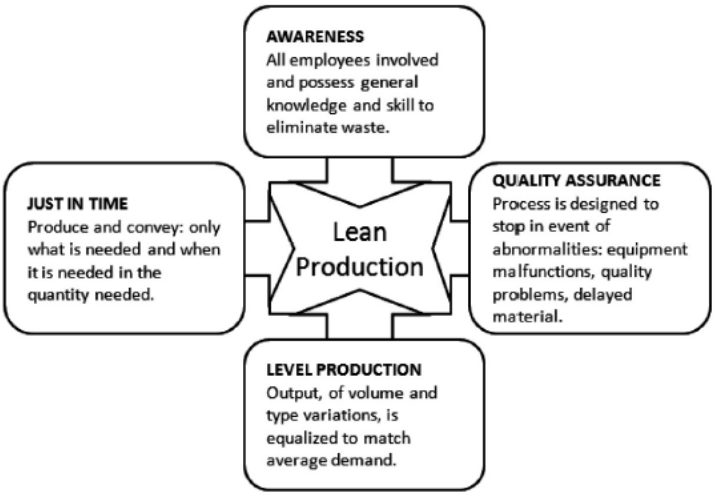

Figure 4. Toyota Productive Systems in Kurlon limited

Awareness: The Toyota Company ensures that all their employees have adequate knowledge and are actively involved in eliminating wastes. Through awareness, employees are performance focused, practice continuous improvement or "Kaizen" and are empowered to make decisions and manage on site when necessary.

Quality Assurance: The quality assurance ensures that all machines and equipment should stop and raise an alarm when there is a defect so that the machines would not be damaged; this is known as the "Poka Yoke". Likewise, employees working on the conveyor belt or operating a machine should stop the machine if there is a defect or problem. Hence, quality is checked at each stage.

Level Production: The level of production is driven by customers' demand in order to avoid overproduction or underproduction.

Just in Time: The necessary materials arrive when they are needed in the right quantity resulting in a smooth flow of the materials.[10]

Linear Programming Model (Aggregate Production Planning Model):

The following model is based on the Lindo Systems optimisation. Many LP models contain hundreds of constraints and decision variables. The objective of the model is to minimise all related costs in the setting up of an aggregate plan. Such costs include raw material cost, labour costs i.e. regular, overtime, hiring and firing costs, inventory costs, backorder, subcontracting and lost sales cost.

Model parameters:

Products j: 1… N N =5

Periods t: 1… T T=12

N = 1 – General mattress

2 – Lounge mattress

3 -- Bedroom mattress

4 – Occasional mattress

5 -- Office mattress

T= 1 -- January……..T = 12 for December (2020)

Parameters:

Dtj = demand forecasted for product j in period t

mtj= hours required to produce 1m3 of product j in period t

OTCAPtj= overtime production hours for product j in period t

WRCAPMAXtj= maximum number of workers for product j in period t

WRCAPMINtj= minimum number of workers for product j in period t

wj= raw material cost per unit of product j

ij= inventory carrying cost per unit of product j

bj= backorder cost per unit of product j

lj= lost sales cost per unit of product j

MINIj= minimum quantity of inventory per product j

MAXIj= maximum quantity of inventory per product j

MAXBOj= upper limit for the amount of product j that can be backordered

IBj= initial value of inventory

BBj= initial value of backorder

WH= number of regular per worker in period t

r= cost of man hour regular time

o= overtime cost per man hour

h= cost of hiring a worker

f= cost of firing a worker

Decision variables:

Xtj= units of product j to be produced in period t

INtj= quantity of product j to be kept in inventory in period t

BOtj= quantity of product j to be backordered in period t

LStj= quantity of product j which the firm loses in in sales in period t

OTtj= man hours of overtime labour used in period t for product j

WRtj= number of workers for product j in period t

RHtj= regular man hours of product j in period t

HRt= number of workers hired in period t

FRt= number of workers fired in period t

Model:

The objective of the company is to minimise total costs and the model can be constructed as follows

$$\boldsymbol{Min\ TC} = \sum_{t=1}^{T} \sum_{j=1}^{N} (\boldsymbol{WjXtj} + \boldsymbol{ljLStj} + \boldsymbol{bjBOtj} + \boldsymbol{ljINtj} + \boldsymbol{rRHtj} + \boldsymbol{oOTtj}) + \sum_{t=1}^{T} (\boldsymbol{hHRt} + \boldsymbol{fFRt}). \qquad \text{.....(1)}$$

Constraints:

$$X_{tj} + IN_{t-1,j} - IN_{tj} + LS_{tj} + BO_{tj} - BO_{t-1,j} = D_{tj} \quad \forall(t,j) \quad (2)$$

$$\sum_{j=1}^{N} WR_{tj} - \sum_{j=1}^{N} WR_{t-1,j} - HR_t + FR_t = 0 \quad \forall(t) \quad (3)$$

$$m_{tj} X_{tj} - OT_{tj} - RH_{tj} \leq 0 \quad \forall(t,j) \quad (4)$$

$$WR_{tj} \leq WRCAPMAX_{tj} \quad \forall(t,j) \quad (5)$$

$$WR_{tj} \geq WRCAPMIN_{tj} \quad \forall(t,j) \quad (6)$$

$$RH_{tj} \leq WH \times WR_{tj} \quad \forall(t,j) \quad (7)$$

$$OT_{tj} \leq OTCAP_{tj} \times WR_{tj} \quad \forall(t,j) \quad (8)$$

$$IN_{tj} \geq MINI_j \quad \forall(t,j) \quad (9)$$

$$IN_{tj} \leq MAXI_j \quad \forall(t,j) \quad (10)$$

$$X_{tj}, RH_{tj}, OT_{tj}, HR_{tj}, FR_t, WR_{tj}, \geq 0 \quad \forall(t,j) \quad (11)$$

$X_{tj}, BO_{tj}, LS_{tj}, HR_{tj}, FR_t, WR_{tj}, IN_{tj}$ are integer values

The LINGO 13.0 model was constructed and the results are given. Equation 2 is a constraint that ensures that the production quantities, backordered quantities and lost sales do not exceed the total demand quantity. Equation 3, 4 and 6 are constraints about the number of workers. Equation 4, 7 and 8 are constraints about regular and overtime working hours. Equation 9 and 10 are inventory limiting models.

Application of trial and error methods:

Application for different strategies will be done with a view of comparing results. This was covered in conjunction with other evaluation methods.

Chase strategy: Chase strategies entail production at a rate in unison with demand. The strategies available include changing the workforce level. The strategy keeps the maximum workforce at 200 which is enough to meet maximum demand at the current production levels. The minimum required level of workforce is 93. The extra manpower is hired and laid off as and when necessary. In this strategy a workforce size of 108 is needed at the current utilization levels of around 54%. The minimum number of workers required is 93 and the cost of this strategy amounts to $ 3,439,798. This can be attributed to the failure of this strategy to fully meet demand as can be seen by lost sales in all the

months of year except January and December. The costs of the different strategies are shown in the Table 2.

Level strategy : The level strategy employed 200 workers producing 60m3 of products per month. The advantage of using this strategy for Furniture Company is that the first and last months of the year can be used to build stocks that might be used during periods of peak demand. The total cost for this strategy is $ 2 095 254. Labour cost and inventory holding cost for this strategy are significant factors that contribute to the total product cost.

Mixed strategy: Analysis of all strategies shows that the level strategy can be used to reduce costs even further by utilising the backordering process where delivery to customers is postponed until production can match demand yields reduced cost. The total cost for this strategy amounts to $2 049 681. There is a significant backordering cost associated with this strategy in comparison with the level strategy.

Lingo solution:

The total cost computed by the LINGO 13.0 model is $1 878 384 which is a slightly better solution as compared to the trial and error methods. LP models can be practical and beneficial once models have been constructed. Constraints are easily applied to the formulated model. According to the generated solution of the linear production model a workforce of 108 people is enough to cater for the whole year with variation in demand being met using inventory and over time. Most of the demand is met within the year so there is backordering and lost sales cost. Trial and error methods also give a good approximation of the production costs and cannot be totally ignored. However in real life situation many objectives have to be settled at once not just the cost aspect to it. For instance it might be necessary to reduce cost, reduce the hiring and firing rates and the cost limits. Linear programming can be modelled to cater for the underachievement or

overachievement of certain goals like inventory levels, firing and hiring thresholds and the ceiling production cost targeted.

Data Analysis:

Table 2: Comparison of Strategies

Cost	Hire/Fire	Overtime	Subcontract	Level	Mixed
Raw Materials	1251690	1497078	1252690	104000	1252690
Labour	1038853	686880	509494	636000	636000
Backordering	0	0	4314	0	139425
Lost Sales	0	1245753	0	0	0
Inventory Holding	10087	10087	10087	65142	2166
Subcontracting	0	0	593435	0	0
Total cost	2301630	3439798	2370021	2095254	2049681

Cost Analysis: The current cost analysis at Spring Master Company shows that the cost of sales for the 2011 trading year was $ 1 965 456 against a figure of $ 1 410 814 for 2010. However the total annual production for 2011 was 446 m3 against a figure of 464m3 for 2010. The cost of sales can be broken down into the following categories as depicted in the Table 3.

Table 3: Cost of Sales Analysis

	2011	2010	Average Percentage Contribution
Cost of Sales	1965456	1410814	
Direct Material Cost	49.8%	49.8%	49.8%
Direct Staff Costs	40.4%	41.8%	41.1%
Maintenance Costs	6.8%	7.0%	6.9%
Direct Operating Expenses	7.3%	8.6%	8.0%

ISO & Quality Costs	0.3%	0.2%	0.3%
Direct Overhead Costs	-4.7%	-7.4%	-6.0%

From the above analysis and the fact that the computed results from the trial and error methods and the linear programming model exclude maintenance, quality and direct operating expenses. The cost of sales in the table can then be adjusted to exclude these costs to enable a fair comparison.

Table 4: Cost Comparison

	Cost	Quantity Produced	Number of Employees
Current	1786389	446	194
Previous Year (2010)	1282279	464	179
Trial & Error	2049681	720	200
Linear Programming	1878384	720	108

From Table 4 it can be appreciated that the cost of sales has gone up since the previous year i.e. 2010 this can be attributed to the increase in cost of raw materials, overheads and direct labour costs. An accurate assessment of the cost can be based on the parameter presented in Table V below

Table 5: Cost Per Unit

	Cost per m^2
Current	400535
Previous Year (2010)	276353
Trial & Error	284678
Linear Programming	260887

The analysis shows an average of $3 384,44 per cubic metre over the past two years. Adopting aggregate production planning process yields a cost reduction of 16% per m3 on the spread sheet model and 23% on the use of linear programming models.

Case Study-2: Increasing SC flexibility for Onion Supply

The tremors of the COVID-19 pandemic are being strongly felt by nations and the human race at large. With each day passing by, the numbers related to the virus are continuously escalating at an unprecedented level. In spite of the various steps taken by leaders of nations, cumulative efforts of the central and governments to curtail the spread of the virus, individuals and economies are still suffering . Business operations across varied trades and verticals have been hit as the virus continues to rampage unimpeded and from a manufacturing perspective, a large chuck of organizational supply chain systems have been completely disrupted. Supply chain managers across organizations across multiple industries are faced with various risks after the spread of COVID-19 . Taking the shape of a global disruption across industries, the impact of this pandemic has affected major operations by virtue of the challenges to the supply chain model and difficulty in evaluation of its impact. Especially, those large number of organizations which are at the heart of highly impacted regions are finding it extremely difficult to manage the huge disturbance . In spite of the fact that predicting the exact repercussions of the pandemic in days to come would be quite troublesome, many firms are still trying to deal with material shortages by re-routing, re-arranging transportation systems routed from affected logistical hubs and at the same time deal with acute shortages in labour on account of quarantine systems or infection . It would to safe to say that no industry is secure to the disruption caused by COVID19, especially those industries having lower levels of inventory in-hand and those having limited options for sourcing of crucial manufacturing components are more vulnerable to major disruptions in the supply chain system .

The impact of the pandemic was also substantial on agri-food supply chain in India, which has led to surges in food prices, affecting the various onion value chain players (Table 6). There has been a three-fold rise in the prices of key staples as compared to the previous months. One of the main factors for such price rise includes, drastic escalation in land transportation costs on account of the restrictions placed on movement of vehicles . The inability of truck drivers to cross inter-state boundaries have led to acute shortages of staples and sharp rise in prices of agri-food products. In order tom explain the impact we can take the example of acute crunches in tomato and onion supply. For example, considered to be the biggest onion market in Asia, the area of Lasalgaon (a census town in Nashik District in the Indian state of Maharashtra) saw arrivals of nearly 11,878 quintals of onion in the month of April 2020, trading at a modal price (a type of average, which is the price point occurring the most number of times during auctions) of USD 10.27 (INR 775) per quintal (100 kg). As compared to the previous month (March, 2020) the onion arrivals in Lasalgaon stood at 73,955 quintals, a drop of 83% in April was witnessed due to transportation issues.

Table 6: Onion Value Chain players in Nashik

Sl. No.	Value Chain Player	Details
1	Input Supplier	Sahyadri Farms
2	APMC (Agricultural Product Marketing Committee)/Mandi Officials	Meeting with Nashik, Pimpalgaon, Lasalgaon APMCs, Secretary and other officials
3	Onion Cultivating Farmers	Farmers in Fields, Mandis and at FPO(farmers producer organisations)
4	Farmers Producer Organization	Sahyadri Farms
5	Large Traders/Exporters/Wholesalers	At APMC Mandis and their own Godowns/Warehouses
6	Bank Officials	Lead Bank- bank of Maharashtra, State bank of India, Yes bank, HDFC bank, Nashik District Central Co-Operative Bank
7	Processing Units	Sahyadri Farms, Varun Agro Processing Foods

8	Other Institutions	District Administration, Government Department, National Horticultural Research and Development Foundation (NHRDF), National Horticulture Board.

This paper is divided into three sections, in section one we allude to the theoretical background of our study i.e. Agri-Food Supply Chain (AFSC). In the subsequent part of the paper, we talk about the major issues of the supply chain system in the form of high transportation costs. Followed by a suggested method to optimize such costs. In the final section of the article we discuss the possible supply chain resilience strategies which could be adopted by government, supply-chain stakeholders and logistics firms for tackling the disruptions caused by the spread of the pandemic.

Considered to be a major societal issue, the distribution of agri-food products to local aggregators has led to acute shortages, hoarding and price hikes. In the direction of the same the development of an extremely responsive agri-food supply chain is required. Considering the high demand of agri-food products in developing countries, issues pertaining to agri-food supply chains should be given more priority both at the academic and organizational level. Unavailability of related location specific literature has led to lack of clarity on the impact of socio-economic dimensions on agri-food supply chains . Directionally, a framework has been illustrated in figure 5, given below to facilitate a better understanding of the agri-food supply chain network.

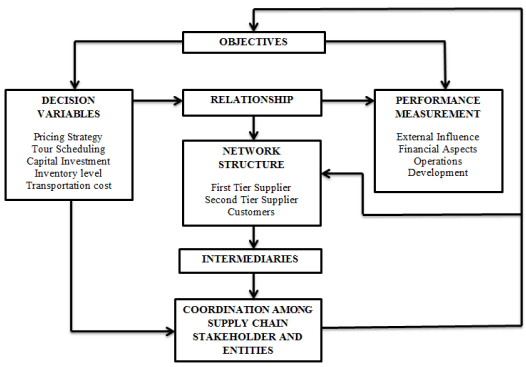

Figure 5: Agri-Food Supply Chain System

Optimization of Transportation Costs:

For optimization of transportation cost of agri-food products (e.g. onion) was calculated by the North-West Corner method, as illustrated in Tables 2 and 3 below. The method was adopted to compute the initial feasible solution of the transportation problem for a weeks' supply of onions. The logistic has to transport the onion shipment from warehouse origin (labelled 1, 2, & 3 vertically on the extreme left corner) to the destination (labelled 1, 2, 3 & 4 horizontally on the top). The supply at origin and demand at the destination is shown in table-7 below.

Table 7: Transportation Cost Optimization for Onion Supply (Problem)

To / Source	1	2	3	4	Supply
1	6	9	5	7	60
2	7	4	7	5	50
3	5	9	8	4	70
Demand	40	30	60	50	180 / 180

Table 8: Transportation Cost Optimization for Onion Supply (Solution)

To / Source	1	2	3	4	Supply
1	6 (40)	9 (20)	5	7	60
2	7	4 (10)	7 (40)	5	50
3	5	9	8 (20)	4 (50)	70
Demand	40	30	60	50	180 / 180

The Total cost can be computed by multiplying the units assigned to each cell with the concerned transportation cost. Therefore, Total Cost = 40*6+ 30*9+ 10*4+ 40*7+ 20*8 + 50*4 = INR 3110 (USD 41.14). From the above results, the total cost incurred for transportation of onion supply for one week was INR 3110 (USD 41.14). Based on the problem discussed above i.e. a drop of 83% in onion supply at Lasalgaon in April 2020, the solution provided above in crucial in reducing the transportation costs, thereby facilitating supply of onion as per market demand.

Strategies for Supply Chain Resilience:

Organizations should develop progressively cooperative associations with suppliers so as to fabricate hierarchical versatility. Anyway, manufacturing concerns need to comprehend their supply chains all the more profoundly. We would encourage organizations to utilize all the innovation accessible to proactively design their supply chain activities and hope to gather the most forward-thinking information . There will be a first-mover advantage for those whose products are prepared to be transported. What's more, if products have must be upgraded due to an adjustment in materials, it is an ideal opportunity to get suitable accreditations arranged for the nations where they will be sold. We have additionally enlisted the potential strategies beneath:

i. **Develop Supply Chain Flexibility -** Companies need to incorporate readiness and speed with the supply chain by making smaller scale supply chains; limited, decentralized, deft 'little working models', with adaptable supplier agreements and associations with assembling nearer to the point of procurement. They also need to investigate techniques to 'purchase where they make, and make where they sell.'

ii. **Smart Procurement/E-Commerce:** To enable organizations comprehend sourcing requirements, advance machine learning can be utilized depending on past purchases, pricing, agro and modern patterns, among others.

iii. **Supply chain automation and analytics:** By using end-to-end data management techniques that take the form of an information warehouse of sorts' manufacturers can capture transactions linked to the supply chain more accurately, consistency, and minimum repetition. Through this approach, organizations can gain market insights which can assess supplier performance, supply chain diagnostics, and risk management.

iv. **Risk management of suppliers:** Risk management at N-tier level of suppliers can aid organizations in deciding on cost structures, trend performance data, and enhance supply chain visibility into the extended value chain. This could assist organizations in avoiding abrupt supply chain disruptions and dealing with lack of information.

v. **Supply chain simulation:** By developing new supply chain strategies based on changes in the business/operating model, firms can approve and distinguish the best cost-efficient network to accomplish the necessary service level across the value chain.[11, 12 & 13]

Conclusion:

In this work it was shown that trial and error methods provide a good approximate on its use and application in an industrial set-up. Cost savings of at least 16% per cubic metre were observed and throughput of 2.27m3 per day was proffered as attainable. The Indian matress industry lacks latest technology and these methods provide helpful production plans. Most developed software on the other hand provide easy to use solutions which can be more exact and accurate than trial and error methods proposed (cost savings of 22% were realised using the linear programming model). Furniture industry is a labour intensive sector, therefore not all proposed theoretical solutions such as hiring and firing and subcontracting are beneficial to the sector.From the above Lasalgaon case study, it was found that the agri-food supply chain resilience can be enhanced by optimizing the transportation cost through the North-West-Corner method. Supply chain models have

come to be exceptionally modern and crucial to the seriousness of numerous organizations. Be that as it may, their interlinked, worldwide nature additionally makes them progressively defenceless against a scope of dangers, with increased potential purposes of disappointment and less safety buffer for engrossing deferrals and disruptions. From a manufacturing point of view, the present circumstance is probably going to quicken digital transformation activities for organizations over the globe, as they are compelled to confront their shortcomings and vulnerabilities. An innovation-driven business model will develop as more basic and significant than any other time in recent memory and will assume a key job in characterizing strategy as we reconsider the worldwide supply chains of tomorrow. In view of exercises that are being fortified and approved in the current worldwide emergencies, there are a few manners by which organizations can develop strong supply chains in the post-COVID world. For instance, there is a dire need to lessen reliance on physical labour across transportation and warehousing. This can be empowered through advances such as Industry 4.0, IoT, blockchain, big data, control towers, AI-empowered forecasting of demand, rule-based and self-changing stock portions. From an absolutely business viewpoint, COVID-19 presents a large number of genuine and once in a while remarkable difficulties for associations cutting over the business condition, including a potential liquidity crunch, worldwide supply chain interruptions, increment in exchange hindrances, and an ever-changing customer outlook. Notwithstanding, the post-COVID world will see advanced innovations assuming an empowering role in conveying upgrades all through the expansiveness of organizations, including stronger supply chains, altogether improved client encounters, and smartly streamlined procedures to deliver business results.

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Impact of covid-19 in Foreign Direct Investment (FDI) in India

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Abstract

Covid-19 has changed the way how world works in future. During covid-19 businesses have undergone lot of changes to survive through these turbulent times. Pandemic has also taken a toss on FDI which is a backbone of any country's foreign exchange reserves. This paper aims at studying the Flow of FDI during pandemic times with reference to INDIA. Paper will talk about impact of FDI in various sectors in India during pandemic. Also, paper will contribute by finding reasons for increase and decrease in FDI in various sectors in India.

Purpose of the study- Thought of the paper was conceptualized after noticing positive trend in FDI in India even if pandemic time when all other nations were suffering on that front. This became a viable topic to research on.

Objectives & Design- Study will be based on secondary data reports published in Newspapers, magazine from sites of banks and other financial institutions.

Findings - Study came up with interesting findings on how developing economies like India and China have managed to attract more FDI even during pandemic time. Study found out sectors which attracted more FDI during pandemic time and also stated reasons for the same.

Implications- Study has very valuable implications for other countries on how that can attract more FDI with kind of policy adapted by Indian Government.

KEYWORDS: FDI, Covid-19, Recession, Economy, GDP, Pandemic, Sector wise, DIPP

Introduction:

Foreign direct investment (FDI) is when an investor of one country invests in a business based in another country, it is significant for developing economies and emerging markets where companies need funding and expertise to expand their international sale. Foreign direct investment in India was introduced in 1991 under the foreign exchange management Act (FEMA) implemented by the then finance minister of India Dr. Manmohan Singh commenced with the baseline of 1 billion dollars. Besides a driving economic growth critically foreign direct investment (FDI) has been a major non-debt financial resource for the economic development of India. Many foreign companies invest in India to take various advantages such as, relatively lower wages, robust business environment, the Indian Government's favorable policy regime, special investment privileges like tax exemption, relaxed FDI norm across various sectors, etc. In 2014 India launched a campaign called "Make in India" to make India a global manufacturing hub.

FDI in India shows a positive growth since the launch of "Make in India" campaign. During this campaign Govt. of India made FDI policy reform in various sector and increase the limit of percentage of FDI. On 17 April 2020 India changed its FDI policy to protect Indian companies from opportunistic takeovers of Indian companies due to current covid-19 pandemics.

Objectives:

1. To study about Impact of Covid-19 on FDI in India.
2. To find out reasons of FDI increase in India even in pandemic time.

Research Methodology:

- Data collection method is secondary data.
- Research design is exploratory research design.
- Analysis is based on facts and figures derived from secondary data and as per the researcher's understanding.

Literature Review:

Many countries have taken globalization positively, various adaptable investment policy over the world resulted into heavy flow of FDI. Due to covid19 pandemic the

global economy had gone into recession which saw a negative GDP growth of the economy across the globe except China. During this time many major economies faced decline in FDI inflow and increase in FDI outflow, but in the same duration India record 13% FDI growth in 2020. In the article, "India records 13% FDI growth in 2020, higher major economies. 5 reasons why." written by Ms. Sanchari Ghosh which was published in livemint.com on (2021), elaborated about FDI flow in India during Covid-19 pandemic. Not only India, but China also first showed remarkably high FDI growth i.e., 4%. Investment in digital economy continues particularly through Acquisition. India and Turkey then attracted record number of deals in IT consulting and digital sector, including e-commerce platform, data processing services and digital payment. A research paper written by Mr. Kapish Aggarwal which was published on (2020) highlights the growth of FDI inflow in India. FDI inflows saw a gradual decline from the onset of pandemic in February which saw a steep increase in the 2nd quarter of financial year 2021. Sector wise data of FDI inflow in India shows that service sector attracted the highest FDI of $1.14bn during the 1st quarter of financial year 2021 followed by computer software and hardware($1.06Bn). Telecommunication sector which received the largest amount of FDI during the same quarter of last year was the worst hit. Hotel and tourism sector also was one of the worst heat sectors. During the 1st quarter of financial year 2020-21, the state which attracted the most FDI includes Karnataka & Maharashtra. The countries production of Covid-19 Vaccine has helped to gain FDI in pharmaceutical (Shehadi, 2021). According to department for promotion of industry and internal trade (DPIIT)", brown field ventures in India got more FDI flow than green field ventures. India's demographics, a young working population, the large market size are key factors that put positive impact on foreign investors which resulted in heavy FDI inflow in India even during covid-19 pandemic (Mohapatra et al, 2021). Indian government favorable policy regime and robust business environment also helped in increasing FDI inflow. FDI relaxation norms across various sectors also impacted FDI inflow positively (IBEF, 2021).

"IMPACT OF COVID-19 ON FDI IN INDIA"

The foreign direct investment inflows saw a gradual decline from the beginning of pandemic in February 2020. For the 1st quarter of financial year 20 most country saw a major decline in their contribution towards equity inflows. At the Covid time all the major economies of the world had gone into recession. The GDP growth was in negative except China. "Investment trends monitor" issued by the United Nations conference on trade and development (UNCTAD) said global FDI collapsed in 2020 by 42% to 859Bn USD from 1.5T USD in 2019. Such low level was last seen in 1930. The low in 2020 is more than 30% below from 2008-09 global financial crises (Mulye, 2020).

But in the global pandemic situation the FDI inflow was positive in India and China (Ghosh, 2021). Due to the robust business environment and favorable policy regime India's govt. has ensured that foreign capital keeps flowing in the country. Some of the major companies which saw investment during this time includes Byju's, Reliance, Cashaa, Unacademic, Phoenix mills etc. (Aggarwal,2020). These investments were driven by some of the biggest companies in the world like google, Foxconn, Amazon, Facebook, Silver Lake, Soft bank group and many more.

Though net inflow of FDI in India dropped from February to June, but gradually increased in July and august 2020. Monthly trends of net FDI inflows fell by 60% to $6.56Bn (Aggarwal,2020). Second quarter during April-June 2020 compared to the same quarter of previous year which stood at $16.33Bn. Second quarter of FY20 saw a steep increase in FDI mainly because of the $10Bn investment by google. FDI inflows surged from $11.52Bn between April and June to $38.15Bn by the end of September (Aggarwal,2020).

Investment in digital economy continued particularly through acquisition. Cross border merger and acquisition grew 83% to $27Bn (Ghosh,2021). India attracted record no. of deals in IT consulting and digital sector including e-commerce platform, data processing services and digital payment. Investment came from various countries all over the world. Singapore is the no. 1 country in terms of FDI investment in India.

In the 1st quarter of financial year 2020-2021 i.e., from April 2020 to June 2020 India received 49,820Cr amount of FDI inflow. In the month of April, it received 21,133Cr, in May it received 16,951Cr, in June it received 11,736 cr. Karnataka got the highest FDI i.e., Rs.10255 Cr., whereas Maharashtra is at 2nd position Rs.8859 Cr. & Jharkhand is at 3rd i.e., Rs. 5985Cr. (dipp.govt.in).

In the 2nd quarter of financial year 2020-2021 i.e., from July 2020 to September 2020 India received 174,793Cr amount of FDI inflow. In the month of July, it received 22,866Cr, in August it received 130,576Cr and in September it received 21,350 cr. Gujarat got the highest FDI i.e., Rs. 116,511 cr. whereas Maharashtra is at 2nd position i.e., Rs. 18,248Cr. and Karnataka is at 3rd i.e., Rs. 17,203Cr. (www.dipp.govt.in).

In the 3rd quarter of financial year 2020-2021 i.e., from October 2020 to December 2020 India received 158,442Cr amount of FDI inflow. In the month of October, it received 39,160Cr, in November it received 63,196 Cr and in December it received 56,086Cr. Maharashtra got the highest FDI i.e., Rs. 74,135cr. whereas Gujarat is at 2nd position i.e., Rs. 38,523cr. and Karnataka is at 3rd i.e., Rs. 19,955cr. (www.dipp.govt.in).

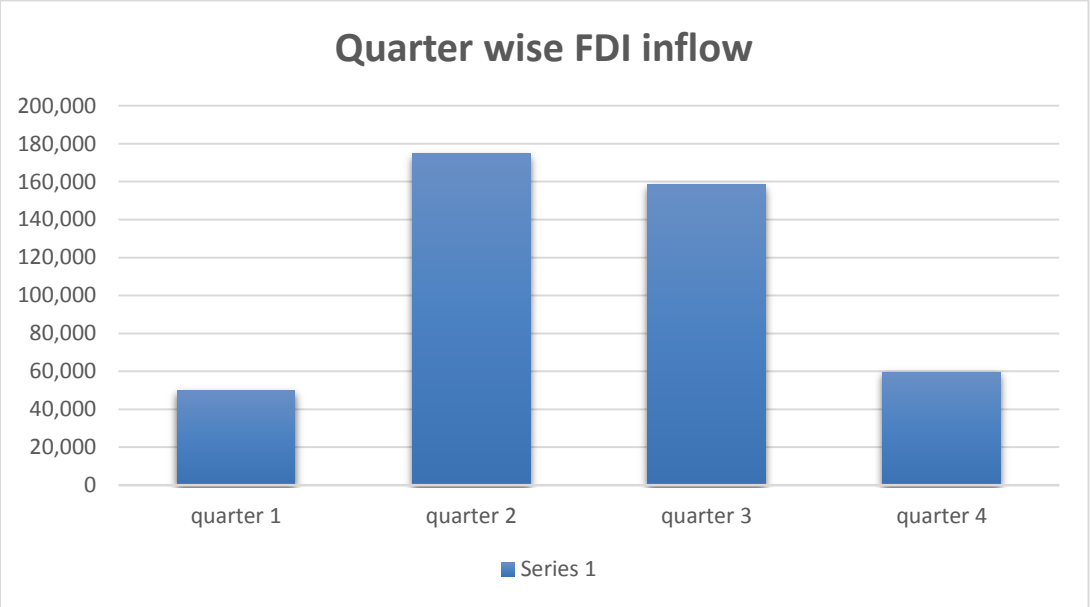
In the 4th quarter of financial year 2020-2021 i.e. January 2021 to March 2021 India received 59,514Cr amount of FDI inflow. In January 2021 it received 19,790Cr, In February it received 18,822Cr and in March it received 20,903Cr. Maharashtra got the highest FDI i.e., Rs. 18,456cr. and Karnataka is at 2nd position i.e., Rs. 9,471cr. and Delhi is at 3rd i.e., Rs.9,121cr. (www.dipp.govt.in).

Table-1

Quarter (FY 2020-2021)	FDI INFLOW in Cr.
1st quarter	49,820
2nd quarter	174,793
3rd quarter	158,442
4th quarter	59,514

Source: DPIIT

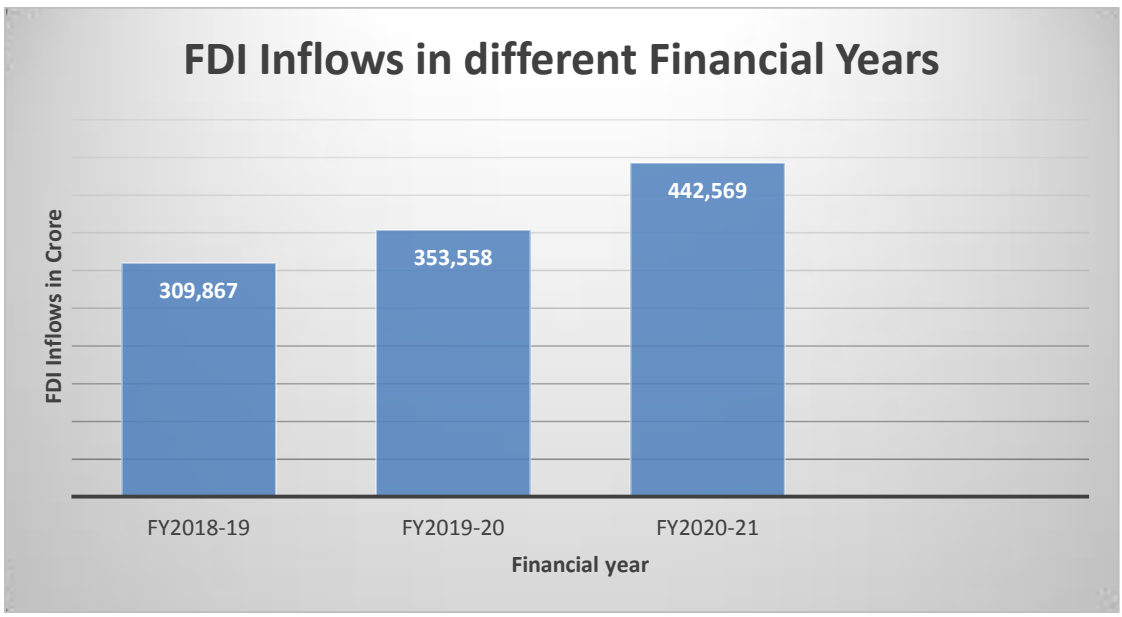
Figure: 1



Source: DPIIT

In FY2018-19 India got 309,867Cr of FDI inflows where as in FY2019-20 India got 353,558Cr Which is which shows a growth of 14% and in FY2020-21 India got 442,569Cr of FDI inflows which show a growth of 25% in compare to FY2019-20.

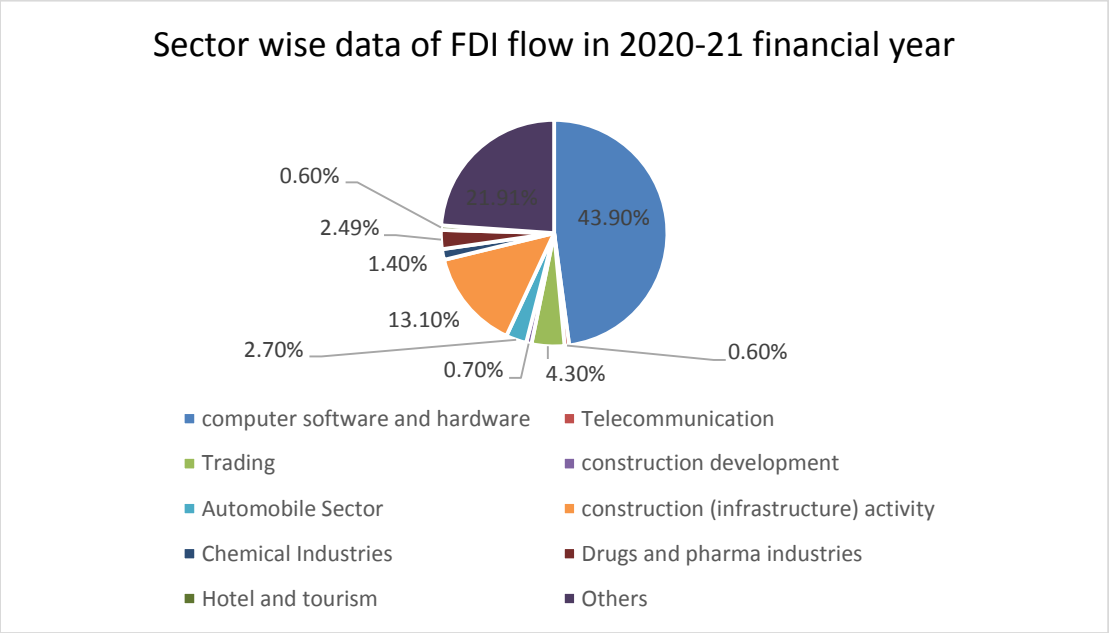
Figure-2



Source: DPIIT

In FY2020-2021 India got 8.3% of the total FDI in Services Sector, 43.9% in Computer Software and Hardware Sector, 0.6% in Telecommunication sector, 4.3% in Trading, 0.7% in construction development sector, 2.7% in automobile industry, 13.1% in Construction (infrastructure)activity sector, 1.4% in chemical (other than fertilizers) industries, 2.49% in Drugs and pharmaceutical sector and 0.6% FDI in Hotel & Tourism sector and 21.91% in other sectors.

Figure-3



Source: www.dipp.govt.in

Sectors attracting highest FDI equity inflows (in crore), April 2018 to March 2021

Table-2

SECTOR	2018-19 (April-March)	2019-20 (April-March)	2020-21 (April-March)
Service Sector	Rs. 63,909	Rs. 55,429	Rs.37,542
Computer software & Hardware	Rs. 45,297	Rs. 54,250	Rs.1,94,291
Telecommunication	Rs. 18,337	Rs. 30,940	Rs.2,884

Trading	Rs. 30,963	Rs. 32,406	Rs.19,349
Construction development	Rs. 1,503	Rs. 4,350	Rs.3117
Automobile Industry	Rs. 18,309	Rs. 19,750	Rs.12,115
Chemicals (Other than fertilizers)	Rs. 13,687	Rs. 7,492	Rs.6300
Construction (Infrastructure) Activity	Rs. 15,927	Rs. 14,510	Rs.58,240
Drugs & Pharmaceutical Industry	Rs. 1842	Rs. 3,650	Rs.11,015
Hotel & Tourism	Rs. 7,590	Rs. 21,060	Rs.2761

Source: DPIIT

(Note: Service sector includes Financial, Banking, Insurance, Non-financial businesses, Outsourcing, R&D, Courier, Tech., Testing and analysis.)

Historical FDI data shows that traditionally service sector and computer hardware & software sector have been the main sectors attracting FDI into the country. Other sectors like trading, automobile, infrastructures, hotel, and tourism are the worst hit sector due to pandemic and the subsequent lockdown and restriction placed on sectors that required physical contact. So, these sectors may invite FDI in future. Investment into technology sector peaked in the September Quarter. Digital sector attracted maximum FDI. Post Covid FDI inflow grew steadily as investors sentiment was quite positive about India which translated into larger flow of FDI. Fintech and health care is some of the other sector that are seeing investors interest. In 2020 the Government of India announced several policy initiatives around FDI in sectors such as defence, PSU oil refineries, telecom, power exchanges and stock exchanges. The FDI in defence manufacturing under the automatic route was increased from 49% to 74%. These FDI policy reforms across various sectors invited many foreign investors.

In the Ease of doing business 2020:

World Bank report, India ranked at 63rd position which was because of a business-friendly environment in India. India has made significant strides across various parameters in the survey. For example, on 'Construction permits' India moved from 184th in 2014 to 27th in 2019, because of simplified procedures and reduction in time taken to obtain construction permits in India. India's ranking on 'Getting electricity' improved from 137th in 2014 to 22nd in 2019. Also, India ranked 13th in 'Protecting minority investors' and 25th in 'Getting credit'. These ranks impacted foreign investors positively which resulted in high amount of FDI inflow.

India is banking on its attractive corporate income tax rate, the removal of FDI cash in different sector as well as government push for manufacturing through the production – linked incentives (PLI) scheme to attract substantial foreign investment into the country.

Findings:

- India received the highest amount of FDI during the Covid-19 pandemic in the world.
- FDI inflow increased during 2nd half of 2020.
- The positive intent of foreign investors about India helped to bring a huge amount of FDI into India.
- The government schemes and policies were attractive to bring in FDI in India even during covid19 pandemic.

CONCLUSION:

In this pandemic nearly every economy of the world had gone to recession and nearly every country's GDP growth was in negative. Global GDP fail 49% in the 1st of 2020 due to covid19 pandemic as largest shares of FDI in developing countries comes from primary and manufacturing sectors . Although, the investment slowed down initially in 2020, later took advantage of low interest rate and increasing market values to acquire assets in overseas market. As India is more into digitalization so the digital and

technological company have a bright future which brought fair amount of FDI in India. So, because of favorable environment, India's demographics, its large market, a working democracy, and a favorable economic outlook over the longer term are likely to be the key factor because of which India is the highest FDI receiving country even during the covid19 pandemic.

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