IMPACT OF INTERNET OF THINGS ON BUSINESS PLAN AND THE ASSOCIATED ENVIRONMENTAL ISSUES FOR EMERGING ECONOMY

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ABSTRACT

In the new concept of the Internet of Things, computational, physical and mechanical devices are interconnected with humans, and data may be sent across a network. It is possible for the wearable systems to collect and exchange data with the help of internet connectivity, sensors, or electrical components Smart home applications, the health care sector, the education industry, and agriculture are just a few of the diverse implementation areas for IoT. This includes creating new company products or services. Enhanced client interaction, productivity, data access, inventory monitoring, and security will be significant benefits of this modern innovation. An analysis of how IoT may improve business prospects and the obstacles associated with establishing a secure IoT link and interacting with the device is presented. Various technical breakthroughs in all sectors of life have been made possible due to the quick development and deployment of smart and IoT technology. While the rapid development of IoT innovations has brought many advantages to society, this rapid growth must be carefully monitored and analyzed from an environmental perspective in order to prevent the existence of adverse consequences and guarantee the sensible usage of global resources that are finite. Technologies that ease its execution, on the other hand, present certain difficulties. Environmental impact is one of them. Green IoT is a paradigm that is used in both practice and study to represent the interest in this subject.

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Introduction

In our everyday routine, at work and in our way of living and thought, the constant growth of modern ICT has a profound effect on us. In the near future, household appliances might be operated via our cellphones and share data using built-in sensors, while automobiles could autonomously calculate the optimal path to avoid jams and order replacement parts from the closest workshop when one breaks. Once only seen in sci-fi movies, today all of these smart and talking gadgets are a part of our everyday lives. The technologies make life simpler, offer a range of comforts, accelerate access to diverse services, and automate the administration of organizations and facilities. Consumers must be educated how to appropriately utilize these new technologies and smart gadgets, or they risk becoming dependent on them. There are many uses of the Internet of Things in our daily lives. This paper will discuss its key advantages, development patterns, and difficulties and challenges that need to be solved. A person's everyday life is affected by the rapid expansion of ICT, since many households' equipment may share data via built-in data sensors, various services are automated, etc. [1]. As a result, users must be taught how to correctly use these objects to avoid becoming dependent on them in different application areas. Due to its importance in today's commercial, retail, and application landscape, the study given here focuses on its most important applications in a variety of life situations and difficulties. Numerous business models have been created to take advantage of the new technologies effect on the digital economy. Traditional firms have a lot of options for implementing new business models today.

IN THE CONTEXT OF BUSINESS, THE INTERNET OF THINGS (IOT):

Its tactics and gimmicks have helped it become a household name. While embedded with software, electronics, sensors, and motors, cars, appliances, and gadgets have brought about a wide range of changes in the evolving world. There is also a growing importance placed on data sharing, as well as device connections through wireless and wired networks. In the business sector, the Internet of Things (IoT) offers limitless opportunities for organizations to develop and change their origins. As a result of the inventions, there is a wide range of impact on data interchange and gathering, allowing firms to develop new ways for achieving their goals [2]. The company has a significant influence on the most recent innovations that are combined with IoT. [3] The finest part is that it does not alter business operations but just makes them better profitable via the use of technology. It has revolutionized how data is transmitted and gathered in order to run corporate operations. In table 1. the Internet of Things is changing the corporate sector for a variety of purposes, including:

Table 1. The Internet of Things is changing the corporate sector

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Inventory monitoring and management	Many organizations that rely on warehouses and storing necessitate real-time inventory control and management. However, it is difficult to supervise everything and requires a significant amount of physical labor to ensure that no activity is delayed. This maintains the staff occupied with physical tasks, which might make it hard to manage other activities. With the advent of IoT into the corporate sector, this has entirely altered. It can help company owners maintain track of their inventories. The automatically regulated choices are extremely beneficial for inventory control and management. It enables workers to focus their energies on more profitable and intellectually demanding activities.
Enhanced effectiveness and efficiency	Marketing and consumer knowledge obtained from clients and customers has a significant impact on productivity. With the improvement in productivity, the data may benefit business owners in a variety of ways. IoT enables devices to function more efficiently while communicating with one another for the greatest results. It also aids in running effectively in a short period of time. IoT-based equipment and software aid in the completion of operations and activities in an error-free and timely way. This supports increasing a company's earnings as well as its productivity. Furthermore, it maintains up with the reliability of technology in a well-maintained way. This should be performed on a frequent basis to guarantee that productivity and efficiency have a significant influence on company operations.
Workers with special skills	The truth is that IoT works best with a fundamental understanding of software and hardware. Furthermore, the manner of operation of devices with regard to the internet is an important aspect of the IoT business necessity. As a result, it is critical to ensure that employees have the skills needed to operate with gadgets and the internet. To guarantee that operations operate properly, personnel must be proficient enough to manage technologies without hiccups. It is pointless to hire someone who is unfamiliar with technologies. It will squander not only time but also money and efforts. Furthermore, productivity might be negative, contributing to the downfall of the firm. It is better to engage someone who is more interested in contemporary technologies. This aids future efforts to increase the value of the company.
Information and perception sharing	Data gathering and sharing are critical components of company operations. This aids in the expansion and operation of the organization while managing data in a much more efficient manner. Furthermore, one can simply acquire customer information, record trends, and IoT devices monitor, allowing the gadget to engage with the customer. This leads to smarter gadgets that enhance customer experiences and work with expansion and development of data interpretation for business. The information is examined to help the business process and gain insight into what customers really desire. In addition, the customer need, buyer cycle, advertising and marketing cycle, and development and better invention may all benefit the firm. The data may be evaluated, distributed, and gathered in order to work with IoT technology to improve the business's efficiency and productivity.
Remote work	The most significant advantage of IoT technology is that it enables remote working and can aid in the management of work at the physical level. Furthermore, physical inventories may be managed in company using IoT to enhance productivity. Employees may effortlessly operate from a faraway place while being connected to others. This creates a more efficient workflow and a happier atmosphere, which substantially improves the operations of a firm.
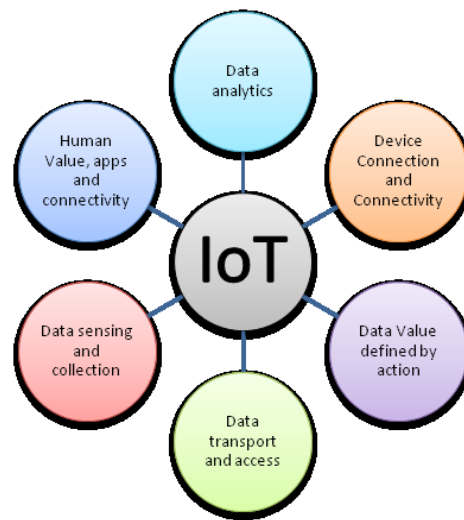
Fig 1. Impact of Internet of things (IoT) on business & Society

The rapid and short-term effects of inventions frequently attract the greatest attention, particularly in mainstream media. However, humanity will most likely discover the most important consequences of the Internet of Things over generations rather than years [4]. Rather than manual inventory upgrades that are money and time consuming, the Internet of Items enables for real-time updates based on the physical movements of things to alert businesses on when to refill inventories, saving not just time but also operational expenditures. The ever-increasing streams of data generated by smart things, smart devices, and smart buildings have become an integral element of the human business.

Sensors can transmit real-time information on humidity, light, temperature, motion, and noises. Many industries can benefit from these monitors, such as healthcare, where wearable sensors can report on patients' health and circumstances via monitoring system. With the fast growth of the IoT sector, the need for IoT-enabled programming has steadily grown, despite the fact that the supply of developers has maintained constant over the last decade [5]. As a result, many businesses are having difficulty gaining the required expertise to build IoT-enabled products in order to fulfill demands. Businesses require individuals with high-level technical expertise in contemporary development languages, as well as an understanding of the business context and infrastructures in which these devices will function. Software developers are always in high requirement, but the rise of IoT will enhance that need, which may provide an opportunity for the IS profession to boost enrollment at universities to fulfill the requirement for graduates.

To attract the industry's interest and hire IS candidates, we will need to make some adjustments, particularly for IS departments to competing with technical institutes that supply specialized capabilities that employers need. Interestingly, many colleges still use COBOL, Visual Basic, or HTML to teach programming. While these applications can assist students in learning computing theory, they lacked the desired traits that many employers seek when recruiting new staff. The Internet of Things has the potential to alter civilization in a variety of ways. For starters, it is an important component in the development of smart cities, which may lead to a new age of urban living [6]. The Internet of Things, for example, might monitor a city's infrastructure and transmit a notification if any component of a structure got overwhelmed with disturbances (e.g., from an earthquake). IoT can also control traffic during traffic congestion, rush hour, and accidents. Street lamps outfitted with IoT sensors may autonomously alter brightness based on how much sunlight is blocked by clouds. In table 2. The following are the advantages of IoT in business:

TABLE 2 THE BENEFITS OF THE INTERNET OF THINGS:

Management and technology	In the case of IoT applications placed on consumption devices such as computers, the phone may automatically operate the AI compatible devices (smart devices) and select the appropriate alternatives. These gadgets may be capable of delivering automated messages and warnings, such as ordering food from a store refrigerator in the event of a product shortage, and controlling the temperatures of their house while they are away.
Time, money, and resource savings	Because of robust connection and quick communications among devices, reaction times and human labor have been reduced, increasing efficiency and production. Many household appliances make homes "smart," conserving power, money, and other assets. Failures in IoT ecosystems can be avoided with forecasting service.
Communication	Built-in sensors and different technologies allow a constant connection and data transfer between devices and people. There are several instances, such as the ability to follow patient healthcare outcomes, products and goods location throughout transit, construction condition tracking, and so on.

INTERNET OF THINGS ON SUSTAINABILITY:

For generations, technology has propelled worldwide wealth. However, it has had serious adverse effects. Some of today's most urgent issues have been exacerbated in part by technological advancements [7].

Consider the following three examples:

- **Emissions of CO2.** Fuel-powered motors and generators were invented in the 18th century, thanks to the steam engine. These human-made Emissions of co2 are a significant cause of global warming, according to scientists.

- **Water contamination.** Water contamination is a serious issue. Chemicals developed in the late nineteenth and early twentieth century are responsible for increasing levels of water contamination.

- **Illness of the mind.** Current research shows that the usage of smartphones and comparable gadgets is primarily to fault for the deterioration of mental health, with suicide rates at historic highs and younger generations more dissatisfied with life.

TECHNOLOGY AND POSSIBILITIES FOR BUSINESS STRATEGY RE TRANSFORMATION

Businesses should be more flexible in order to incorporate new technologies and increase their reliance on technology in the business environment. To construct the strategies, new tools are required. Such creative competitiveness tactics can successfully transform their business models and meet customers' requirements [8]. Business plans must be linked to technology innovation in order to meet the needs of customers and offer satisfaction. Organization can gain greater performance by taking into account new elements impacting the business model, such as IoT. The Internet of Things may give different chances to breakthrough technology and equipment in many commercial applications, providing a vast space for firms to build novel business concepts in order to maintain market dominance. In all parts of the user's existence, data is generated in various ways, such as wearable devices, smartphones, trackers, and so on, which keep track of each and every movement and sense. These insights help both the client and the manufacturer [9]. Ultimately, the situation is evolving toward an Internet of Objects (IoT) world in order to benefit everyone while remaining interconnected to humans and things. IoT devices aid in the surveillance of the import process by recording and transferring data, and they give new ideas, enhance productivity, and allow businesses to reach more informed judgments. IoT informs organizations on what really is occurring in businesses, rather than what they think or expect is happening, with the assistance of AI and statistics, which may detect patterns of use or activity. Traditional businesses are also benefiting from IOT solutions in order to compete and cohabit with online sellers, since "ultra" shopping eliminates the distinction among online and physical stores [10]. The Internet of Things may advise the consumer about the item she has been searching at digital when she approaches the retail business and

SMS her a tailored coupon to complete the purchase in-store that day. IoT technology may also give data that can be used to enhance shop designs, enabling fully automated registration, and good inventory control [11].
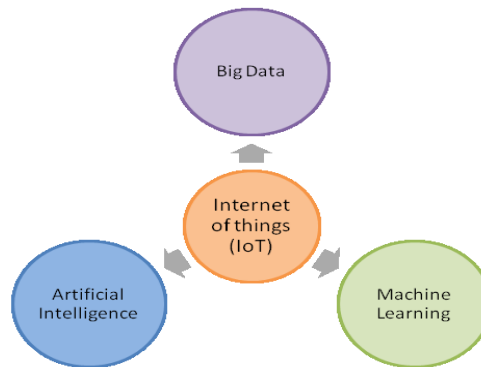

Fig 2. Internet of Things (IoT) Synergy with other technologies

The IoT and Big Data

As the number of IoT devices grows, so does the revolutionary technology known as Big Data. The Sensors retain the data in real-time, and because to the enormous volume of this information, some scenarios are wanted to analyses it on-the-fly, without having to record and collect the information [12,13]. The success of IoT is entirely dependent on information. The key foundation of IoT success is information and how it is distributed throughout the system. As a result, big data technology and the Internet of Things are so inextricably linked that it is difficult to think of them as independent entities capable of altering business in tandem.

Internet of things (IoT) and Big Data's Impact on Business

- Businesses have collected a plethora of data relating to their consumers, goods, and services in order to enhance decision - making processes by maintaining records at the center of critical choices.

- Businesses will make real-time choices regarding their prices, sales, logistics, and so on by transforming proper information procedures into meaningful intelligence.

The IoT and Machine Learning

Machine-to-machine communication is at the heart of IoT applications. In general, Technology devices are dynamic in nature. As a result, there is a requirement for thinking to transmit intelligence to machine in order to understand how the boundary conditions have altered. Machine intelligence is essential for any machine to change the result of any action [14]. It offers a variety of standards for locally generating information in devices, and this information may also be shared among linked devices.

The Impact of Internet of Thing (IoT) and Machine Learning on Business:

- Equipment Learning solutions with IoT could save a significant amount of money by implementing preventative measures such as establishing alarms when machine maintenance is necessary [15].

- By integrating IoT and machine learning, businesses may develop purchase behavior patterns for their customers based on their buying behaviors.

- In the hotel business, this two-component combo may automatically set room temperature.

The IoT and Artificial Intelligence

IoT and AI are two important technologies that, when combined, provide application cases in a wide range of businesses throughout the world [16]. Al big corporations utilize these gadgets since IoT can collect information from large end devices and, with the help of AI, these gadgets may become intelligent [17].

Case studies

- Preventive maintenance may enhance the operational functionality of technology, and anomalies in the devices can be discovered in a timely manner.

- By producing forecasts about tasks that may be automation in an organization, operational efficiency can be greatly enhanced.

Conclusion

In this study, we highlight the context of business, the Internet of Things (IoT). We also study the Impact of Internet of Things (IoT) on Business and Society, as well as the benefits of the Internet of Things. In this research, we briefly but importantly discuss the Internet of Things on sustainability, as well as Technology and Possibilities for Business Strategy Re Transformation. We have quickly discussed the coupling of IoT with revolutionary technological trends: IoT in collaboration with Breakthrough Technological Innovations with IoT such as Big Data, machine learning, and so on, as well as their influence on business.

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AN ANALYSIS TO UNDERSTAND THE ROLE OF PRODUCTS AND SERVICES IN OPERATIONS MANAGEMENT

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ABSTRACT

Value Package Prism is a conceptual structure developed and proposed in this study for examining management procedures and adaptability in delivering value packages of different types (services and product offering mix). A new approach to improving operations management by shifting away from the extraordinary of genuine service providers or natural products, the structure (stock ability, strength of engagement and simultaneous consumption) may prove useful to operations managers in establishing, planning, organizing or manipulating the production and delivery of products or services. This study knowing operations management, is meant to give you with a fundamental basis for analyzing operations management and its organizational and administrative background. It is divided into three parts: There is an operations role that is important in all sorts of organizations, regardless of their product or service offerings, as well as their sector of operation. This is a processes concept of operations that explains the transformation of input data into output data within the confines of an operations system's boundaries in addition, it covers the function of operations management, highlighting the significance of concentrating on providers and consumers that are outside of this border.

Keywords: Services, Business, Operations Management, Value Packages, Commoditize, Performance, Customers, Etc.

Introduction

The limits between services and products are fluctuating because products are frequently defined by combined products and services. As services and products are often offered together in a single value package, it is essential to consider both practice and study the pairing of services and products as a unit. This article therefore aims to offer a helpful method to understand the problems of operational management of bundled services and the product, or value packages, rather than seeking to create a structure that focuses on the distinctions between services and product. The aim is to create a framework that can guide operational decision-making when a specific value package is to be prepared and delivered. The overall solution provider is one obviously competitive approach that emerged since the mid-1990s [1]. Instead of just supplying goods to be managed by the business, or services which the company must match with the product in order to give value, firms do both inside a single product range. This trend towards the combination of products and services has many causes.

Many products are quickly becoming commoditized, including money. The addition of support services to the product may give a method of distinguishing product offers in order to avoid or postpone commoditization margin loss. The addition of services to the product was also often utilized. Due to the capacity of service providers to tailor services and the ability to personalize assistance and establish personal connections, businesses typically have greater difficulty in commercialization or direct comparison of services than in the comparison of products [2]. As the service component of the service-product group becomes larger and more diverse, the less commoditized is the product. In addition, these services may serve as loyalty agents, which help to enhance upcoming business, since business flows rely on the connection flow and therefore on customer loyalty being maintained or enhanced. Loyalty in competitive marketplaces only applies to

customers who are extremely pleased with the provided value package and contribute to a decreased change in suppliers. In many cases, the first mover toward a combined service and product value package would have an edge in any particular sector.

WHAT IS THE DEFINITION OF OPERATIONS MANAGEMENT (OM)?

Control of operations concentrates on the precise management of processes for the production and distribution of goods and services. There is a significant lot of emphasis

on process reliability and performance. Therefore, operational management often involves significant internal process monitoring and analyses [3]. In the end, the existence of how the operations is managed in an organization largely relies on the nature of the goods or services in the organization, such as agricultural, mining, construction or basic

services. Here are some more views on the subject.

- Management of operations is concerned primarily with planning, organization and supervision in production, manufacture or service providing settings.
- Operational management is the area that focuses on the design and control of the production process and the redesign of business activities in product or service manufacturing.

The main operational management activities are a system which is integrated and coordinated [4]. The task of the operational manager is to guarantee that they are all working together successfully and efficiently to achieve the intended purpose of usable products and services for consumers.

In Table 1. Observe the different inputs handled to create specific outputs and results (desired goals).

Table 1 Different Variables

Inputs	Expert knowledge, best practice, finance, tools, facilities and technology, customer response and the overarching strategic objectives of the business
Outputs	Great quality services and products
Outcomes	Very happy customers
Processes	Management (capacity, design, manufacture, facilities, jobs, inventory, quality control, etc.) and performance management to create good quality products and services

Responses from consumers should be continuously gathered and used as an input into organizational procedures for product and service development and manufacturing. This actually means that the operating system is a repeating series of results that in turn affect the input to the following system cycle.

APPLICATION'S 4 FEATURES OR PRINCIPLES

Administration of value packages seems to be affected by four factors: Level of stock ability; The level of interaction's strength; The level of consumption and production occurring simultaneously; and the level of evaluating of performance is quite simple.

Level of stockability

When referring to the level of stock ability trait, it refers to both the ability to stock things needed to supply the service already when production develops, as well as the capacity to stock the service to be supplied. In literary, simultaneity is defined by this idea. A value package's demand levelling technique may be easily used irrespective of the ratio of services and products. Yet, unlike simultaneity, this feature is not dichotomous [5]. For example, an espresso coffee is a tangible commodity that, in practice, cannot be stored for more than a few seconds. Although consumption and production are not precisely identical, the time lag between one and the other is extremely small, making it

nearly difficult for a coffee shop to store espressos in accordance with the plan. A fresh sandwiches has a greater degree of stock ability than an espresso since it may be eaten a few hours after manufacture – which is why some establishments create anticipatory stockpiles of them to increase supply high hours of the day. The argument is that a commodity that is not created and consumed at the same time does not ensure that anticipatory stockpiles can be built. It is determined by the individual item stock ability as a consequence of the longest time interval between anticipating stock building and increasing supply. Just-in-time may not be the most effective way to use your capacity, but the option of storing products can allow you to better respond to shifting demand, meet seasonal fluctuations, and have greater scheduling versatility. The level of interaction's strength Historiography's idea of heterogeneity relies heavily on humans involvement, particularly client-provider interactions. People delivering services in diverse ways create heterogeneity. Service heterogeneity is associated with services in literature, however certain services might be quite homogenous. Services that do not need a lot of work, such as online purchasing, tend to be extremely constant. But not all products are created equal. The difficulty of achieving reliability in a product that requires specialized expertise is evident. Neither heterogeneity nor if a process provides a service or item are important to operational activities, but rather the level of contact between a client and a process. In generally, higher levels of customization need more engagement with the client to gather information about their unique demands. Operational capabilities are needed in these situations, and the operations manager must find them. Whether the processing outcome is a services or a product, the level of contact necessary will determine how much of this is necessary [6]. As a result of this, the further challenging it will be to oversee and manage the creation and supply of the value package, the more individuals and assets will be involved.

The level of consumption and production occurring simultaneously

In the research, this quality is connected to both the ideas of tangibility and inseparability.

However, high essence does not always correlate to low stock ability. To what extent anticipation stocks can be developed up to good level of production, for example, the level of stock ability of a product significantly affects the stock and ability management possibilities that can be used, while the level of consistence straightforwardly affects the performance management alternatives that can be used, for example, process and/or evaluate product quality assurance. For some procedures that produce physical products, finished product quality control is impractical or unpleasant because the production and purchase of the product occur at once [7]. This is very common in the services sector, but it is also true for some procedures that produce physical products in which completed product quality assurance is impractical or problematic. It does not matter if the value packages are more service-oriented or product-oriented if, therefore, product or control systems is chosen based on manufacturing process characteristics or the level of simultaneously production and usage of the product.

The level of evaluation of performance is quite simple

It is the customer's capacity to assess performance that supports the idea of tangibility. Customer support services like as call center activities were traditionally considered as ethereal and hence impossible to measure. This is changing. The situation has changed, however, as call centers have become more common and are increasingly outsourced. A customer's wait time in the lineup may now be scientifically measured. It is feasible to measure service quality. In other words, measuring challenges for operations managers are not driven by the tangible or intangible nature of a service. It refers to the level of ease or difficulty in measuring a certain quantity or property.

Contrary to complicated value packages (whether physical or intangible), those with minimal assessment complexity demand distinct management techniques.

WHAT ARE PRODUCT AND SERVICES?

A product, on the other hand, is a physical giving to a consumer, but a service is intangible. The other is often a one-time value transaction.

A service, on the other hand, generally takes a longer time. A product's worth is implicit in the tangible giving itself, such as a can of paints or a pair of trousers. In comparison, the value of a service is frequently determined by the customer's perceived gain from the time spent using the service [8]. Furthermore, the quality of the connection between the provider and the client while using the service is frequently used by the consumer to quantify the effectiveness of a service. In table 2. Significant key features and their differences between products and services:

Table 2 Significant key features and their differences between products and services

Serial No	Key Features	Product	Services
1	Quality	Because they are tangible characteristics that can be held, the quality of items may be evaluated.	It might be tough to evaluate the quality of services provided by various service suppliers.
2	Quantity	Products can be mathematically evaluated and come in a variety of shapes, sizes, and formats.	Services cannot be described numerically. While you may select from a variety of service suppliers, the principle stays the same.
3	Returnability	If a client is dissatisfied with a product, it is easier to return it to the vendor. As a result, the client will get a refund for the returned merchandise.	Because a service is intangible, it cannot be returned to the supplier.
4	Inseparability	When a purchasing is finished, a product can be removed from its user.	Services and their providers are inseparable since they may be used at the same time they are being provided and purchased.
5	Relationship vs. Necessity	Customer requirements and desires are met by a product that can be transported somewhere.	However, nothing is taken away as a result of the services. Advertising a service is largely focused with establishing a connection with customers.
6	Perspectives on values	Users of a product can take or generate value from it. The customer's use of the product determines its worth.	It is the service supplier who determines what a service is worth to its customers. The value of a service is inextricably linked to the service supplier.
7	Shelf line	Unsold products can be resold at a later date.	It's more difficult to keep up with the demand for services than it is for products. When a service has a short shelf life and should be sold sooner, the situation is differently.
8	Products are tangible	They are tangible in nature, allowing them to be handled, smelled, felt, and even seen.	It's impossible to see or touch services since they're ethereal.
9	Perishability	Perishable goods on the other hand, are readily apparent. Food goods such as fresh farm produce and other perishable items can be preserved for future consumption or sales.	Due to the fact that services may only be utilized at the moment they are given, they cannot be kept or sold for later use or sale.

OPERATING SYSTEMS FOR THE PURPOSE OF PLANNING

Planning of product and service

Marketing strategy is used in the organizing of products and services (the system's outputs) to:

- Determine the requirements and wants of possible consumer groupings (market niches) and how particular products and services could meet those needs and desires.
- Establish the optimal method for distributing new items and services in these areas.
- Identification of rivals and collaborators
- Recommend the best price for the items and services available.
- Recommend the best ways to market and promote to these client segments.

As a consequence of the study, the product or service's specifications are developed. Different feasibility assessments and maybe a prototype may be conducted to enhance the service or product specification.

Capacity Planning

When it comes to capacity planning, it's important to know how many items (or services) will be generated and how often. The desire for these results can also be predicted or forecasted [9]. It would be quite helpful to refer back to the market analysis that was conducted previously. These and additional tools might be beneficial. See the full list below. To guarantee that numerous conceivable impacts are taken into account, scenario planning is a helpful planning approach.
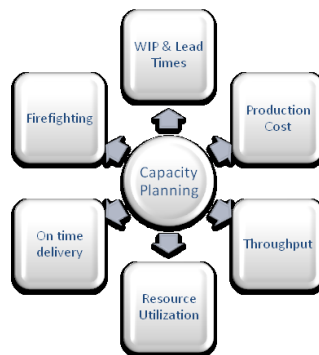

Fig 1. Beneficial Capacity Planning

It may also be beneficial to engage a service or product specialist who is familiar with the development process. It is expected that the planning process would result in estimations of the inputs required to generate the service or product.

The planning of facilities and the layout of buildings

The maintenance and upkeep of assets is among the most important tasks in operations management, not only because they support and allow the production of products and services in a highly effective and quick manner, but also because they are among the costliest [10]. Unfortunately, there aren't many papers that explain how to achieve this level of proficiency in operations management.

Management of Workflows

Developing and improving data routes to finish things in a given phase is defined workflow management. Among the activities involved in workflow management include mapping out the optimal workflow, eliminating duplicate jobs, automating the process, and eliminating bottlenecks or places that might use some work. Combining inputs, processes, outputs and results, the system's flow is depicted in the map. Operational management process maps are also occasionally called to as such.

THE TRANSFORMATION MODEL:

An organization's products and services are created and delivered via its operations, as was discussed above. Introduction to the Transformation Model for Operational Analysis Inputs, transformation processes, and outputs make up the three elements of operations [11].

Resources (inputs) are transformed into completed products or services for consumers or clients through operations management, which comprises the systematic direction and control of those processes (outputs). For-profit and non-profit organizations alike can use this fundamental transformation model.
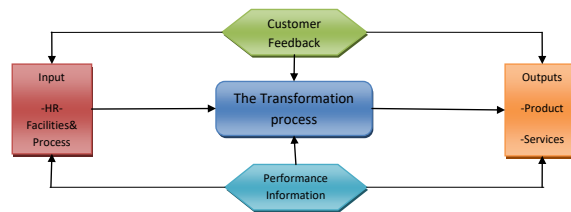

Fig 2. The Transformation Model Output

Unlike a doctor's office, where the main output is healed patients, a nuclear reactor's main output is reprocessing fuel and radioactive waste. The products and services produced by several transformation processes are often the same thing. In a restaurant, for examples, a service is provided, but food and drinks are also produced.

This example shows how a transformation process might produce unwanted outputs (such as nuclear waste) in addition to the products and services they are intended to offer. Waste minimization is an essential part of operations management in various organizations, from the source of production through the point of final disposal. As a result, operations management is also responsible for safeguarding the safety and health of employees and members of the local community [12]. Operational functions may also have a responsibility for ethical behavior in regard to the societal effect of transformation processes, both locally and internationally

Transformation processes

In a transformation process, any action or collection of operations that changes and adds value to one or more inputs before providing outputs to consumers or clients is considered to be a transformation process. When the inputs are raw materials, such as when milk is changed into cheese and butter, it is reasonably straightforward to detect the transition [13]. The nature of the change may be less clear when the inputs are information or people. Individuals that are sick (the input) are transformed into healthy ones in a hospital, for instance (the output).

The following are examples of transformation processes:

- Physical properties of products or customers can be altered.
- Materials, data, or customer relocations.
- The transfer of ownership of goods or data.
- Materials, data, and customer storage and accommodations.
- A modification in the information is available purpose or presentation.
- Alterations in consumers' physiological or psychological status.

Inputs

The development of a product or service uses certain inputs, while others play a role in the process but aren't consumed [14]. Typically, input resources are categorized into one of three categories:

- Transforming resources – In the process of transformation, these are utilized as inputs.
- Transformed resources – The operation transforms inputs into the products or services that are its outputs in the same manner.

Conclusion

Operations managers require a new strategy to creating, planning, coordinating or managing production and distribution of services or products that takes into account the way businesses function todays management. These services and products must be viewed as a continuum. Value products are being packaged more and more these days. A product-services combination provides for distinctiveness and reduces transformation, which results in lower profits. Useful concepts should be grounded on

real-world experience. Through the use of this paradigm, organizations may move away from the extremes of pure services and pure products and instead focus on offering value bundles, which is how they compete and function today. To better comprehend value packages, operations managers should focus on qualities such as stock ability, intensity of engagement, simultaneity of consumption, and difficulties assessing effectiveness. Contrary to the usual method of emphasizing on contrasts, these unique qualities were chosen to bring services and products along. Pure services and pure products can also benefit from the mentioned features

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A COMPARATIVE ANALYSIS OF DEEP LEARNING AND ITS IMPACT ON CUSTOMER SERVICE IN E-COMMERCE TO GAIN COMPETITIVE ADVANTAGE

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ABSTRACT

Nowadays, a rising number of individuals use online social networks, e-commerce, and applications to not only socialize and engage, but also to express their ideas. Deep Learning is an area of machine learning dealing with neural representations of procedures, most frequently shown as neural networks, neural beliefs, and so on. When evaluating sentiments for a given datasets, it is critical to choose the most practical and precise approach possible because this impacts both buyers and sellers. Deep Learning (DL) approaches have been used to identify important data and make recommendations from enormous data sets. The effectiveness and results of various deep learning techniques may change based on the data sets utilized, as well as the techniques' appropriateness to the information and applications domains under discussion. To meet this demand, a comparative examination of well-known deep learning techniques was conducted. E-commerce was the first business to capitalize on the advantages of Deep Learning (DL). Firms now have whole DL departments, which is not uncommon. Because digital transactions have become the usual means of acquiring products and services, top E-commerce businesses are investigating how DL may improve customer satisfaction and company profitability. The idea is that they contain a massive volume of information, and making use of that information is difficult. E-commerce firms spend a lot of money to automating tedious procedures, enhance the customer experiences, tailor offers for specific customers, and gain a deeper understanding of their customers.

Keywords: Deep Learning, Machine Learning, E-commerce, Customer Service, Algorithms, Firms

Introduction

Deep Learning (DL) is a recommendation system in e-commerce that performs the very same thing for internet purchasing. Its usual duty is to make item-to-item suggestions. This is when an E-commerce store or publication website suggests another commodity or types of information that is comparable to the one the customer is presently seeing. A recommendation engine discovers the various trends and structures by analyzing gathered big information on social website traffic. A recommendation engine takes in past user behavior analytics information as training phase and discovers the distinct structures and trends by analyzing gathered big information on social website traffic (Supervised Learning). Following the collection of data on users' shopping patterns, the findings will be shown on a customized web page with recommended goods that are effective in convincing them. When the customer submits their transaction, the suggestion will consider whether or not its suggestions were effective

and will update its algorithms (Reinforced Learning). Users, items, and interactions between them are the primary objects of any recommendation systems. These interactions are often represented as a matrix with cells holding contact data. The conventional way of generating a prediction is mutual information. The method's fundamental premise is that comparable user evaluations of particular things in the past likely to be equivalent in the future. A content-based optimization algorithm with a DL design is intimately connected to the system's factual substance.

A COMPARITVE ANALYSING OF DEEP LEARNING

Deep learning has facilitated change and innovation in a wide range of sectors. Firms have been able to use artificial intelligence to obtain a strategic advantage and sometimes even transform the way their industries perceive the user experience, ranging from outlier detection to video assessment. Deep learning, a specialized and sophisticated kind of machine

learning, conducts what is known as "end-to-end learning." Deep neural networks (DNN) are convolutional neural networks having several hidden layers of modules between the output and input layers that are used to build deep learning models. Artificial neurons are roughly modelled after an artificial brain, while each neuron linked to so many others and each neural component implementing a summing algorithm that aggregates the values of all its inputs. Given enough training data and time, it is feasible to train systems to be self-learning and capable of performing certain activities. These methods frequently outperform standard computer algorithms in situations where the solution or feature detection is difficult to explain. Convolutional neural networks (CNN) simulate animal vision and may be used to perform image processing tasks. CNNs can benefit from the 2D structure of the input data. Convolutional neural networks outperformed other deep designs in picture and voice recognition [1].
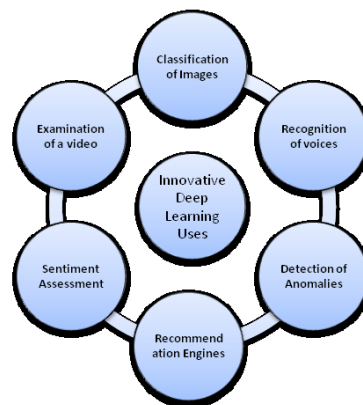

Fig 1. Deep Learning Innovative Uses

Classification of Images

This is the technique by which an artificial intelligence program me recognizes and detects an item or characteristic in a digital picture or video. Deep learning models are being used to swiftly analyze and evaluate in-store images to instinctively predict inventory movement in the retail vertical. This has resulted in more efficient operations, lower expenses, and new sales prospects [2].

Detection of Anomalies

Out of millions of transactions, this deep learning approach attempts to identify anomalous structures that do not match the anticipated behaviors for a certain system. These implementations can indicate the presence of a financial network assault, fraud prevention in insurance files or credit card transactions, production management, power consumption optimization, and even the isolation of sensor data in industrial plants indicating a safety concern.

Recognition of Voices

This is a deep learning model's capacity to accept and understand dictation or understanding and execute out oral directions. Models can translate recorded voice instructions to texts and then apply natural language processing to determine what is being said and in what circumstances. This has resulted in significant advantages for businesses such as automotive, healthcare, and customer service, among others [3].

Recommendation Engines

Such models evaluate user behaviors in order to provide suggestions based on user behavior and purchasing history. E-commerce sites rely heavily on recommendation engines [4]. This significantly lowers complexity for the customer while also providing efficient income streams for the firm.

Examination of a Video

With the use of deep learning models, it is now feasible to scan and assess enormous streams of video sequences for a variety of

purposes, such as for intrusion detection in airports surveillance systems, banks, or sporting events, among other applications. In order to minimize latency and enhance the customer experience, media firms utilize video monitoring.

Sentiment Assessment

To get a comprehensive knowledge of customer opinions, customer mood, and the effectiveness of promotional activities, deep learning methods such

as natural language processing and text classification are used. In the healthcare business, it may be used to acquire information of the patients and their disorders.

USE CASES FOR ECOMMERCE DEEP LEARNING

Deep learning's commercial benefits have been discussed in broad terms [5]. Time to be more precise about the influence of technology on internet purchasing. In Table 1. We show E-Commerce deep learning may be applied to the following six application scenarios.

STEPS FOR ADOPTING DEEP LEARNING (DL) IN YOUR ECOMMERCE BUSINESS

With this information, you should have a better understanding of how Deep Learning (DL) can be used in eCommerce [8][9]. The personal online store may perhaps occur to you. This is excellent, but how do you begin to adopt the technology? As

a starting point, in table 2. here are six simple steps.

Table 1. E-Commerce deep learning six application scenarios.

Personalization.	Consumers of today don't want to be addressed as one of many. A fully customized client experience is preferred. The personalization of your brand is what maintains loyal customers. A rival who can supply it will take your place if you cannot.
Site search.	Search engines have come a long way in recent years, as anybody who has used Google recently will attest to. All too often, though, website queries on eCommerce sites fall short of expectations. If you don't know exactly what to type, finding the items you're looking for might be frustrating. In the age of big data and machine learning, there is no justification for this. When intelligent techniques are used appropriately, intelligent searches are a breeze to execute.
Managing supply and demand.	It's all about production and consumption in eCommerce, just as it is in many other sectors of the economic world. It is your responsibility as an online merchant to guarantee that you have the proper inventory in the right quantities to meet the demands of your customers. Those needs alter with time, as do the circumstances [6]. As a result, the greater your inventory and supply chain management, the more active you can be. Therefore, demand forecasting is extremely important to online retailers. Your competitive edge comes from being able to anticipate shifting consumer demands. In order to produce these real-time, precise predictions, you need to use deep learning techniques.
Churn prediction.	Business-to-business (B2B) companies frequently discuss customer turnover. In other words, it's the pace at which customers quit a brand in favor of the other. E-commerce is also a viable option. Clearly said, selling to an existing customer is easier. Because of this, internet merchants find recall marketing to be quite useful. But what if you could enhance your marketing approach by anticipating which clients are most likely to leave? Machine learning provides this potential [7].

Scam detection.	Many people today believe that eCommerce scam is a thing of the past. However, you'd be incorrect in your assessment of this situation. As scam costs online merchants more and more money, this trend is expected to continue. Scam detection and prevention are thus vital operations for any online shops. As a result of deep learning techniques, these procedures may be accelerated and made more effective.
Improved customer service.	A customer care strategy is a priority for all e - commerce firms, regardless of their size. Describe the characteristics of world-class customer care. In today's competitive retail environment, customer service must be provided when and how the customer wants it. The hiring of additional employees is one approach to provide 24-hour, omni-channel assistance. Even for the biggest companies, however, this is not always possible.

Familiarize yourself with anything related to deep learning.	First, you must grasp the possibilities of deep learning. That involves spending the time necessary to investigate the current status of the technology in order to make an informed decision. Research AI-enabled technologies and how machine learning may enhance procedures.
Profit from third-party knowledge and experience.	Ask current specialists in the subject for assistance, especially if you can't uncover all the answers yourself. You may also ask a professional for some general guidance. An engineer with machine learning expertise might be hired for further in-depth work. This means that they'll be capable of managing adoption throughout your business.
Identify the challenges that you would like deep learning to help you with and describe them.	You must first identify your goals before implementing any technology solutions. For machine learning, it's the same store. To simplify your eCommerce shop is not enough [10]. You must establish specific goals. This means that your official website has a high conversion rate, for example. If you want to minimize the conversion rates, you may do so by improving your personalization. Such a goal can be achieved with the aid of a machine learning-based solution.
Recognize that you have a technological and capacity gap.	When doing this step, it's preferable to do it in conjunction with the one before it. Your organization's abilities should be taken into consideration while setting your machine learning objectives. Be realistic about your workforce and technical capabilities [11]. Adoption of many machine learning systems is rather easy. However, this isn't always the case. Machine learning applications, on the other hand, should be approached with caution.
Create a team dedicated to implementing machine learning technology.	You may begin the adoption of machine learning by setting clear, attainable goals. An organized procedure may be maintained by creating a team. It keeps your present personnel from being overburdened with tasks. He or she also makes sure that he or she attracts the recognition he or she needs.
The terms measure and scale are used interchangeably in this.	If you're going to implement a new machine learning technology, you should start small. To learn how to use a new tool or software, begin by analyzing a small, specialized data set. Using this method, you may test the conclusions you've drawn, your forecasts, or your outcomes. As soon as you're satisfied with the performance of your new machine learning application, you may scale that up. In addition, by demonstrating its effectiveness at a shorter length, you'll be able to get the support of important groups. When the adoption rate is increased, it will be easier to get their support.

CHALLENGE FOR DL IS PRICING FOR PRODUCTS

They are influenced by a variety of things and can change widely. Due to the large number of goods and variations, as well as the hundreds of elements involved in their pricing, it is sometimes impossible for humans to determine the best prices quickly and completely [12]. Three among the most frequent price setting strategies employ dynamic pricing:

- It allows prices to be adjusted dynamically in response to company expenditures, while maintaining profitability at a specific level.
- Pricing based on competitors takes into consideration pricing decisions made by competitors.
- As customer demands grows and supply decreases, prices rise.

E-commerce companies may get a competitive edge by employing DL prediction models to find the optimum price for each commodity.

Fraud is a threat to e-commerce firms. Payment fraud results in charge backs, which are only the beginnings of its negative effects. Reputational harm may ruin a reputation of the company forever in specific situations. In order to prevent fraudulent activities from occurring, anomaly detection DL models can analyze the repetitious, tiresome information at a quick rate. Only one transaction of importance may be retrieved from a sea of transactions.

In the world of e-commerce, providing great customer service may be a challenge. Bots that use machine learning to learn can address the problem. Bots that utilize speech recognition to engage with customers, detect problems, and resolve them are known as intelligent chatbots. Users' inquiries can be interpreted by them, and they can answer to each one personally [13]. Users of e-stores can benefit from virtual assistants by imitating the most successful advisers. Data is derived from the website and presented to customers. In addition, bots are frequently employed to update customers via instant messaging services.

These are only a few examples of DL uses in e-commerce, but the possibilities are endlessly varied. Difficulty learning is no anymore a frightening black box thanks to tools such as Amazon's AI services, Google's AutoML, and Microsoft's Cognitive Services. Now is a great moment to use it in an E-commerce business.

DEEP LEARNING AND THE CUSTOMER EXPERIENCE

The use of deep learning in eCommerce helps firms to provide a more customized experience for customers. It is no longer an option for people to interact with their favorite companies on an individual basis, but rather, they demand it [14].

Businesses can personalize each contact with their consumers using artificial intelligence and machine learning, resulting in a better result for their customers.

Businesses may decrease customer service issues before they arise by utilizing deep learning. This should lead to a decrease in cart desertion percentages as well as an uptick in sales [15]. In addition, customer care bots are able to respond to inquiries 24 hours a day, seven days a week, without bias.
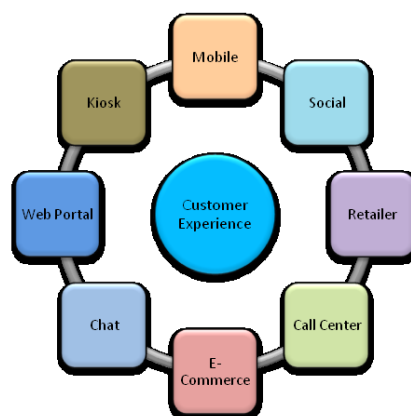

Fig 2. Customer Experience in Deep learning

DEEP LEARNING IN eCOMMERCE – INSIGHTS UP FRONT

Current Dl applications that top industry leaders are employing most often include: [16]

- **Chatbots/AI assistants:** Natural language engagements include replying to client questions, reacting to voice instructions for simple activities, and offering product suggestions.
- **Smart logistics:** Data is being analyzed using machine learning techniques to enhance inventory management.
- **Recommendation engines:** Customer activity on websites is being analyzed by companies, which are employing techniques to forecast which goods would be popular with consumers as well as provide suggestions.

In this section, we'll examine the DL applications of each eCommerce business. We'll start with Amazon, the number one eCommerce company.

Amazon Deep learning – Amazon Go

Prime Now and Amazon Go are both new initiatives that are part of the company's larger food drive, as seen by its projected $14 billion purchase of Whole Foods Market. "When products are removed from or returned to shelves," the business says, using deep learning and computer vision and sensor technology. A digital shopping cart keeps track of items, and clients are paid through their Amazon accounts. As a result of this procedure, a typical check-out system would be eliminated. Amazon's headquarters in Seattle, Washington, inaugurated its first Amazon Go shop in December 2016. However, a project of this nature is not without its

difficulties. Over than 15-20 consumers at a time were reported to be having technical issues with the program. A small shop architecture and a specific number of public employees on location to oversee processes and give tech assistance may be required as Amazon attempts to enhance its business.

Machine learning – Recommendation Engine

Alexa, which has been around for a few years, is Amazon's most prominent AI application. It's much less obvious and much more fundamental to the company's operations, however, that AI is one of its most lucrative uses. In Amazon's

focused marketing approach, machine learning is at the heart of its technologies, which enable the business to anticipate which goods would be most appealing to buyers and to give personalized suggestions based on their queries. Amazon's recommendation system is believed to be responsible for 40 per cent of all purchases.

EBay AI assistant – eBay Shop Bot

It is a successful eCommerce firm that is aiming to employ artificial intelligence to retain customer engagement and a competitive advantage. It was originally trialed in October 2016 as an eBay Shop bot, a chat bot accessible through Facebook Messenger. Using natural language, the bot acts as an AI assistant to help consumers locate goods of relevance. Users may connect with the chat bot by text, speech, or by taking photographs of images relevant to a certain product with their smartphones. There is no public indication that the chat bot is a substantial income generator for the firm. As a result, eBay's business plan appears to include deep learning.

CONCLUSION

The Research explores DL is gaining traction in the retailing industry's eCommerce market, where it is being used to handle customer support inquiries, goods packing and shipping, and internal processes. Machines that can understand without human intervention were formerly considered scientific fiction. It has become very much a part of everyday life. And their influence is just rising. If your ecommerce company isn't on line with machine learning, you're falling ahead. After all, the benefits of technology to your industry are vast. Machine learning can improve everything from customer service to inventory management. Utilizing technologies in the field is also simpler than you would imagine. In this study, we compare Deep Learning and its novel applications. In this research, we have also gone through the methods for implementing Deep Learning (DL) in e-commerce firm, as well as use cases for e-commerce deep learning. We also investigate the difficulty for DL in product pricing and the

consumer experience, as well as Deep Learning in eCommerce - Insights Up Front.

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UNDERSTANDING THE EFFECT OF CONSUMER BEHAVIOUR ON INTERNET MARKETING STRATEGIES IN THE ERA OF COVID-19

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ABSTRACT

Covid-19 pandemic has resulted in a disruption in the entire lifestyle as well as the purchasing pattern of the consumers. The global economy is adversely impacted by the effect of the Covid-19 where all the industries are seeking substitute ways of business promotion. Maximum of the consumer's section are now tended towards the online marketing over the changing period of Covid pandemic. The social and digital platforms are now playing a vital counterpart in acquiring the changing customer behavior. The study has focused on the core understanding of these vital factors that established the casual relationship between the customer behavior and marketing strategies. Herethis study aims to indicate the transformation of consumer buying nature in the time of psoriasis and demonstrate the new characteristics of marketing strategies. The study reveals that concerning the hygiene factors, or the environment-friendly goods and services, the customers are determined by their willingness.The article explores customer engagement, digital marketing practices, customer satisfaction, and the intention of the purchase. This article attempts to seek and analyze the key regulator of new marketing strategies during the pandemic period. It analyses how the changing time has taken the purchasing intention of customers. Furthermore, moderation is expressed here significantly. The articles argues not only about the early adopters, and the latest innovation during pandemic, but also strong-armed to justify whether this new marketing strategies might explore new ways in the upcoming time. Additionally, the study bears the content about the communication, and acquisition through internet marketing in this dramatically changing era.

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Keywords: Digital marketing, internet marketing, Covid-19 pandemic, purchasing behavior

Introduction

Covid-19 is affecting the marketing trends- this era is establishing a strong ground for internet marketing for the future. Today, a huge percentage of consumers are depended on the internet to adjust their busy life schedules. Utilizing this changing pattern of purchasing style, in the time of Covid pandemic the business created a strong knot between the customer behavior and marketing strategy. Here, this study has explored the core features of this new digital trend and the transformation of marketing. The increasing use of social media in daily life of the consumers and to promote business is further denoted through this stuffy. The major purpose of this study is to indicate the current purchasing behavior over changing patterns in the marketing strategy along with the indication of the future probability of this online trend of marketing. The article aims to analyze the parity with a clear discussion and conclusion on the subject matter.

Literature Review
Concept of consumer behavior

Consumer purchasing behavior refers to the activities of the consumers upon purchasing a product or service. The procedure includes engaging in the posts on social media, consulting about the different search engines and other actions related to the purchasing pattern of the customers [3]. Any business needs to understand the marketing strategy in order to gain the consumer's attention. Consumer behavior is the key indicator generating effective marketing efforts.

Factors affecting consumer behavior

There are several factors that influence the purchasing behavior of the consumer.The factors are psychological, social, and personal that nurtures the actions of consumers in their buying pattern.

Psychological factors: Psychological factors refer to a consumer's attitude, perception in a particular situation, their capability to understand the provided information about the product which motivates their beliefs and ideas about the purchasing nature [2]. Here, the utility of the products concerning the expenditure, whether it is environment friendly can react. Personal thinking of the consumers isreliable on those characteristics of the product.

Personal factors: Personal characteristics denote gender, age, occupation, financial stability, location. While a person of older age will prefer to spend on necessities, focusing on the utility of the product, on the other hand, a younger person will spend more on luxurious goods. Industries like automobiles provide products with innovative features that may not be affordable for all, financial condition guides the way here.

Social factors: Social influences may come from family, friends, neighbors. The demographic wall of a country plays a vital role here as the socio-cultural parity is different in different countries. Culture, religion acts as the influencing factors here. Literacy level or living condition acts in a certain way that the consumers are segmented in different groups in terms of the socio-cultural factors.

Buying behaviors of the consumers may be the response of a selected routine in which the purchasing pattern follows repetition. It may also be limited decision-making where the consumers buy certain products occasionally. In case of impulsive buying the influences of psychological factors are important. Many big companies use familiar faces (celebrities) to promote their business, hence the impulsive buying nature of the customers led by those eye-washing features. It has seen that household income drastically affected the purchasing behavior in India due to the Covid-19 pandemic [1]. Approximately 45.7 % of the decrease is seen during this time. Fall in income has hugely impacted the buying nature of the consumers in India.

Table 1: Internet literacy in India

Characteristics	Percentage
Web accessibility level	3
Educational attainment	91
Digital literacy support	90
Level of literacy	92
Average	73

(Source: Inspired by [11])

In the year 2021, India has ranked 73 among the 120 countries in terms of internet literacy level. The hope of digitalization of marketing is considerable [11]. Hence, the economical rise can direct the way positively.

According to the ***consumer behavior theory*** Social, personal or psychological factor, everything is important to nurture the purchasing pattern of the consumers. Whether it is the impulsive buying nature or the routine bounded purchasing, these factors influence a lot.

2.3 Conventional marketing and online marketing in Covid-19 pandemic time:

Digital transformation and use of social media

While in the pre-pandemic time, only selected products like clothing, electronic devices, or other home appliances were distributed through the online channel- products like grocery items were comparatively less distributed through online marketing. Few companies were active in that distribution channel. During the pandemic time many new market entrants are serving all the necessary products through online channels. The probability of incensement of this new marketing is very high as concerning the hygiene; time and cost savings the customers are feeling this new method more

useful. Consumer sentiment is influenced widely in the entire world. The constant way of conventional marketing has turned into a new form [5].

Consumers have become more conscious about their consumption patterns, and they are now optimistic about their buying nature. The quality of the product, its efficiency and other information are asked by them. Perfect labeling, information, and feedback of the other customers about a certain product are catching the attraction on digital platforms. It has become easier for them to justify a product based on the available information provided in the channel. Picture and videography play a crucial role here convincing the beliefs of the consumers.

Proposed methods

The article has developed on the qualitative and thematic analysis of the secondary data. The information is gathered from the previously published journal and research article by the peer researchers which have helped to get a crucial glimpse about the effect of the Covid pandemic on the industrial world. The sudden shift is examined throughout the countries along with India describing the provided information. Analysis of the dataset is encouraged by the qualitative commentary of the secondary data. Critical interpretation of the online marketing the covid 19 periods has gained synthesized examination involving the qualitative analysis of those data.

Result and Discussion
Changing behavior of consumers during Covid-19 pandemic

During pandemic, customers have dramatically moved towards the online channel, and the industries and companies have responded well in turn. Multiple studies indicate that the shift is very rapid towards the interaction through online channels (). Adoption rate throughout the entire globe is high which represents; almost 80% of the consumers are now turned towards the digital channel. Perhaps, the speedup is more surprising in creating digitally improved offerings. Throughout multiple regions, the result indicates more than five times an increase in digital marketing at one time (). Again the leap is greater currently, and bearing huge probability for the upcoming time.
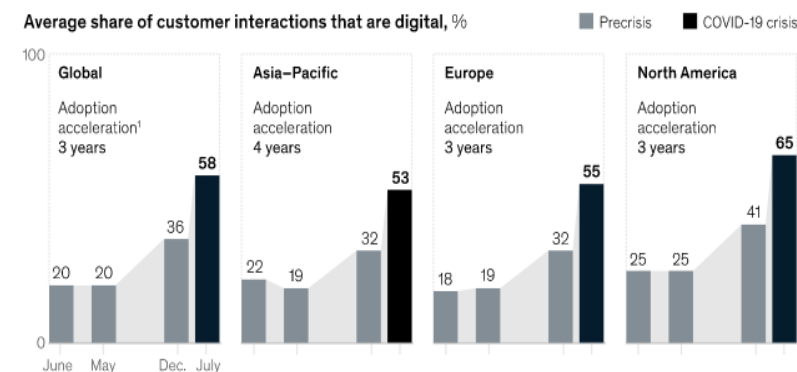

Figure 1: Digitization of the customer interaction during the pandemic period and post-pandemic period
(Source: Inspired by [12])

Across different sectors, the developing rates differ concerning the respondents. It has been seen that the growth rate of the retail sector is concerning higher than the others. A significant increment is also reported in the pharmacy and healthcare products too. The home delivery of medicine and testing service is fresh in the digital channel. The scope of digital marketing in multiple countries may be high or low according to the literacy level, use of the internet in daily life. An example can clarify this- more than 60% of the Malaysian people use the internet in their daily life. The chances of digital marketing exploration are higher than the other developing countries of Asia. Only 34% of the total Indian population uses the internet in their daily life. The scope of digital marketing in India is comparatively lower than Malaysia [12]. It is a matter of hope that the percentage of internet usage in India is

increasing, and it is estimated that by the year   2023 it will reach a notable place.
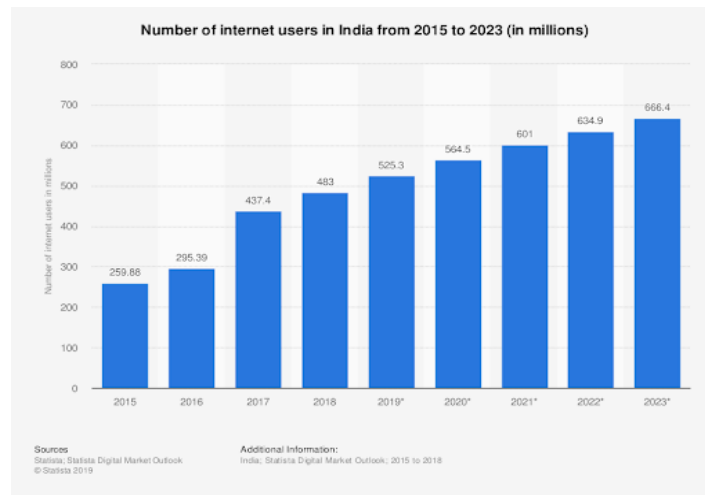

Figure 2: Numbers of internet users in India
(Source: Inspired by [11])

Transformation of marketing strategies during Covid-19 pandemic

It has already been discovered that the modern consumer expects a more personalized experience in their purchasing. Regarding the expectations of the customers, today's marketers are using sophisticated tools and techniques in marketing strategy to get the behavioral insight of the consumers. This pandemic led into the digital future and there are less chances to turn back to conventional marketing again. Undoubtedly, this trend will continue in the post pandemic period too. While the maximum percentage of the consumers were reliable on the conventional purchasing style for many reasons like safety in the payment methods, they are concerned about whether the details that theory is using during the purchasing are safe or not. Besides that there was also the product quality issue [7]. In case of any product defect, the process of refund seemed complex to them. Due to these reasons they avoided online marketing, but the Covid-pandemic has turned it totally. The fear and concern was gone, rather it now seems easier to tackle their busy life schedule using the online method of marketing.

Table 2: Share of expenditure in different sector in India

Characteristics	Share of Expenditure
E-commerce	24%
Consumer durable	17%
FMGC	14%
Telecom	13%
Banking, insurance, and financial services	10%
Others	9%
Auto	6%
Media and Entertainment	5%
Retail sector	2%

(Source: Inspired by [12])

Content consumption of India is increasingly turning towards online platforms, where the advertisers are also seeking their audiences on the digital platform. Among multiple business vertices in India, the E-commerce sector consists 24% of the total expenditure on the digital platform that is the highest of all. The online advertising for the business promotion is

taking a recognizable place regardless of any sector following the urgency of the situation. From the commodities of daily necessities to the smallest things are now selling through the digital; channel.

Digital marketing throughout the world

While it is discussing digital marketing over the entire globe, the Chinese social media is several steps ahead from the rest of the world in integrating their customer experiences. The innovation and new way of serving is instantly presented in China in terms of the needs of the consumers. Many social apps of china serve the payment solution and for that the consumers are seamlessly turning into the digital media streams. Fast technology is helping the way of eliminating the complexities in digital marketing [8].

In terms of the expenditure of digital marketing, Australia is currently spending the highest than the other countries of the world [9]. It is reported that more than 50% of the total advertising budget of Australia is dedicated to the online platform. The country is struggling highly in getting consumer attraction through the online channel. The digital channels of Russia are very strong. The strategy though these apps are attracting the consumer attractions.

Digital marketing rate in the entire world is recognizable, and depending on the changing pattern of marketing, the world entrepreneurs are getting the sight of online marketing growth.

Conclusion

Observing the entire study about digital marketing, it can be said that the hope of digitalization is not so bad in India. In the Covid-19 period the rate of online marketing has become high, and it is estimated that the rate will increase in the following year. Amongst the other influencing factors of consumer buying behaviour, the economical factor is highly influential in India. The major obstacles in the way of digitalization can be the immense fall of the economic graph of the country. The individual income has become low in this period, and if the situation is not reversed within time it may adversely affect the industrial world of the country. Beside the factor, the hope of online marketing India is positive and it is establishing a new field in marketing.

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THERMAL INSTABILITYIN A COUPLE STRESS NANOFLUID IN PRESENCE OF VERTICAL MAGNETIC FIELD

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ABSTRACT

In this paper thermal instability of a horizontal layer of Couple Stress nanofluid in a porous medium is investigated under effect of horizontal magnetic field.It is assumed that nanoparticle flux is zero on the boundaries. Stationary convection is studied using normal mode technique. It is found that critical Rayleigh Number increases with an increase in the magnetic Chandrasekhar number as well as couple stress parameter. Stability of system has been investigated with effects of Lewis number, concentration Rayleigh number, modified diffusivity ratio and magnetic field. .The effects of various parameters on thermal Rayleigh Number have been presented graphically.

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Keywords: *Darcy – Maxwell nanofluid, Magnetic field, Critical Rayleigh number ,Couple Stress parameter.*

Introduction

In 1992, while working on microchannel liquid-nitrogen cooling of high heat load silicon mirrors, Choi [1] noticed that an excellent heat transfer could be achieved only at the increased pumping power. This finding proved to be a milestone in leading him to think of a new heat transfer enhancement approach. The aim was to achieve highest possible enhancement in thermal conductivity at the smallest possible concentration. In 1995 Choi [1] introduced a new class of fluids which were engineered colloidal suspensions containing nanometre – sized metallic particles suspended in the conventional heat transfer fluids and named them Nanofluids.In Non-Newtonian fluids , during last four decades , the Couple Stress fluids attracted the attention of research workers.Couple stresses appear in noticeable magnitudes in Polymer Solutions (liquids with larger molecules) .Theory for Couple Stress fluid was proposed by Stokes ([3], [4]).The field equations for the couple stress vector were discussed by Cosserat and Cosserat [2]. Stability of couple stresses binary fluid mixture having vertical temperature and concentration gradients was discussed by Rachana [5].

The onset of convection in a horizontal layer of a porous medium saturated by nanofluid was studied by Nield [6]. The model incorporated the effects of Brownian Motion and Thermophoresis. It was found that critical thermal Rayleigh number can be reduced or increased by a substantial amount, depending on whether the basic nanoparticle distribution is top - heavy or bottom – heavy. Thermal instability of rotating nanofluid layer was studied by Yadav [10]. Galerkin Method was used to obtain the analytical expressions for both non- oscillatory and oscillatory cases. The influence of various nanofluid parameters and rotation on onset of convection was analysed and it was found that rotation has a stabilizing effect depending on the various nanofluid parameters. The effect of the magnetic field on flow of electrically conducting fluid through a vertical plate is of great importance such as metal casting, the cooling systems of electronic devices . In order to get enhanced heat performance of such devices, the use of nanofluid can be considered as a working medium. When the space between the plates is filled with the electric conductive nanofluid the flow and temperature fields can be controlled using a magnetic field. The effect of magnetic field on the onset of nanofluid convection induced by internal heating was studied by Yadav[11]. Effect of magnetic field on thermal convection of a porous nanofluid layer using Darcy Law was considered by Gupta [12]. It was found that magnetic field stabilizes the nanofluid layer appreciably while porosity hastens the

onset of convection. Magnetic Field effect on unsteady nanofluid flow and heat transfer using Buongiorno Model was studied by Sheikholeslami[13].The graphical and analytical investigation was carried out for different governing parameters.Further, analytical and numerical study of the stability of a mono diffusive convection in a Darcy porous layer saturated by a Maxwellian nanofluid was done by Jaimala[7]. It was found that the mode of convection is changed in presence of salt and heat transfer is most active in Soret induced convection.

Keeping in view the importance of Couple Stress nanofluid in a porous mediumattempt has been made to study the thermal instability in a horizontal layer of Couple Stress nanofluid in presence of vertical magnetic field.

Mathematical Formulation of the Problem

We consider an infinite isotropic porous layer of incompressible Maxwellian couple stress viscoelastic fluid confined between two horizontal planes $z^* = 0$ and $z^* = d$ where the temperatures at the lower and upper boundaries are T_h^* and T_c^* respectively, T_h^* being greater than T_c^*. A uniform vertical magnetic field $H^* = (0,0,H_0^*)$ acts on the system. Asterisks are used to distinguish the dimensional variables from the non-dimensional variables (without asterisks).
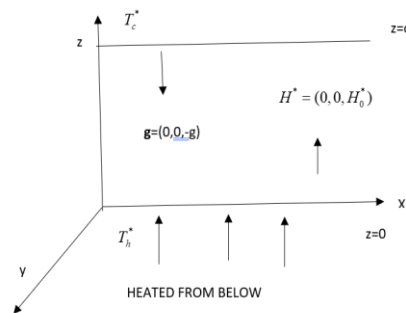

Fig.1 Physical Configuration of the Problem

Governing equations are

$$\nabla^* . V_D^* = 0 \tag{1}$$

$$\frac{1}{k}(\mu - \mu_c \nabla^{*2})V_D^* = (1 + \lambda^* \frac{\partial}{\partial t^*})[\{-\nabla^* p^* + (\phi^* \rho_P + (1-\phi^*)\{\rho(1 - \beta_T(T^* - T_c^*))\})g]$$
$$+ \frac{\mu_e}{4\pi}(\nabla^* \times H^*) \times H^*] \tag{2}$$

$$(\rho c)_m \frac{\partial T^*}{\partial t^*} + (\rho c)_f V_D^* . \nabla^* T^* = k_m \nabla^{*2} T^* + \epsilon (\rho c)_p \left[D_B \nabla^* \phi^* . \nabla^* T^* + (\frac{D_T}{T_c^*})\nabla^* T^* . \nabla^* T^* \right] \tag{3}$$

$$\frac{\partial \phi^*}{\partial t^*} + \frac{1}{\epsilon}V_D^* . \nabla^* \phi^* = D_B \nabla^{*2} \phi^* + \frac{D_T}{T_c^*}\nabla^{*2} T^* \tag{4}$$

The modified Maxwell equations are

$$\left(\frac{\partial}{\partial t^*} + \frac{1}{\epsilon}(V_D^* . \nabla^*) \right)H^* = (H^* . \nabla^*)\frac{1}{\epsilon}V_D^* + \eta \nabla^{*2} H^* \tag{5}$$

$$\nabla^* \cdot H^* = 0$$

$$\eta = \frac{1}{4\pi\mu_e\sigma'}$$

where $V_D^* = (u^*, v^*, w^*)$ is Darcianvelocity , k is the permeability , μ_c is couple stress viscosity, λ^* is relaxation time , ϕ^* is concentration of nanoparticles , ρ_P is mass density of nanoparticles, ρ is density of base fluid , T_C^* is reference temperature , $(\rho c)_m$ is effective heat capacity of the medium , $(\rho c)_f$ is effective heat capacity of fluid , $(\rho c)_p$ is effective heat capacity of material constituting nanoparticles , c is specific heat of nanofluid , k_m is effective thermal conductivity of porous medium , $\in$ is porosity, D_B is Brownian diffusion coefficient, D_T is the thermophoretic diffusion coefficient, μ_e is magnetic permeability, σ' is electrical conductivity of nanofluidandη is electrical resistivity of the nanofluid.

In this paper a physical realistic boundary condition on the nanoparticle volume fraction is considered i.e. flux of nanoparticle concentration is zero at the boundary .Therefore the boundary conditions are

$$V_D^* = 0 , \; T^* = T_h^*, \; D_B \frac{\partial \phi^*}{\partial z^*} + \frac{D_T}{T_c^*} \frac{\partial T^*}{\partial z^*} = 0 \qquad \text{at} \qquad z = 0 \qquad (6)$$

$$V_D^* = 0 , \; T^* = T_C^*, \; D_B \frac{\partial \phi^*}{\partial z^*} + \frac{D_T}{T_c^*} \frac{\partial T^*}{\partial z^*} = 0 \qquad \text{at} \qquad z = d \qquad (7)$$

Taking following non dimensional parameters

$$(x,y,z) = \frac{(x^*, y^*, z^*)}{d}, \; t = \frac{t^* \alpha_m}{\sigma d^2}, \; (u,v,w) = \frac{(u^*, v^*, w^*)d}{\alpha_m}, \; p = \frac{p^* K}{\mu \alpha_m}, \; \phi = \frac{\phi^* - \phi_0^*}{\phi_0^*},$$

$$T = \frac{T^* - T_c^*}{T_h^* - T_c^*}, \; \lambda = \frac{\lambda^* \alpha_m}{d^2},$$

$$(H_x, H_y, H_z) = \frac{(H_x^*, H_y^*, H_z^*)}{H_0^*}. \text{ where } \phi_0^* \text{ is}$$

$\sigma \left(= \frac{(\rho c)_m}{(\rho c)_f} \right)$ is the heat capacity ratio parameter.

reference scale for volumetric fraction of nanoparticles, $\alpha_m \left(= \frac{k_m}{(\rho c)_f} \right)$ is the thermal diffusivity of the porous medium and

On replacing V_D by V, nondimensional form of equations (1) to (5) together with boundary conditions (6), (7) can be written as

$$\nabla.V = 0 \qquad (8)$$

$$(V - C\nabla^2 V) = \left(1 + \frac{\lambda}{\sigma} \frac{\partial}{\partial t} \right) [(-\nabla p - R_m \hat{e}_z - R_n \phi \hat{e}_z + R_a T \hat{e}_z) + \frac{P_r}{P_{rM}} Q D_a (\nabla \times H) \times H] \qquad (9)$$

$$\frac{\partial T}{\partial t} + (V.\nabla)T = \nabla^2 T + \frac{N_B}{Le} \nabla \phi.\nabla T + \frac{N_A N_B}{Le} \nabla T.\nabla T \qquad (10)$$

$$\frac{1}{\sigma} \frac{\partial \phi}{\partial t} + \frac{1}{\in} (V.\nabla)\phi = \frac{1}{Le} \nabla^2 \phi + \frac{N_A}{Le} \nabla^2 T \qquad (11)$$

$$\frac{1}{\sigma} \frac{\partial H}{\partial t} + \frac{1}{\in} (V.\nabla)H = \frac{1}{\in} (H.\nabla)V + \frac{P_r}{P_{rM}} \nabla^2 H \qquad (12)$$

and boundary conditions are

$$V = 0 \; , \; \text{T} = 1, \; \frac{\partial \phi}{\partial z} + N_A \frac{\partial T}{\partial z} = 0 \qquad \text{at} \qquad z = 0 \qquad (13)$$

$V = 0$, T=0, $\dfrac{\partial \phi}{\partial z} + N_A \dfrac{\partial T}{\partial z} = 0$ at   z = 1   (14)

where,

$$R_a = \frac{\rho g \beta K d \left(T_h^* - T_c^*\right)}{\mu \alpha_m}$$ (Thermal   Rayleigh Darcy number)

$$R_n = \frac{(\rho_P - \rho) \phi_0^* g K d}{\mu \alpha_m}$$ (Concentration Rayleigh Darcy number)

$$R_m = \frac{\rho_P \phi_0^* + \rho(1 - \phi_0^*) g K d}{\mu \alpha_m}$$ (Basic   Density Rayleigh Darcy number)

$$P_r = \frac{\mu}{\rho \alpha_m}$$ (Prandtl number)

$$P_{rM} = \frac{\mu}{\rho \eta}$$ (Magnetic Prandtl number)

$$Q = \frac{\mu_e H_0^{*2} d^2}{4 \pi \mu \eta}$$ (Magnetic   Chandrasekhar number)

$$D_a = \frac{K}{d^2}$$ (Darcy Number)

$$C = \frac{\mu_C}{\mu d^2}$$ (Couple Stress parameter)

$$N_A = \frac{D_T (T_h^* - T_c^*)}{D_B T_c^* Q_0^*}$$ (Modified Diffusivity Ratio)

$$N_B = \frac{(\rho c) \rho \in Q_0^*}{(\rho c)_f}$$ (Modified Particle density increment)

$$Le = \frac{\alpha_m}{D_B}$$ (Lewis Number)

$$\left(\frac{1}{\sigma}\frac{\partial}{\partial t} - \frac{P_r}{P_{rM}}\nabla^2\right)\left[(\nabla^2 - C\nabla^4)w' - \left(1 + \frac{\lambda}{\sigma}\frac{\partial}{\partial t}\right)\left(R_a \nabla_H^2 T' - R_n \nabla_H^2 \phi'\right)\right]$$

$$= (1 + \frac{\lambda}{\sigma}\frac{\partial}{\partial t})Q\frac{P_r}{P_{rM}}\frac{D_a}{\in}\nabla^2\frac{\partial^2 w'}{\partial z^2}$$

(15)

$$\frac{\partial T'}{\partial t} - w' = \nabla^2 T' - \frac{N_A N_B}{Le}\frac{\partial T'}{\partial z} - \frac{N_B}{Le}\frac{\partial \phi'}{\partial z}$$

(16)

Linear Stability Analysis

Basic State

Time independent basic state of nanofluid is described as

$$V = 0 , p = p_b(z), T = T_b(z), \phi = \phi_b(z)$$

The basic volume fraction and temperature of nanoparticles satisfy the following equations

$$\frac{d^2\phi_b}{dz^2} + N_A \frac{d^2 T_b}{dz^2} = 0$$

$$\frac{d^2 T_b}{dz^2} + \frac{N_B}{Le}\frac{d\phi_b}{dz}\frac{dT_b}{dz} + \frac{N_A N_B}{Le}\left(\frac{dT_b}{dz}\right)^2 = 0$$

On solving , basic temperature and concentration equations satisfying the boundary conditions are given as

$$T_b = 1 - z$$

$$\phi_b = \phi_0 + N_A z$$

Perturbed State

Using linearised stability theory and normal mode technique ,
Let

$$V = V', p = p_b + p', T = T_b + T', \phi = \phi_b + \phi', H = \hat{e}_z + H'$$

are the perturbations in fluid velocity , pressure , temperature , nano particle concentration and magnetic field. Neglecting products of primed quantities, the linearised perturbation equation of Couple Stress Nanofluid are obtained as

$$\frac{1}{\sigma}\frac{\partial \phi'}{\partial t} + \frac{1}{\in}N_A w' = \frac{1}{Le}\nabla^2\phi' + \frac{N_A}{Le}\nabla^2 T'$$

(17)

with boundary conditions

$$w' = 0, T' = 0, \frac{\partial \phi'}{\partial z} + N_A \frac{\partial T'}{\partial z} = 0$$ at   z = 0 and z = 1   (18)

Analysing the disturbances into the normal modes and assuming that the perturbations quantities are of the form
Let $\left(w', T', \phi'\right) = \left[W(z), \Theta(z), \Phi(z)\right]e^{st+ilx+imy}$

where l, m are dimensionless wave numbers in x and y directions respectively and $s(=\omega_r + i\omega_i)$ is complex time constant. Further, $\omega_r = 0$ represents the marginal state and s=0 characterises the stationary state. On substituting

, the linearised equations in dimensionless form are as follows:

$$\left[\begin{array}{l}\frac{s}{\sigma}\left(D^2-\alpha^2\right)-\frac{P_r}{P_{rM}}\left(D^2-\alpha^2\right)^2-Q\left(1+\frac{\lambda s}{\sigma}\right)\frac{P_r}{P_{rM}}\frac{D_a}{\in}D^2\left(D^2-\alpha^2\right)\\ -\frac{sC}{\sigma}(D^2-\alpha^2)^2+\frac{P_r}{P_{rM}}C(D^2-\alpha^2)^3\end{array}\right]W-R_a\alpha^2\left(1+\frac{\lambda s}{\sigma}\right)\left[\frac{P_r}{P_{rM}}\left(D^2-\alpha^2\right)-\frac{s}{\sigma}\right]\Theta$$

$$+R_n\alpha^2\left(1+\frac{\lambda s}{\sigma}\right)\left[\frac{P_r}{P_{rM}}\left(D^2-\alpha^2\right)-\frac{s}{\sigma}\right]\Phi=0$$

(19)

$$W+\left(D^2-\alpha^2-s-\frac{N_A N_B}{Le}D\right)\Theta-\frac{N_B}{Le}D\Phi=0 \qquad (20)$$

$$\frac{N_A}{\in}W-\frac{N_A}{Le}(D^2-\alpha^2)\Theta-\left[\frac{1}{Le}(D^2-\alpha^2)-\frac{s}{\sigma}\right]\Phi=0 \qquad (21)$$

with boundary conditions

$$W=0=\Theta, D\Phi+N_A D\Theta=0 \quad \text{at} \qquad z=0 \text{ and } z=1. \qquad (22)$$

$$\text{where } D=\frac{d}{dz}, \alpha=(l^2+m^2)^{1/2}$$

$$W_k=\Theta_k=\sin k\pi z, \Phi_k=-N_A\sin k\pi z$$

Equations (19) to (21) together with boundary condition (22) constitute a linear eigen value problem of the system which is solved by the Galerkin – type weighted residual technique. The variables are written in a series of base functions as :

$$W=\sum_{k=1}^{N}A_k W_k, \Theta=\sum_{k=1}^{N}B_k\Theta_k, \Phi=\sum_{k=1}^{N}C_k\Phi_k$$

where A_k, B_k, C_k are unknown constants with k= 1 ,2,3….N. Using boundary conditions given by equation (22) base functions are assumed as

Taking first approximation (N=1) ,
$W=A_1\sin\pi z, \Theta=B_1\sin\pi z, \Phi=-N_A C_1\sin\pi z$
Substituting these values in above equations and , we get

$$\begin{pmatrix}\frac{s}{\sigma}\delta^2+\frac{P_r}{P_{rM}}\delta^4+\frac{sC}{\sigma}\delta^4+\frac{P_r}{P_{rM}}C\delta^6 & & \\ +(1+\frac{\lambda s}{\sigma})\frac{QP_r}{P_{rM}}\frac{D_a}{\in}\delta^2\pi^2 & -R_a\alpha^2(1+\frac{\lambda s}{\sigma})(\frac{s}{\sigma}+\frac{P_r}{P_{rM}}\delta^2) & -R_n N_A\alpha^2(1+\frac{\lambda s}{\sigma})(\frac{s}{\sigma}+\frac{P_r}{P_{rM}}\delta^2) \\ 1 & -(\delta^2+s) & 0 \\ \frac{1}{\in} & \frac{\delta^2}{Le} & -(\frac{\delta^2}{Le}+\frac{s}{\sigma})\end{pmatrix}\begin{pmatrix}A_1\\B_1\\C_1\\D_1\end{pmatrix}=0$$

(23)
where $\delta^2=\pi^2+\alpha^2$

Stationary Convection

For stationary convection , put s=0 in equation (19) , the following Rayleigh number is obtained

$$Ra^{st} = \frac{\delta^4}{\alpha^2} + \frac{C\delta^6}{\alpha^2} - \left(1 + \frac{Le}{\in}\right) R_n N_A + \frac{QD_a \pi^2 \delta^2}{\in \alpha^2}$$

(24)

The above relation expresses the stationary Rayleigh number as a function of the parameters $C, Q, R_n, \in, D_a$

and dimensionless wave number α.

To study the effects of the Couple Stress parameter C, Lewis number Le, modified diffusivity ratio N_A, nanoparticle concentration, Rayleigh number R_n and porosity parameter $\in$ on stationary convection , we observe the behaviour of

$\frac{\partial R_a^{st}}{\partial C}, \frac{\partial R_a^{st}}{\partial Q}, \frac{\partial R_a^{st}}{\partial Le}, \frac{\partial R_a^{st}}{\partial \in}, \frac{\partial R_a^{st}}{\partial N_A}$ and $\frac{\partial R_a^{st}}{\partial R_n}$ analytically

. From equation (24), we have:

$\frac{\partial R_a^{st}}{\partial C} = \frac{(\pi^2 + \alpha^2)^3}{\alpha^2}$ which is same as obtained by Jaimala[16].

Clearly

$$\frac{\partial R_a^{st}}{\partial C} > 0, \frac{\partial R_a^{st}}{\partial Q} > 0, \frac{\partial R_a^{st}}{\partial Le} < 0, \frac{\partial R_a^{st}}{\partial N_A} < 0, \frac{\partial R_a^{st}}{\partial R_n} < 0$$

which shows that Couple Stress parameter and Magnetic field have stabilizing effect while Lewis number , modified diffusivity and nanoparticle concentration Rayleigh number have destabilizing effect on stationary convection. Porosity has stabilizing effect in absence of Q . But porosity has stabilizing as well as destabilizing effect in presence of Q .

Stabilizing if $R_n N_A Le\alpha^2 > QD_a \pi^2 \delta^2$

Destabilizing if $R_n N_A Le\alpha^2 < QD_a \pi^2 \delta^2$

If $R_n = 0, Q = 0$

$$Ra^{st} = \frac{\delta^4}{\alpha^2} + \frac{C\delta^6}{\alpha^2} = \frac{(\pi^2 + \alpha^2)^2}{\alpha^2}(1 + C\delta^2)$$

which is same as obtained by Shivakumara et al.[18].

To obtain critical Rayleigh number put

$\frac{dR_a^{st}}{d\alpha} = 0$,critical wave number is given by equation

$$2S(\alpha^2)^3 + (3\pi^2 S + 1)(\alpha^2)^2$$

$$-(\pi^6 S + \pi^4 + \frac{QD_a}{\in}\pi^4) = 0$$

which shows that critical wave number depends on Couple Stress parameter, Darcy number, Porosity and Magnetic field. The stationary convection curves for Rayleigh number R_a versus the wave number α are shown in Fig. 2(a)-(g) by assigning fixed values,
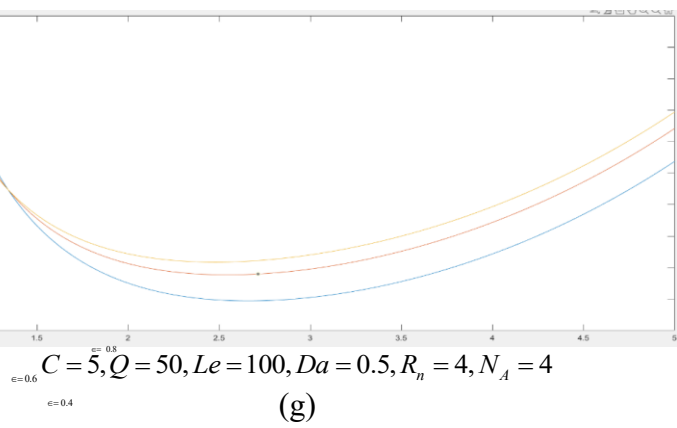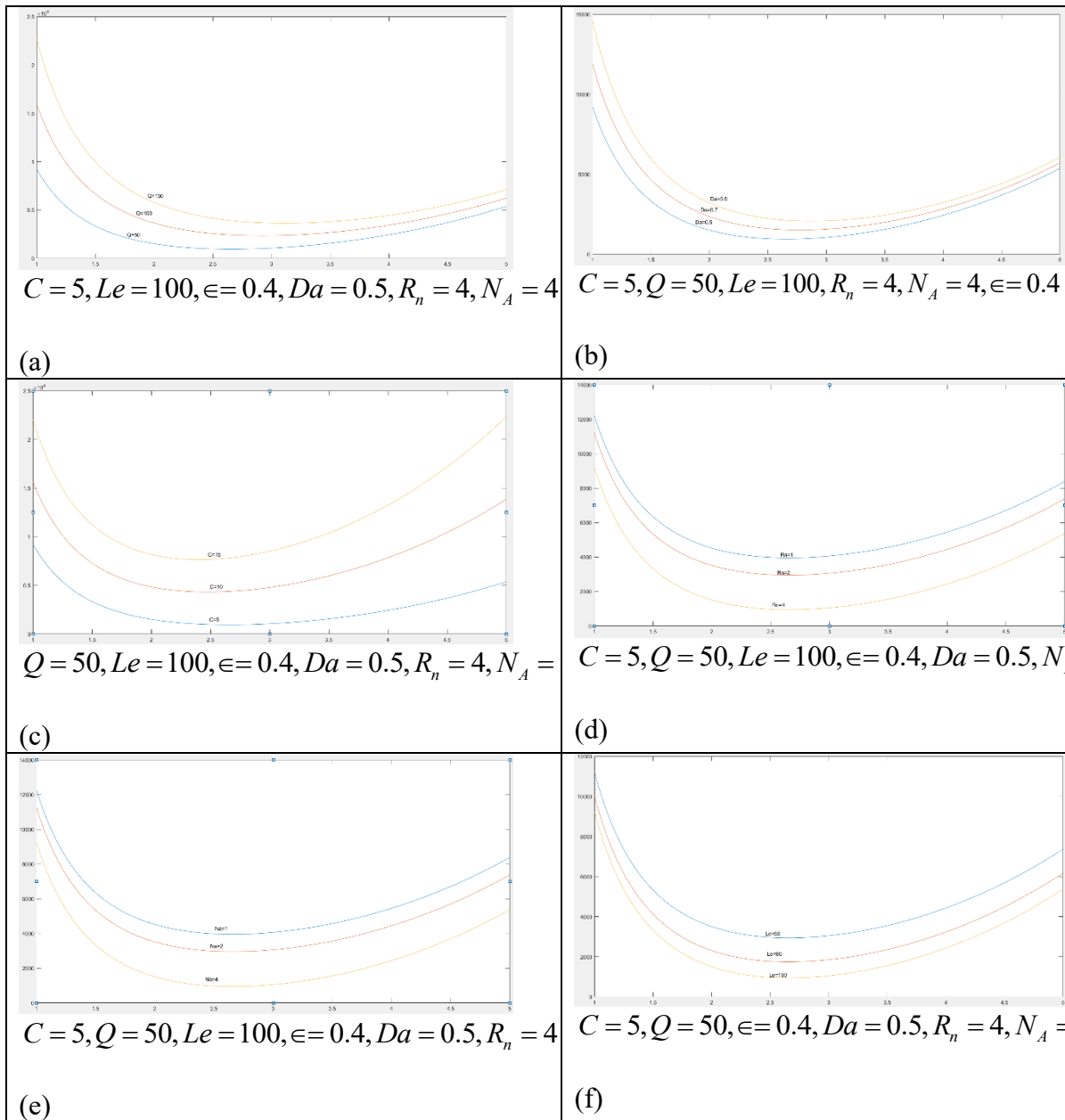
C = 5 , N_A = 4, D_a = 0.5, Le = 100, R_n = 4, $\in$ = 0.4, Q = 50

with variations in one of these parameters.

The graphs for Rayleigh Number R_a^{st} against the wave number α for various values of Q and fixed values of other parameters are in Fig 2(a).It is clear from the figure that there is a significant increase in the value of critical Rayleigh Number with increase in Q . Thus, the magnetic field stabilises the nanofluid layer .and the increase in magnetic field increases the stabilising effect.Fig 2(b) shows the effect of Darcy number. The increase in Darcy Number increases the Rayleigh Number resulting in delay in convection.

Fig 2(c) shows the neutral stability curves for different values of the Couple stress parameter keeping other parameters fixed. It is clear from figure , that the minimum value of the Rayleigh number increases with an increase in value of C, indicating that the effect of C is to stabilise the system.The effect of R_n on Rayleigh Number is shown in Fig 2(d). Different Curves show that Rayleigh Number is decreased with increase in R_n .It means instability is promoted by R_n .The graphs for Rayleigh number R_a^{st} against the wave number α for various values of N_A and fixed values of other parameters is in Fig 2(e). It is evident that N_A advances the onset of stationary convection. Fig 2(f) illustrates the behaviour of Rayleigh Number for different values of Lewis Number. There is decrease in stationary Rayleigh Number with increase in Le . By definition, Lewis number is directly proportional to thermal conductivity of Darcy Maxwell Fluid and inversely proportional to Brownian diffusion coefficient D_B , therefore it is concluded that the convection is enhanced due to thermal conductivity but system gets stabilised due to increase in Brownian diffusion.

$C = 5, Le = 100, \in = 0.4, Da = 0.5, R_n = 4, N_A = 4$

(a)

$C = 5, Q = 50, Le = 100, R_n = 4, N_A = 4, \in = 0.4$

(b)

$Q = 50, Le = 100, \in = 0.4, Da = 0.5, R_n = 4, N_A =$

(c)

$C = 5, Q = 50, Le = 100, \in = 0.4, Da = 0.5, N$

(d)

$C = 5, Q = 50, Le = 100, \in = 0.4, Da = 0.5, R_n = 4$

(e)

$C = 5, Q = 50, \in = 0.4, Da = 0.5, R_n = 4, N_A =$

(f)

$C = 5, Q = 50, Le = 100, Da = 0.5, R_n = 4, N_A = 4$

(g)

Fig.2 : Linear Stationary Convection

Fig 2(g) depicts the effect of porosity parameter keeping other parameters fixed. The graphs show that porosity has stabilising as well as destabilising effect. Initially , the increase in porosity decreases the Rayleigh number implying that porosity has destabilising effect

but after a certain wave number, increase in porosity increases the Rayleigh number implying that porosity has stabilising effect.

Conclusion

In the present paper, the effect of magnetic field on a couple stress nanofluid layer heated from below has been investigated. The main conclusions of present analysis are :

- Stationary Rayleigh number is independent of Relaxation parameter.
- Critical wave number depends on Couple stress parameter as well as magnetic field.
- Couple stress and magnetic field both have stabilizing effect. Lewis number , modified diffusivity and nanoparticle concentration Rayleigh number have destabilizing effect on stationary convection.
- Porosity has stabilizing as well as destabilizing effect in presence of Q .

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PHILLIPS CURVE UNEMPLOYMENT AND INFLATION IN CONTEXT OF INDIAN ECONOMY

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ABSTRACT

The present research study reveals the existence of the Phillips curve approach in the Indian economy context. To illustrate the Phillips curve researchers have considered two variables viz... Unemployment Rates and Inflation Ratesin the context Indian Economy. Secondary information was obtained from the annual data collected from various sources. The study was based on secondary data for the decade from 2009-10 to 2018-19.
Results were obtained by using the statistical tests such as Averages, Percentage methods, Trend analysis, Correlation Coefficient etc. The resultsinterpret that there is an inverse relationship between Unemployment and Inflation in the Indian Economy Context. Thus it is confirmed from the research study that there is existence of Phillips Curve in the Indian Economy.

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Keywords: Phillips Curve, Unemployment rate, Inflation rate, Indian Context, Variables, Factor Relationship, Economy etc.

Introduction

The present research study examines the relationship between unemployment rates and inflation rates in context of Indian economy. Indian economy has the highest inflation rates among emerging economies in the world.

Since independence India's economy is facing one of the severe problemsi.e. unemployment. In the past 73 years, as per the collected data, the Indian economies unemployment rate is one of the debatable questions among the people.

Reports indicate that the unemployment rate of Indian economy is at 3.43% in the year 2018-19 which is reducing slowly but still quite high compared with other emerging economies.

According to the Indian government reports,in September 2018 Indian economy had 31 million people unemployed in the country and more employment opportunities are required to be generated and created for handling the situation. Indian Government is trying hard to overcome this problem.

In each and every five year plan, Indian Government has introduced new policy for creating new employment opportunities like Make in India, Made in India, Skill India etc. The root of this problem is 'Jobless Youth' in the Indian economy. Thus the question is arising that is there any relationship between unemployment and inflation.

Phillips investigation: Phillips curve found that there is an inverse relationship between unemployment ratesand inflation ratesi.e. inflation increases as unemployment decreases and vice versa. So it proves that there is the existence of the Phillips Curve in the context of India.

Challenges of unemployment rate in Indian context: The rapidlyincreasing population is the main reasonbehind increasing unemployment rate and on the other hand shortfall of skilled manpower, low capital, inefficient allocation of resources and inefficient businessand market proximity are unemployment problems in Indian context.

Challenges of inflation rate in Indian context: High level of inflation rate, inflationary gap, huge supply of money, corruption,decreasing productivity and less export whereas excess import these are significant challenges of inflation in the Indian context.

Review of Literature

The literatures reviewed for present research study are-

Estimation of Phillips Curve, Lipsa Ray. Thisresearch study reconsiders the existence of the Phillips curve in the Indian context. In this studyresearcher took variables like inflation and output gap.

Study on Unemployment and Inflation in India, M. Thiruneelakandan&Ullamudaiyar. The objective of this research paper was to study the trends of unemployment and inflation rate in India and analyse the tradeoff between unemployment and inflation in Indian economy.

Understanding Inflation in India Laurence, Ball Anusha Chari&Prachi Mishra. This research paper examined the trend of inflation in India. Researcherhas explained Phillips curve in which the inflation rates are dependent on slow-moving averages and deviation of output from trends.

Empirical Study of Phillips Curve,Manoj Kumar & D.C.Vashist. Inflation and unemployment are two significant variables in macroeconomics. This study fouds that past study has mixed evidence about the shape of the Phillips curve

Phillips curve relationship in an emerging economy, Harendra Kumar, GarimaWahi and MuneeshKapur. This research paper reexamined the issue of determinants of inflation with the help of Phillips curve framework and made key contributions in existing studies.

Research Methodology

A. Research Objectives:
   a)   To study the concept of Phillips Curve& its existence in economies.
   b)   To find out the existence ofthe Phillips Curve in the context of Indian economy.
   c)   To measure the relationship between unemployment rate and inflation rate in the context of Indian economy.

B. Hypothesis:
H_0: There is an existence of a relationship between unemployment rate and inflation rate in context of India.

H_1: There is no existence of a relationship between unemployment and inflation rate in context of India.

C. Scope of Research:
The scope of present research study was the last decade i.e. 10 years of unemployment and inflation data from 2009-10 to 2018-19.

D. Data Collection Methods:
a) Type of Data:
Secondary data has been collected and used for the present research study.

b) Sources of Data:
Secondary data was collected from the internet, books, journals, articles, publications and various printed material.

c) Tools for Data Analysis:
Averages, Percentages, Line Chart and Correlation Coefficient was used for analysis of collected data and hypothesis testing.

d) Duration:
The present study covered a time span of a decade i.e. from year 2009-10 to 2018-19.

E. Limitations of study:
a)Present study was based on available data and information of unemployment and inflation rate of India.

b)The present study concentrates only upon Indian scenario of unemployment and inflation rates.

Data analysis and interpretation

A) Phillips Curve:
The study of "relationship between inflation rates and unemployment rates" is known as Phillips curve.
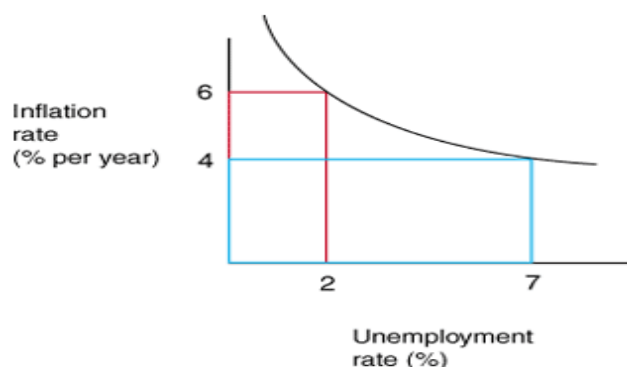
The study suggests that there is existence of relationship between inflation rates and employment rates in the context of India. Certain extent of inflationary conditions in the economy are considered valid in order to reduce unemployment rate. Phillips found a relationship between unemployment rates and inflation rates in the context of Indian economy. Phillips found that unemployment rates and inflation rates have an inverse relationship i.e. inflation rises as unemployment falls and vice versa.The challenge in front of policy makers is how to keep inflation rates and unemployment rates low as much as can.Phillip's study was an important outcome but having some challenges like how to control unemployment rates and inflation rates, when minimizing one result, increasing the other.It is significant to know that the Phillips curve cited above is aforecasted example, actual Phillips curve may vary due to other variables.

b) Relationship between Unemployment Rates & Inflation Rates in Context of India Since 2009-10 to 2018-19:

The approach of Phillips curve is-reduction in unemployment increase in inflation and increase in unemployment reduction in inflation.

The table below shows variation in unemployment and inflation rates currently in India since 2009-10 to 2018-19:

Table No. 1: Relationship between Unemployment and Inflation										
Years	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
% Change in unemployment rate	0.2	0.03	0.07	0.18	0.13	-0.06	0.02	-0.05	-0.18	-00
% Change in inflation rate	3.22	-1.78	-1.03	0.5	-0.06	-3.6	-0.9	-0.5	-0.9	-0.17
									Source: dbie.rbi.org.in	

Relationship between Unemployment and Inflation
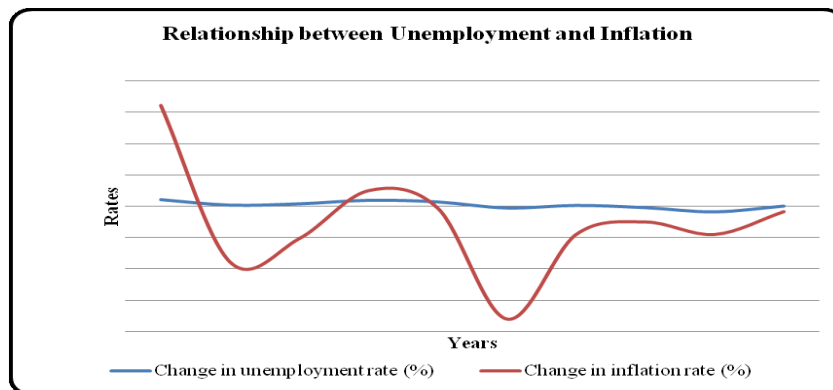
Analysis& Results: From the above results and analysis it has been observed that Phillips Curve exists in Indian context. In 2009-10 change in unemployment rate was 0.2% whereas inflation rate was 3.28%.

In the years 2015-16 and 2016-17 the unemployment rate was negativei.e.0.02% and (0.05%), at the same time inflation rates were (0.9%) and (0.6%) respectively.

Therefore,relationships exist between unemployment rates and inflation rates in context of Indian economy.

Hypothesis Testing

H_0: There is an existence of a relationship between unemployment rate and inflation rate in context of India.

H_1: There is no existence

of a relationship between unemployment and inflation rate in context of India.

Table No. 2: Hypothesis Testing Results		
Sr. No.	Particulars	Correlation Coefficient
1	Inflation Rate based on **W**holesale **P**rice **I**ndex for all Commodities & Unemployment Rate	-0.3664
2	Inflation based on **C**onsumer **P**rice **I**ndex& Unemployment Rate	-0.1239
3	Inflation Rate based on **G**ross **D**omestic **P**roduct deflator (annual %) & Unemployment Rate	0.0315

The statistical results proved the relationship between unemployment rates and inflation rates in the Indian context.

The Correlation Coefficient between inflation rates based on WPI for all commodities and unemployment rates is -0.3664 and other two results clearly interpret that there isan inverse relationship.

The correlation coefficient between inflation and unemployment is negative, so null hypothesis is rejected (**Reject H$_0$)** and alternate hypothesis is accepted **(Accept H$_1$).**

There exists an Inverse relationship between unemployment rates and inflation rates in the Indian context.

Findings

The significant findings of the research study are:

a) It is found that if Inflation rate rises, the unemployment rate falls and vice versa.

b) Unemployment rates and Inflation rates showed inverse relationship in the context of Indian economy.

c) It is confirmed that there is existence of the Phillips curve in the context of Indian economy.

Conclusion

The present research study attempts to demonstrate whether the relationship exists between unemployment rates and inflation rates in the context of Indian economy.

The results, analysis and findings of the study proved that Phillips Curve present in the Indian Economy.

The results and observations showedan inverse relationship between the unemployment rates and inflation rates in the context of Indian economy.

The results of statistical tests and hypothetical analysis revealed that unemployment rates and inflation rates are inversely related, thus confirming the existence of the Phillips curve in the context of Indian economy.

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INDIAN TRANSGENDER SOCIAL ADVANCEMENT: LITERATURE AND FROM THE PERSPECTIVE OF THE MEDIA

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ABSTRACT

The social status of transgender in India is improving day by day, but still a lot of difficulties will have to be faced. The only means of getting the same place back in mythology is the medium of communication like cinema, newspapers, mythological texts, Vedas. Human beings have come to know about the status of transgender because of the means of communication. If perhaps the media were recognized as public servants If so, it is a challenge before those media to make it a reality. To what extent will continue in the present environment and will wait for how much success is achieved, this is the present in the human being believes.

Introduction

The term transgender is used for people that have a gender identity or expression different from the gender assigned to them at their birth. Some transgender people who wish to seek medical help for gender change. These are called transsexuals. Transgender often abbreviated as trains. This category defines individuals quite broadly. This category includes not only those whose gender identity is opposite to their assigned gender (transsexual men and transsexual women), but also those who consider themselves to be exclusively masculine or feminine. Do not feel. Their yoni and shape are different from ordinary human beings. Men and women cannot be differentiated from their geographical or blood characteristics. In Hinduism, the origin of transgender is believed to be from the toes of Brahma, and these people consider Mount Kailash as their abode, that is why they worship Shiva. It is also said that these people are clever in dancing and singing like Yakshas and Gandharvas and the word 'Kimpurush ' for transgender is also used in Sanskrit, hence transgender or Kimpurush was considered a yoni of deities. In the Harivansh Purana, it has been told that these transgender are adorned with flowers and leaves and present themselves in front of the people, who have great ability in singing and dancing. To increase the social status of these transgender, many schemes can be experienced in the present situation, but has its reach reached those true transgender? If not, what is the root cause? The basic point of today's literature must be that if the government or the constitution has given any kind of rights to these transgender, what can these people do to get them? It should be learned. These transgender have been seen only like a beggar in front of the common people in the society, while many Supreme Courtses of the world has / had decided that neither man nor woman should be given opportunity along with men and women in gender identity. It turns out that they too have an identity of their own in the society.

Objectives of the study

Primarily the purpose of this study is to shed light on problems like the identity crisis of transgender. Understanding the plight of sociological exclusion of transgender and gender beliefs and their consequences in Indian society, focusing on the pathway to gender identity disorder and their paradoxical sexual practices. The main objective is to bring the problem of transgender in front of the whole world and solve this problem forever.

Impact of Mass Communication on Transgender

Now the point is that in order to achieve those rights, the people of this aimless caste should learn about the means through which they have to reach them. These days the message of this awakening is seen in practical cinemas. If we the general public keep looking at them with a sense of purposelessness , considering them as such only for entertainment , then they will keep slipping from every step of moving forward . In this context, the statement of Lal

Bahadur Verma is visible - "Whatever humanity has achieved in the last 200 years could not have happened to the last 2000 years. There were not as many enlightened people in the world today as they were before today." . From the above statement, one thing is understood that whatever thought has put pressure on the heart and mind of man, it has also opened the doors of liberation. Anhad magazine editor Santosh Kumar Chaturvedi, while presenting his views on Lal Bahadur Verma's article - "Democracy and nobility", says that - "The biggest obstacle in the path of democracy is - 'Elite'. It means a false sense of growing up. A baseless conceit. This conceit is built up in caste, racial, religious, scholarship, wealth, etc. In such a way that it penetrates deep into our self and we do not even realize it. On the whole, this understanding is an anti-humanity which is based entirely on the cruel feeling of inequality and contempt. These transgender are facing this condition of indifference to their home environment. Since childhood, they have experienced hearing insults to their parents, siblings, relatives and treating them as cursed creatures etc. Now they need what society can do to identify them? He has to make a definite choice. This work is available only through cinema and literature. In 2002, from the novel 'Yamdeep ' written by Neerja Madhav, Mahandre Bhishma 'Kinnar 'Main Payal and Ghulammandi' , 'Zindagi 50-50 ' and 'Teesri Tali' composed by Pradeep Saurabh , if we see once It is revealed how in the presented environment they are struggling for their family expectation and relationship yearning and sensibility and economic crisis, social disdain, as well as educational and economic empowerment. Neerja Madhav in his novel named Naaz One can see the description of Sobti's condition while trying to separate the character of the profession by explaining the problems caused by prostitution to the character. If such they have to get away from the tendency to earn money , then before that they should also know their rights like the rights of ordinary people , by showing the condition of reaching there through the cinema and literature , which is the constitutional form to get it . By understanding all the citizens of the society , we will try our best to motivate them.

When these transgender beg and do prostitution due to no jobs, it is only their compulsion, But taking advantage of this compulsion, some fake transgender has / had also landed in the city of Mumbai. With this goal, the people of India Alert have made a documentary in Dangal TV channel and this is a good effort to keep it in front of the society. But how many people would understand by seeing this? If the picture of this is shown in cinema or literature on the basis of the true story, then it will have full effect. This is our belief. Because as mentioned above, only a few sections of the society have got information about its reality of the documentary which was made in the name of fake transgender. But how many people try to know ideas with the help of this documentary, we have to understand first.

Rights given to transgender in Indian legal system

The rule of law is supreme in India and everyone is equal to the eyes of law. Nevertheless, the transgender community is in a constant battle as they face harassment, abuse and discrimination from every section of the society, be it their families and friends or the society at large. The life of transgender people is a daily battle as there is no acceptance anywhere and they are ostracized and ridiculed from the society. Although the Supreme Court of India, Justice K. S Radhakrishnan and A. K Sikri in National Legal Services Authority v Union of India and others recognized third gender along with male and female. By recognizing different gender identities, the Court has done away with the social recognition of the dual gender structure of 'male ' and 'female'. The Supreme Court observed that the recognition of transgender as a third gender is not a social or medical issue, but a human rights issue. The right to equality before the law and equal protection for / against the law is guaranteed under Articles 14 and 21 of the Constitution. The right to choose one's gender identity is an essential part of living a life with dignity which comes under the purview of Article 21. Further, discrimination on the basis of gender is a violation of Articles 14, 15, 16 and 21. The Court also protects the sexual expression of a person enforced by Article 19

(1)(a) and said that any restriction on one's personal appearance or selection is subject to the restrictions contained in Article 19 (2) of the Constitution, Cannot be imposed.

Conclusion

Transgender face an identity crisis. They often face sexual abuse and physical violence in the society. They are also excluded from social and cultural participation. We need to take a look at their past or future to help prevent massive discrimination against the transgender community, or to work their way out of sex workers into good citizens in the future. It is pertinent to mention that if there is any medium for transgender to re-acquire their own mythological place scale, then it is only through media such as cinema, newspapers, social network, literary genre, etc. Therefore, it is necessary for the society to take a resolution that to maintain the social progress of transgender, it is necessary to make maximum efforts in their field. If perhaps the media is recognized as a public servant, then it is a challenge before those media to realize it. To what extent its utilization will continue in the present environment and how much success they will get, it is the belief in the citizens presented.

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ASSESSING THE CREDIT RISK OF INDIAN BANKING SECTOR: A STUDY DURING COVID-19 PANDEMIC

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ABSTRACT

Credit risk is one of the major risks that a bank inherits, due the nature of business. It has, acquired a greater implication for researcher during the recent past for various obvious reasons. Important among them is the wave of economic liberalization blowing globally. The developing nation India is no exception to this roll towards market-driven economy. The aim of the study is to assess the credit risk exposure of the entire banking sector of India basically during the COVID 19 pandemic. The study concludes that there is a tremendous load of NPAs on all the banks and especially the pressure id more on state owned banks. Hence, a better credit portfolio diversification would enhance the prospects of the reduced concentration of credit risk.

Keywords: Credit Risk, Non-Performing Assets (NPAs), Gross Non-Performing Assets (GNPA), Financial Stability, State-Owned Banks.

Introduction

The banking system is the backbone of a successfully developed economy. This financial intermediariesfoster economic development of a country. However, the globalization of financial markets technological advancements has put forward complexity in banking activities. Traditionally the main function of the banks was to receive deposits and provide loans for earning interests (Kiss, 2003; Gan & Lee, 2005). Banks are now exposed to various types of risks based on their diversified functions. The risks involved in the banking industry includes liquidity risk, commercial risk, credit risk, financial risk, income and prices structural risk, and the risks due debts and assets structure. Credit risk is very crucial aspect which is hitting the banking industry in the present dynamic environment. This type of risk is the outcome of fiscal transaction between the customers who use money and providers.Hence, estimating and identifying this type of risk has been interesting for credit and financial institutions. Although banks are confronting various types of risk, credit-risk has the main part to play on their profitability potential. This present study is an attempt to assess the credit risk exposure of the entire banking sector of India basically during the COVID 19 pandemic where the different business communities as well as individuals have been severely affected.

Literature Review

Credit Risk, which is the default by the borrower to repay the money taken from the banks, remains the most significant and crucial risk to manage till date. The credit risk predominance is also reflected in the structure of economic capital, which banks keep aside as a protective measure to tackle these types of risks.

In the global context, credit risk has proved to be the most vital among the different risks faced by a banking institution. A study on the failure of banks in New England revealed that, out of 62 banks which existed before 1984, and which had failures in 1989 to 1992, there were 58 cases in which loans and advances were not repaid by the customers on time (Prahlad Sabrani, 2002). This signifies the importance of credit risk assessment and therefore it forms the basis of present research analysis. Moreover, researchers and risk management practitioners have been consistently trying to improve on current risk management techniques and enormous efforts have been made in improving the art and science of credit risk measurement and management (Ravi Mohan R, 2001). It is a real challenge for credit risk managers to correctly identify pockets of risk concentration, quantify extent of risk carried, identify opportunities for diversification and balance the risk-return trade-off in their credit portfolio. During the COVID-19 pandemic scenario and the flexible policies announced by the government, puts more pressure on the elevation of credit risk. Hence, undergoing an

assessment of credit risk in the present context becomes more pertinent.

Study method

The study has been conducted with an intention to make an assessment of credit risk in the present scenario for both the public and private sector banks. The data used for the study has been collected from secondary authentic sources like bulletins of RBI, reports of different banks etc. the study would serve as a guidance to predict the present status of banking scenario and help the policy makers and banking authorities in strategising ways in order to sustain the uncertain future.

Discussion and Major Findings

At present the banking system in India which is reddening with excess liquidity is in a situation on catch-22 situation. Though it is very important to provide lending support to their customers during this crisis of Covid-19 pandemic, they also cannot ignore the risks associated with these lending. The MD & CEO of Indian Bank, Padmaja Chunduru is of the opinion that credit risk assessment in a VUCA environment is one of the vital challenges with is faced by the banking sector. If the banks do not extend credit then the operation of the business organisations will be at stake and if they lend, then their own balance sheet will see a down turn. The regulatory authorities have been adopting methods of quantitative easing by boosting liquidity and lowering the interest rates but these steps may also have subsequent side effects. Hence, it becomes very significant for the banks that they not only facilitate lending but also keep an eye on how the disbursed money is utilised by the borrower.

The banks in India have around 4.5 lakh of MSME customers who are entitled and eligible for loans assured by the government. In view of this, the total disbursement of loans in projected to be ₹7,000-7,500 crore. Till date banks have sanctioned loans of ₹2,000 crore. Now, the main essence lies in administering the utility of this disbursed money, so that the MSMEs can timely repay the money. Hence, the banks have to ensure a stringent monitoring mechanism for assessing the cash flows and production cycles of these MSMEs (Money & Banking, 2020). As opined by Shri CS Ghosh, MD and CEO of Bandhan Bank, the growth in credit growth is likely to start accelerating in the second quarter of this fiscal. However, the major issue would be to extend credit to small enterprises which do not have any credit ratings.

Increasing trend in NPAs

1. Over the last few months it is observed that the Indian banks have been creating provisioning for non-performing assets (NPAs) in anticipation of bad loans. The State Bank of India who is the largest lender had made provisions of Rs2,062 crore, while HDFC Bank, the largest private sector bank had made provisions of Rs.1,451 crore.

But the analysts are of the opinion that these bad loans could eventually be more than that has been predicted by the banks.

Figure 1: Provisioning for NPAs by Banks and actual NPAs

Banks	March 2020	June 2020
ICICI Bank	Rs2725 crore	Rs5550 crore
HDFC Bank	Rs398 crore	Rs1451 crore
Axis Bank	Rs3 crore	Rs730 crore
Kotak Bank	Rs650 crore	Rs616 crore
IndusInd Bank	Rs283 crore	Rs920 crore
Bandhan Bank	Rs690 crore	Rs750 crore
DCB	Rs63 crore	Rs32 crore
City Union	Rs102 crore	Rs100 crore
Federal Bank	Rs93 crore	Rs93 crore
SBI	Rs938 crore	Rs2062 crore
Bank of Baroda	Rs810 crore	Rs996 crore
Bank of India	Rs414 crore	Rs620 crore

Quartz | qz.com | Data: Investor presentation, news reports | Note: HDFC Bank figures are Q1 floating provisions

1.

Source: Quartz/qz.com/Data: Investor presentation, news reports/Note: HDFC Bank figures out Q1 floating provisions
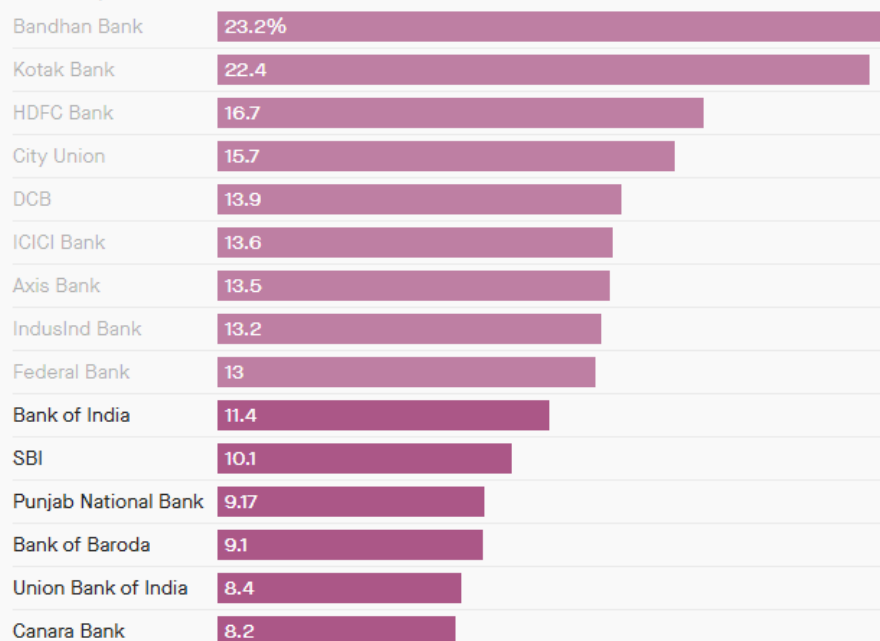
As per the Mumbai-based credit ratings agency India Ratings, the entire banking system in India would need an additional fund amounting to Rs. 50,000 crore to fill the gap created by rising NPAs and continued lending, but the state-owned banks would require to raise Rs30,000 crore.

There is an indication that sectors such as aviation, hospitality, commercial real estate, and small businesses have been struggling to sustain during this Pandemic over last six months. Hence, bad loan seem to be mounting from these sectors.

There has been an increase in retail loans such as personal, housing, credit cards, and micro-finance because of job losses and pay cuts. So, individuals may prefer unsecured loans like personal loans and credit cards, which would again boost up the non-yielding loans. Hence, banks will need to raise money to overcome this crisis. The banks have thus created high capital buffers to get rid of this situation but these also do not seem to improve the situation much Indian banks' bad loan woes to mount (Prathamesh Mulye,2020).

Figure 2: Capital Buffer created by private sector and state-owned banks

Private-sector banks in India have higher capital buffer compared to state-owned peers

Bank	%
Bandhan Bank	23.2%
Kotak Bank	22.4
HDFC Bank	16.7
City Union	15.7
DCB	13.9
ICICI Bank	13.6
Axis Bank	13.5
IndusInd Bank	13.2
Federal Bank	13
Bank of India	11.4
SBI	10.1
Punjab National Bank	9.17
Bank of Baroda	9.1
Union Bank of India	8.4
Canara Bank	8.2

Quartz | qz.com | Data: JM Financial, Investor Presentation | Note: % Common equity tier-1

Source: Quartz/qz.com/Data: JM financial presentation /Note: % Common equity tier-1
**Projections in Gross Non-performing Assets (GNPAs)**

It has been projected by Financial Stability Report (FSR) of Reserve Bank of India that banks' gross non-performing assets (GNPAs) may observe a sharp rise to 13.5 per cent by September 2021, and then shoot up to 14.8 per cent, which is almost double the 7.5% in the same period of 2019-20, under the severe stress scenario of COVID 19 (FSR, 2020). So, banks need to formulate strategies and support for a rollback of regulatory forbearance that was announced in the wake of the pandemic, and enhance their capital positions.

The RBI Governor Shaktikanta Das has very well noted that "Stretched valuations of financial assets pose risks to financial stability. Banks and financial intermediaries need to be cognisant of these risks and spillovers in an interconnected financial system."

Further the FSR report highlights that the growing disconnect between certain segments of financial markets and real sector activity, has infused abundant liquidity which spurs a quest for returns. Moreover, within the financial market range, the discrepancy in expectations in the equity market and the debt market has increased.

Figure 3:Projection of Banks' GNPA ratios

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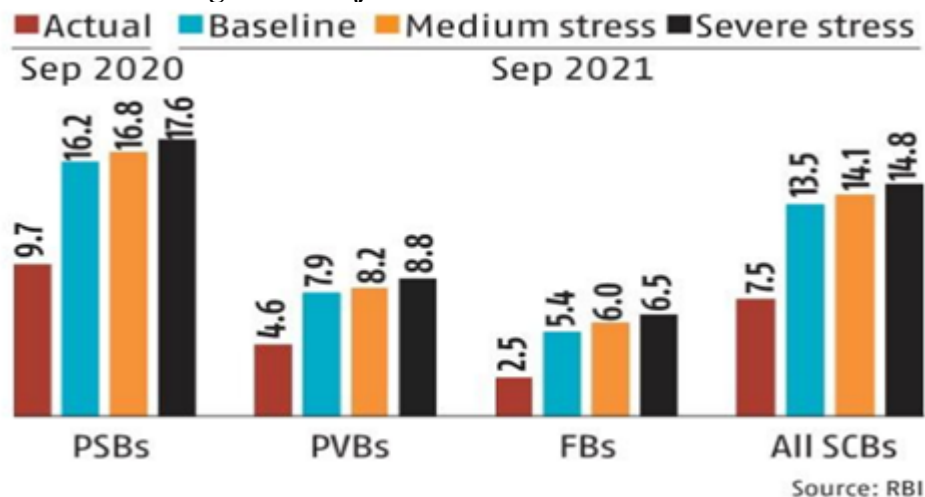
1. 1612711024. The above **figure 3** shows that the state-run banks have been affected the worst in comparison to other banks with their GNPA ratio which is projected to elevate to 16.2% by September 2021 from 9.7% in September 2020. If there exists a scenario of severe stress then the GNPA is expected to be 17.6 per cent.

2. The implications of the capital adequacy would be that it is estimated to fall to 14% in September 2021 from 15.6% in September 2020 in normal condition and to 12.5 per cent if the scenario if under severe stress.

3. The results of stress test reveals that four banks are likely to fail in meeting the minimum capital adequacy level by September 2021 under the normal baseline conditions, without being factored with any capital infusion by stakeholders. Under severe stress scenario, it is likely that nine banks fail to meet the minimum level of capital adequacy.

Conclusion

The stress tests indicate towards corrosion in the asset quality of the Indian banks. An early identification of the problems and forceful capitalisation are essential for facilitating credit growth across various sectors. Nevertheless, pre-emptive strategies are to be made to tackle the potential NPAs. Dividend earnings from state-run banks are not certain because as per RBI banks may not make any dividend payment on equity shares from the profits pertaining to the financial year ended March 31, 2020, this would supplement more lending. Hence, banks need to prepare for these adverse scenarios by improving their capital base. It's a fact that simple financial policy are planned to facilitate and give a boost to the growth prospects, but these could also yield unintended penalties like encouraging leverage, increasing asset prices and fuel the threats to financial stability of the economy.

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CREDIT RISK MANAGEMENT IN CONTEXT OF BANKING SECTOR REFORMS IN INDIA

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ABSTRACT

The banking sector in India has fallen victim to a massive reform action, so as to ensure the sustainability of institutions engaged in financial intermediation process. The financial stability of banking institutions should play a very important role in preserving society and the economy, and at the same time the health of the institution. With the advent of using limited financial resources for economic development, India's financial sector has begun to succumb to various controls and regulations. This study aims to examine credit risk management in Indian banks in the context of banking sector reforms.

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Keywords: *Credit risk, economic conditions, private banks, public banks, NPAs*

Introduction

India has been recognized as one of the world's growing economic powers over the past three decades (Didier and Schmukler, 2013). The global economic crisis and its impact on the global economy have drawn attention to the need to integrate banks into risk management concepts, particularly in the Indian economy, and into their national policies. In the current situation, the sensitivity to credit risk in Indian banks has increased due to market competition, socio-economic conditions, and the dynamics of the foreign exchange market in both business and global businesses. Today, most banks in India deal with the standard risk associated with commercial and agricultural loans and advances. In the past few years, the vast majority of Indian banks have started to expand their holdings and diversify their operations by engaging in other activities such as insurance, funds, etc. However, many of these expansions are also at risk for these banks. In times of high volatility and market fluctuations, banks must prove their resilience in terms of rising stock prices. That is why the main factor in the credit risk management system would be the use of a steam line of risk management and maximizing the profit from the products and services provided by the bank. Banks must distinguish between any avoidable and unavoidable risks associated with them, and they must decide to what extent these threats can be accepted by the central bank. Risk plays an important role in the bank's profit a high rate of return is paid for risk, and, therefore, it is very important to maintain the priority between risk and return.

In India, the banking system suffered a setback during the beginning of 1990s and most of the banking institutions were about to collapse. The financial stability of these institutions was adversely affected as the health of all banks was eroding. The need for a turnaround was felt and banking sector reforms as a part of overall economic reforms were initiated. The main objectives of the banking sector reforms were to enhance productivity, profitability and efficiency. The reform measures introduced in a systematic manner have contributed to the financial health of banking institutions resulting in financial stability for our country. The present study aims at studying the credit risk management of Indian banks in context of the banking sector reforms.

Objectives of the study

The research paper is based on the following objective defined:

1. To study the pre-reform and post-reform phase of the banking sector in India.
2. To analyze credit risk management of Indian banks in context of the banking sector reforms.

Method of the study

The study has been conducted using secondary data for authentic sources such as articles, published bulletins. The facts and figures are very recent and have been taken for a period from 2018 to 2020. However, discussions and other data has been supplemented with data before 2018 to 2020.

Relevance of the study

The main function of the financial system is to mobilize savings and allocate them efficiently among competing sectors/firms in the economy. In most emerging economies, banks play the dominant role in the financial markets, while the capital markets tend to develop later. The Indian banks are no exception as a high proportion (about 33 percent) of household savings is held as deposits with banks and other financial intermediaries (Sharifi et al., 2016). The credit risk management in Indian banks assumes significance in the context of large number of small deposit accounts. A direct consequence of these problems is the fragility of the Indian banking system manifested by the large NPAs, especially in the government banks (PSBs) (Azad et al., 2016). This comes in the way of healthy development of India's economy due to the adverse impact on banks' ability to lend. Therefore, the identification and estimation of credit risk is important for orderly growth of Indian banks and financial system.

Pre Reform Phase

The commercial banks in India were nationalized in two stages, one in 1969 and another in 1980 with the objective to control the heights of the economy and to meet progressively and serve better the needs of development of the economy in conformity with national policy and objectives. Taking advantage of the government policy and guidelines the banking sector grew to a great extent spreading its wings to the hitherto unknown areas, extending the credit facilities to the needy sectors of the economy and promoting savings habits among the populace both rural and urban. The growth phase was remembered by mass banking. In addition to the commercial banking functions, banks in India were called to shoulder social responsibilities – poverty alleviation, employment generation, agricultural and industrial development, balanced regional development through priority sector and rural development programmes like IRDP, Self-Employment Programs etc. However, the mushroom growth of the banking sector has created some problems questioning its further existence and survival. Productivity and efficiency of the system have suffered. Low profitability, high and growing non-performing

assets and relatively low capital base continued to cause anxiety. The Cash Reserve Ratio (CRR) and the Statutory Liquidity Ratio (SLR) as the monetary tools to control the volume of credit in the economy was pre-empted impairing the freedom of banks to deploy them efficiently in the market. The CRR was gradually raised from 5 per cent in June 1973 to 15.0 per cent by July 1989 and the SLR from 26 per cent in Feb 1970 to 38.5 per cent in Sept 1990. Thus, by 1991, 53.5 per cent resources of the banking sector were pre-empted in the form of SLR and CRR. Such large pre-emptions offered little operational ability of banks. Earnings from the pre-empted resources of banks were rather low and banks earned less than market rate of interest on these balances. The proliferation of directed credit arrangements, administered structure of interest rates and increase in statutory pre-emption all had an adverse impact on banks' profitability. In 1991-92, the profitability of public sector banks as measured in terms of working funds was 0.27 per cent, without taking into account the provisioning related norms. The quality of loans assets declined over the years with the result, the non-performing asset of banks have increased reaching about 24.2 per cent of advances in 1992-93. The capital base of Indian banks was very low, the ratio of slightly over 2 per cent in 1991-92 being much lower by international standards. In short, the balance sheet of the performance of the banking sector was mixed - strong in widening the credit coverage, but weak as far as viability and sustainability are concerned.

Post Reform Phase

It was in this background the government has thought the need for reforms to revamp the financial sector. The reforms have become imperative on account of the facts that despite its impressive quantitative growth and achievements, the financial health, autonomy, flexibility, and vibrancy in the financial sector had deteriorated over the past many years. In 1991, Government of India has appointed the Committee on Financial System under the chairmanship of Shri M Narasimham to examine all aspects relating to the structure, organisation, functions and procedures of the

financial system. The committees' approach was to reform the financial sector especially banking and hence emphasised on three premises – competitive efficiency, viability and autonomy. The report of the committee and the action taken by the Government on several of the recommendations constitute the banking reforms in India.

Literature review

Credit Risk is the oldest and biggestrisk that Banks, by virtue of their very nature of business inherit. The pre-dominance of creditrisk is the main component in the capital allocation. **Adem Anbar (2006)** evaluates the credit risk management applications in the Turkish bank sector. His findings also indicate that banks should accelerate their studies and preparations which are related to data about borrowers and loans that are used in credit risk measurement.**World Bank Group (2007)** the study describes the main features of the supply side of SME financing by analyzing the perceptions of banks in Argentina and Chile regarding lending to SME. The study identifies that the lending practices and risk management will change substantially in the years to come, as the involvement with SME matures. **Anna and Antonio (2005)** the study has been highlighted in the proposed Basel Accord II that includes the internal rating approach to credit risk as one of the cornerstones. This paper attempts to investigate the extent to which the credit rating systems are used in Macao based on the survey. **Vivek Rajbahadur Singh (2016),**made an attempt to understand the status andtrend of NPAs in Indian Scheduled commercial banks, The factors contributing to NPAs,reasons for high impact of PAs on Scheduled commercial banks in India and recovery of NPAsthrough various channels.

This study shows that extent of NPA is comparatively very high inpublic sectors banks. The NPAs level of our banks is still high as compared to the foreign banks. ***Nayan & Kumaraswamy (2014),*** in their study found that the profit in PSBs was declining trenddue to competition, lack of diversity of banking services and stringent rules of RBI beforeeconomic reforms. The profit was declining initial period due to operation was not linked withprofit and lack of diversity in the banking services.

There are research studies which show the credit risk assessment of commercial banks in India. But there are dearth of literatures which reveal the credit management done so far after the post reform phase in the Indian banking sector and very few studies have reflected it in terms of private sector and public sector banks.

Discussion

The Indian banking system consists of 12 public sector banks, 22 private sector banks, 46 foreign banks, 56 regional rural banks, 1485 urban cooperative banks and 96,000 rural cooperative banks in addition to cooperative credit institutions As of November 2020, the total number of ATMs in India increased to 209,282.Asset of public sector banks stood at Rs. 107.83 lakh crore (US$ 1.52 trillion) in FY20.During FY16-FY20, bank credit grew at a CAGR of 3.57%. As of FY20, total credit extended surged to US$ 1,698.97 billion.During FY16-FY20, deposits grew at a CAGR of 13.93% and reached US$ 1.93 trillion by FY20. Credit to non-food industries stood at Rs. 105.53 trillion (US$ 1.44 trillion), as of January 15, 2021.Non-food industries grew at 5.7% in January 2021 as against an increase of 8.5% in January 2020 (IBEF report, 2021)
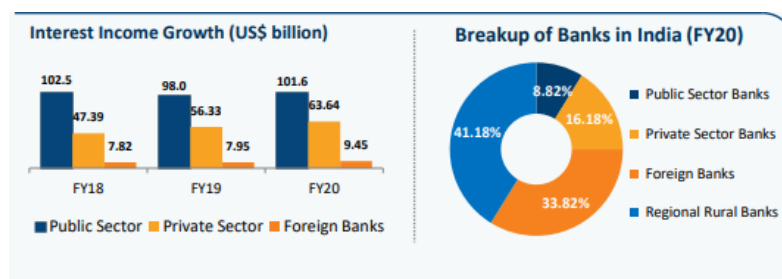
Source: IBEF report 2020

Fig1:Interest income growth and break up of Banks in India
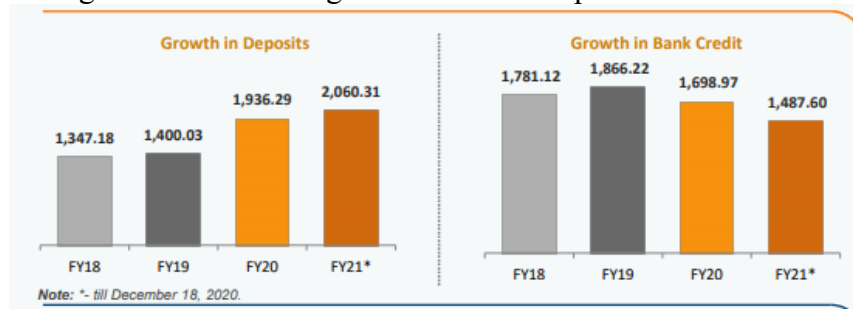
Source: IBEF report 2020

Fig1: Growth in deposits and growth in bank credit

Public banks controlled over 70 per cent of the market till a few years ago, but according to the latest data released by the Reserve Bank of India, their market share in loans has dipped to 59.8 per cent in 2020 from 74.28 per cent in 2015, while private banks' share has surged to 36.04 per cent from 21.26 per cent in the same period (Fig 3).

MARKET SHARE IN LOANS (in percentage)			
Year	Public sector banks	Private sector banks	Foreign banks
2000	79.41	12.56	8.03
2005	74.25	19.21	6.54
2010	77.24	18.08	4.67
2015	74.28	21.26	4.45
2020	59.8	36.04	4.15

Source: RBI

Fig:3- Market Share in loans

In case of deposits also private banks' market share has gone up to 30.35 per cent this year from 19.44 per cent in 2015, while public banks' share saw a decline to 64.75 per cent from 76.26 per cent.

MARKET SHARE IN DEPOSITS (in percentage)			
Year	Public sector banks	Private sector banks	Foreign banks
2000	81.29	12.63	5.47
2005	78.16	17.12	4.7
2010	77.68	17.31	5.05
2015	76.26	19.44	4.3
2020	64.75	30.35	4.89

Source: RBI

Fig:3- Market Share in deposits

As per a report prepared by a working group of the RBI, which was set up to review ownership guidelines and corporate structure for Indian private sector banks," The PSBs have been consistently losing market share to the private banks, a process which has markedly hastened over the past five years. The primary reason for this has been the beleaguered balance sheets of PSBs on account of the non-performing asset (NPA) overhang of post-global financial crisis

years." The dip in public sector banks' market share is also reflective of risk-aversion. As more and more loans turned bad, these lenders became extremely cautious towards fresh lending also because of fear of investigative agencies littering their premises even after retirement.The bad state of public sector banks is also reflected on operational efficiency parameters. The staff expense-to-total income ratio for public sector banks zoomed between 2015 and 2020, while for new private sector banks, the ratio remained stable.Public sector banks have been overly dependent on the government for fresh capital infusion. A massive Rs 3,18,997 crore of capital was infused by the government in the last five years in state-run lenders. Private banks were able to raise Rs 1.15 lakh crore of capital from the markets, as compared to Rs 70,823 crore by public sector banks. The public sector banks needed higher capital due to sharp increase in bad loans. Banks need to set aside capital as provision for non-performing assets (Manojit Saha, 2020).

Conclusion

Despite the impressive quantitative achievements in resource mobilization andextending the credit reach, several distortions have crept into the financial systemsespecially in respect of the allocation of financial resources, productivity and efficiency ofthe system have suffered, its profitability has been eroded and its quality has deteriorated.Low profitability, high and growing non-performing assets and relatively low capital basehas continued to cause anxiety. Credit Risk Management is the proactive strategy to plan, organize, lead, and control the varietyof risks that are associated with the organization's daily and long-term functioning. Credit risk analysishas emerged as a big challenge for the banks in India. It is imperative to mention that default clients havebeen a major problem for the banks and too for long and the banks have been trying to reduce thedefault problem all along. The Non-Performing Assets have always created a big problem for the banksin India. The problem of recovery is not with small borrowers but with largeborrowers and a strict policy should be followed for solving this problem. There is an adverse effect onliquidity of the bank. The RBI has been striving to assist the Indian Banks to get out of the default riskproblem by formulating policies.

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