ENCOURAGING CUSTOMER LOYALTY THROUGH REDUCING CUSTOMER REMORSE: A DESCRIPTIVE STUDY

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ABSTRACT

In most consumer buying processes, buyer satisfaction (or dissatisfaction) and potential remorse follow the post-purchase evaluation process which occurs after the product is consumed. Specifically, post-decision dissonance causes buyer's remorse, which arises when a person has to make a difficult decision, which requires high involvement as in the case of a heavily invested purchase between two similarly appealing alternatives. Buyer's remorse is the consequence of a buyer's decision and it is familiar with all of us as in our personal life we may experience it from time to time or at any point in time. Factors that affect buyer's remorse may include the resources in which one has invested, the time and effort have given by the purchaser, whether the purchase is aligning with the goal of the purchaser, the post-purchase experience of the customer also includes regret. The Buyers are worried about the opinion of others that they may doubt the purchase or claim to know better alternatives which would further increase the buyer's remorse. The marketer must make the deal with the customer inviting, informative and enjoyable without underestimating him. The marketer must build the trust by-product or service he has sold to the customer is exactly as he promised to avoid buyer's remorse getting into bed with its customers.

Introduction

Marketing is the process of planning and executing the conception pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives. Satisfying customers is the ultimate objective of every marketer in all categories of goods and services. The marketer's interaction with the customer must be inviting, informative and enjoyable as customers continually make decisions that may be large or small, having high involvement or low involvement, and afterward, there are consequences of these decisions. For example, we have started a new job and later realized it was the wrong job; we have bought a car and later thought that had we have bought the wrong car; ordered a meal at a restaurant and after taken services from it, then regretted our choice. The consequence of the buyer's decision is either satisfaction or dissatisfaction which is the result of the post-purchase evaluation process occurring after the product is consumed. If the performance of the product/ service matches with the expectation of the customer or the value gained from purchase equals the expected value thought by the customer before the purchase, the customer is satisfied and If vice versa occurs, it leads to customer dissatisfaction. Customer dissatisfaction results in cognitive dissonance as a consequence of a negative buyer's experience and it follows the potential Buyer's remorse. Every marketer faces the dilemma of buyer's remorse at some point or the other. When the marketer seeks to build strong relationships between customers and the organization then, remorse appears like an obstacle. Today companies are in a more competitive environment than before, so there is a need to understand the influence of post-purchase consumer regret on consumer satisfaction. We cannot live without desire, also, feelings and, regret (Tsiros and Mittal, 2000). Thus, our satisfaction does not depend solely on what we have received instead it depends on what we could have received, noting that a satisfactory purchase can also lead to regret with time.

Statement of the problem

The level of consumer regret in our business environment shows that there is less exploration of the components of outcome and process regret and how each of thesecomponents can be experienced in the context of consumption (Zeelenberg and Pieters, 1999). A research finding by Churchill and Gilbert 1979 suggests that regret should be observed as a powerful force that motivates

and directs one's behavior. Regret is not only an emotional reaction to the bad result of a decision.Zeelenberg and Pieters (1999) have identified the existence of consumer experience, regretting what they bought and how they bought them.

Businesses are daily faced with poor sales performances due to consumer dissatisfaction ofproducts purchased (Landman 1993) while the purchase stage is more crucial from the manufacturer or marketer's perspective, the post-purchase behavior indicates the ultimate satisfaction perceived by the consumer and as a determinant of future purchase decision (Connolly and Zeelenberg 2002; Zeelenberg and Pieters 1999).

The present research work looks into the problem of post-purchase consumer remorse which the customer face after post-purchase of products and services. The research also analyses important factors influencing post-purchase remorse in the business environment to facilitate proper solutions to consumer regret's effect on customer satisfaction to develop a better marketing organization.

Objective of the research

The present descriptive research is designed to achieve the following objectives:

- To understand the concept & psychology of buyer's remorse.
- To understand the concept of cognitive dissonance and its happening.
- To discuss the types of buyer's remorse.
- To find out the factors & causes of buyer's remorse
- To discuss how the buyer can reduce his remorse after purchase
- To discuss the factors which will encourage customer loyalty by reducing customer remorse.

Importance of the Research

The present research is very pertinent to the current marketing environment as customer post-purchase regret arising out of dissatisfaction is the key challenge to the marketing strategists. The research contributesto the knowledge on the influence of post-purchase consumer regret on consumer satisfaction. The research will make the stakeholders understand the types, factors, and causes of buyers' remorse arising out of dissonance. The present research also highlights howa buyer can reduce his remorse after purchase and how the marketers can encourage customer loyalty by reducing customer remorse as it is of great concern and a key requisite of business success.The research will contribute to the advancement of knowledge in society in general and in institutions of higher learning in particular

Research Methodology

The present research has a descriptive research design. The nature of data is qualitative and Secondary data is used to descriptively analyze the factors leading to buyer's remorse to suggest the remedy to the buyer as well as to the marketer. The researcher made an extensive scan &reviewed the various literature available and analyzedit to reach the inference.

Concept of Remorse

Regret is a painful sensation that arises when we compare "What is" with "What might have been" (Sugden 1995). Macmillan dictionary defines remorse as a feeling of regret or guilt after we have bought something we no longer want. It is a feeling of regret after we have made a big decision with serious consequences that we think may have been the wrong decision. Sometimes, we wish we had made different choices as our decisions don't lead to desirable outcomes, leading buyers to experience remorse. Buyer's remorse is regretting spending money on something. For example, a customer went to a store and he might have felt pressure from friends or a salesman to buy a trendy outfit and had the reassurance from the friends or a salesman that it looked great on him. At home, he realized that he didn't want to spend the money and will never wear the outfit. The customer wants to return the outfit and get his money back but cannot do so. It leads to feelings of regret resulting in repentance.

A buyer's remorse can be felt in the form of regret or anxiety that arises after he has purchased something. The purchase can be anything significant such as a home or new car, but remorse can also occur after smaller or low involvement purchases.It means that there is a powerful motive to every individual for

maintaining cognitive consistency which gives rise to irrational and sometimes maladaptive behavior (Festinger, 1957). According to him, people hold much cognition about the world and themselves, when they clash, a discrepancy is evoked, resulting in a state of tension known as cognitive dissonance. It is a situation involving conflicting attitudes, beliefs, or behaviors which produce a feeling of discomfort that may lead to an alteration in any of the attitudes, beliefs, or behaviors to reduce the discomfort and restore balance. In other words, regret transpires when an obtained outcome is comparedunfavorably with a better possible outcome that could have been achieved if thebuyerhad chosen the other alternative (Bell 1982, Tsiros and Mittal 2000). Following questions/thoughts always comes to the customer's mind which may lead to Buyer's remorse:

- The buyer's thinking if he needs the product/ service (i.e., automobile)that he purchased.
- The buyer's thinking if the right brand (i.e., car) has been bought.
- The buyer's thinking is if he was fooled by giving ambiguous information about the product/ service or was lied to by the seller while making a purchase.
- The buyer's thinking if the product should bepurchased in the first place.
- The Buyer's thinking whetherthe amount spent on the purchase (i.e., automobile/ house) could have beenused for their children's education.
- After the purchasing buyer might check out rival models/ brands (i.e., automobile, mobile phone) and could start seeing drawbacks in performance or quality of purchased models/ brands or think about he should have purchased that competing model/brand.

The cognitive battle of consumption

According to Art Markman(2012),under the Psychology of Buyer's Remorse, regret is the function of two opposite motivational systems that guide us and hence try to control our decisions. He believed that whenwe look for products to buy, there is a clash going on cognitively in the buyer's mind between avoidance and approach. The "avoidance system" leads a customer to avoid negative events and risks; tells us to avoid the purchase, giving us reasons to do so. The avoidance system helps us to deal with negative things like debt and all the other things we want to avoid. Emotions like regret and guilt can be viewed as survival instincts as these emotions keep us away from doing activities that might harm us emotionally or physically.

The "approach system" is the opposite of the avoidance system and it makes the buyer happy at the time of purchase. The approach system deals with things we want and desire and lets us choose our happiness and focuses onmomentary pleasure instead of a long-term effect.

Out of these two, avoidance system and approach system, one system can be more dominant as compared to the other and it is the one towards which the buyer is more aligned. The buyer chooses a system that matches with his goals though much of the time the approach system is in control of the buyer. Buyers perceive all the things he wants and incline that his purse is full of cash.

After the buyer has gone through the search and evaluation process, he develops a desire to purchase. As soon as he makes the purchase, the approach motivation stops driving him and the avoidance system is now in control.Now, the buyer thinks about all the consequences of his purchase. This, in turn, converts to buyer's remorse because when a buyer buys an item, he is inflated by the approach system and he feels joy from the purchase; however, after the purchase, the avoidance system kicks in and the buyer begins to regret his decision to purchase.

The negative aspect of buyer's remorse is that it can occur even after superior decisions havebeen made. We can say that bad financial decision can be avoided in the future if a person is going through a buyer's but that regret can be mind-boggling even when a buyer has got agood deal.

Concept of Cognitive Dissonance

It is believed by many psychologists that buyer's remorse surfaces from cognitive dissonance, specifically post-decision dissonance which results from a tough decision taken by the buyer. Psychological discomfort arises when more than a couple of elements of

perception are clashing. Post-decision Cognitive Dissonance is the formal name given to the feeling of disappointment a person goes through after they have made asignificant purchase after which they think they might have made a wrong choice.

According to cognitive dissonance theory, it happens when an individual goes through a phase where he experiencespsychologically inconsistent (dissonant) thought (cognitions). We can understand this phenomenon very well by the following example, the cognition "I am a competent decision-maker" is inconsistent with the cognition "I made a bad decision." Cognitive dissonance is psychologically draining and uncomfortable. And that discomfort motivates the individual to mitigate that discomfort. To lower the impact of cognitive dissonance a person might decide that the decision isn't so bad and choices would have created worse consequences. So, the person concludesthat the positive consequences of the choice are so good that they outweigh its bad aspects. Such dissonance reduction usually cancels out or moderates the feelings of buyer's remorse. Sometimes it leads us to repurpose our buyer's remorse for defensive purposes. For example, if a buyer can avoid responsibility for the decision ("I was lied to or cheated," or "Anyone would have made the same choice."), a bad decision can be reconciled to his belief that he is a good decision-maker.

Psychological processes are intramural. They take place even if no one else is aware of our thoughts. Often, we have to deal with the consequences of making our private cognitions public. People don't want to admit they regret the decision to buy, they don't want to share their buyer's remorse with others as they fear that others will see us as stupid or inept people.

Hence, people like to deal with their buyer's remorse by themselves. People feel more psychological discomfort or experience buyer'sremorse when they have invested more resources such as time and money in making important purchases.

According to social science research, we are psychologically motivated to be satisfied with our decisions. On the simplest level, if our choices are supported by trustworthy data, the chances of good outcomes increase. Besides this, psychological processes which are frequently active without our awareness, promote decision satisfaction.

Working of Buyer's Remorse

Before Buying, a potential purchaser often feels good and positive about what he has to purchase which leads to an increase in the desire to purchase. The buyer will expect to like the product. But, later, after they have made the purchase, they can see the other side of the purchase. i.e., the opportunity cost of buying and lower ability to purchase. Buyer's Remorse also arises when we are skeptical about our purchase as people raise questions about the bought item or claim to know better options.

We all have a perception of ourselves of the beliefs and values we hold. When this perception of ourselves contradicts our actions, it causes stress on a subconscious level. We getsad and regretfulas our actions don't align with our deeper beliefs. Cognitive dissonance causes buyer's remorse as our mind doesn't agree with our actions which causes uncomfortable emotions.

This happens when our brain experiences something which it has not expected to happen. For example, a buyer bought a jacket online because it looks great from the picture available on the website. But whenhereceives it, herealizes that it's too big or the color doesn't suit them.

For instance, a buyer aims to buy a car and he is searching and looking out for one brand and model which matches with his want, and meanwhile, in one showroom, a sales executive comes to him with a 'deal.' The buyer goes to the showroom and gets excited as he looks at the brand-new modeland immediately signed the documents to book the car to be delivered in one week. Here the buyer's approach system overpowers his avoidance system.

But after a few days or months later, the buyer might not feel as excited as he was at the time of purchase. Then, avoidance concerns like stress may slowly originate in the mind. The buyer may be more worried about the fuel expenses, running cost, maintenance, and insurance. Now, he regrets his decision to buy a new model of the car when he could settle for a used car, which could be bought by spending less than he did. So, a feeling of guilt may originate over his own choice. A person goes through a carried range of feelings through this period and questions, 'if he has made the right choice or this decision could make him regret later?' or 'maybe the sales executive just fooled me into buying something which was not needed?' The buyer might notice poor quality or performance in his purchased product or service.

This leads to a sentiment of mental inconvenience leading to a kind of regret whenever the buyer looks at the purchased brand. Hence, Buyer's remorse can be termed as cognitive dissonance that refers to a situation or a period of mental discomfort caused by conflicting attitudes, beliefs, or behaviors. This is the period where a buyer doubts his purchase and what else he could have used the money for, he begins to regret the purchase. The level of discomfort is larger if the item costs more or is considered "a big purchase". Surveys show that "70% of all the people who buy a new car, and 44% of all the people who own a new home, experience buyer's remorse of one kind or the other." This can also be applied to smaller purchases.

Types of Buyer's Remorse

Buyer's remorse feeling arises from two categories of post-purchase regret: Process regret and Outcome regret.

Process regret occurs when a buyer gives blame to himself for having a faulty purchase process after the purchase has been made. The buyer regrets that he should have put more effort intodeciding to purchase something significant (Regret due to under consideration) or the buyer regrets that he should have put less effort into making the purchase decision to obtain the desired result (Regret due to over consideration). Regret due to under-consideration occurs when an individual is skeptical of the heuristic processing which led him to purchase something which seems unimportant later. Individuals assess the quality of their decision process by examining both implementation/execution and the amount of information they gathered. Regret due to under-consideration occurs when an individual feels he has failed to implement the decision process or when he retrospectthat he lacks the desired quality/quantity of information needed to make a good decision. (Janis& Maun, 1977)

Outcome Regret occurs from the buyer's experience from the purchase is not positive and he feels that the purchased product isn't what he needed. While evaluating the alternatives, the buyer feels that the earlier alternative has a perceived better outcome than the present outcome (Regret due to forgone alternatives) or the buyer regrets that the actual utility from the purchased product is less than the perceived utility meaning thereby that the purchased product failed to meet his expectations (Regret due to a change in importance).

Causes of Buyer's Remorse

Before buying something, the buyer is often optimisticabout a purchase which includes desireand an anticipation of the enjoyment ofusing the product. Before the purchase, the buyer has several options, also, whether he wants to purchase or not, but later, the only option left is to buy, surrendering all other alternatives. Afterward, having made the purchase, the buyers either may be satisfied by the purchase or may not find his purchase as he thought to be and as a result is not happy with the purchase and experiences the negative side: reduction in purchasing power and the opportunity cost of the purchase. (Marković, Zorica, 2012). This may result in the anxiety that the decision to buy was not the correct one.

Regret is not always the result ofbuyer remorse. Regret results from several triggers that include:

Expensive Purchases: Purchase of expensive products/servicescan cause both outcome regret and process regret as they involve all three cognitive dissonance elements – effort, commitment, and responsibility. It is unlikely that the customer buysthe expensive product/servicewithout thought or effort. Expensive offerings make buyer compare it with alternatives which result in a process regret.

Output regret happens when you have raised your expectations froman expensive product/service purchase as you have paid the bigger amount for it.

Impulse Purchases: Impulse purchases happen when one hasa strong and irresistible urge to buy the product/service. Social media and fear of missing out are the other factors that disrupt the usual buying process of customerswhich let their decisions be powered by emotions rather than rational thinking.

Nowadays, there is an increasing trend of people making online purchases. When the buyer sees a product online, they tend to put an order irrespective of their needs. Moreover, the younger generations buy something simply to show off on social media. It is researched that Gen Z has the highest percentage of buyer's remorse, with 70.8% of them agreeing to the fact that they bought an item simply for the attention on the social media sites like Instagram and Facebook where they post their pictures with the bought item.

External Stimuli: Marketers use external stimuli viz., advisements, personal selling, sales promotion, and various marketing strategies as marketing cues to stimulate the demand for their offerings to attract and lure customers. Strategies like marketing scarcity, discounts, targeted advertisements, remarketing, etc. are followed by marketers for making sure the buyers fulfill their aroused desires by making a purchase. Marketers also use internet marketing to lure customers through social media advertisements, discount pop-ups, follow-up emails, and other intrusive methods. If the marketer's offering does not match with the promise made through external stimuli, then a sense of regret emerges leading to the buyer's remorse.

Interpersonal Influence: Interpersonal influence is the intensity to which others (other than the marketer) influence the buyer's decision. It may be Informational influence and/or Normative influence. When we seek information or gain knowledge about the offering from our group members (Primary as well as secondary). It is called Informational influence. For example, while purchasing a Laptop or going for dinner, a person gets knowledge from his relatives or his friends. When a buyer makes a purchase decision to maintain his significant image in the eyes of members of his society or his colleagues then it is a normative influence. If a buyer is susceptible to interpersonal influence, then it is likely that he will suffer from post-purchase regret.

The paradox of choices: Today, the buyer has many choices. Hence, consumers get confused and overwhelmed about what to buy. The paradox of choice is the phenomenon that we experience when we are faced with too many choices, hence, we go through an element of psychological distress. For example, we visited a restaurant and get a large menu that is full of options. Narrowing down the choices to "Top 5" is the first step, then we have to decide among these "top 5". Finally, we order the Paneer Dosa. We enjoyed our meal, but laterthe thought came to our mind if Pizza or Burger would have been the better option. In other words, all the choices create a feeling of remorse i.e., buyer's remorse.

In short, the below-mentioned points can cause the buyer's remorse, like:

- The person bought the product/service hastily instead of waiting and thinking about his decision.
- The buyer trusted others'opinionsthan his mind.
- The buyer later questions the need and value of the bought product/service.
- The buyer might start thinking that the money he spent on a purchase might be used somewhere else.
- How much the buyer is involved. The more the buyer is involved in a purchase, the more intense the potential regret will be.
- Level of external influence.
- Whether the thing is bought to satisfy the buyer's wants and needs.

- Money put in the purchase as bigger purchases may cause deep remorse as reversing the decision maybe beyond the limit of the purchaser.
- Time the buyer spent on research as well as on purchase.
- Some extreme shopping activity may lead to some deeper disquiet after purchase.
- A higher level of commitment or long-term dedication contradicts more with the perception leading to more buyer's remorse.
- Fluctuating behavior of the buyer
- Disappointment with the quality or performance of product/service
- Emotions after buying (including regret) like "I wonder if I have made the right choice" or "I wonder if I have been fooled, or the salesperson spun me a lie
- The buyer might start to notice shortcomings in quality or performance.
- The purchased object was not acceptable to others.
- The purchased object viz, property, automobile, vacation was bought on money received as a loan.
- The purchased object was something that the buyer later questions the value and need of.

Products and Services that cause the maximum remorse to the customers include Real estate, Contract purchases, Vacations, Electronics, Cars, etc.

Factors of Buyer's Remorse

When a buyer is going for shopping, he knowingly walks into situations where he is either:

- Going to spend some money.
- He will be tempted to spent money.
- He spent money, then regret spending it later.

Either way, there will be times where the intentions are good, but the actions produce the feeling of buyer's remorse. A buyer after buying something always goes through a period of post-purchase rationalization, where he tries to convince himself that he made the rightdecision by adding up the positives points of his decision and removing the negatives. If the negative points are summed up more compared to the negative points then this leads to buyer's remorse. Buyer's remorse can be the result of buying items he purchased doesn't end up meeting his expectations or satisfying him. Mainly there are the following factors that are linked to cognitive dissonance and buyer's remorse and influence Buyer behavior:

Effort: If the resources like time and money invested more in a purchase, proportional to the transaction's importance, then buyer's remorse is more likely to occur as a lot of effort has gone to decide to buy something significant though it hasn't yield expected benefits.

Responsibility: It means that who were the initiators and influencers and their impact on decision-makers. If a buyer purchased his own without anyone else's opinion, the buyer is more likely to feel dissonance as he doesn't have anyone else to blame for those wrong purchases.

Commitment: It means that as the buyer has made the purchase, he has to continue the purchased product/service/ object for quite some time. Hence commitment refers to the continuation of an action.

Preventing Buyer's remorse – Buyer's Perspective

No buyer wants to experience the feeling of guilt over his purchases. Buyer's remorse is the result of the lofty expectations a buyer has from the purchase. We often buy offerings because we (falsely) think that the act of acquisition can make us happy. The following measures may be adopted by the buyer to prevent or reduce it.

Conducting Research: Buyer must make a mindset of researching the product he wants to purchase. He must question himself whether he needs it or not before buying something. The more information(like) reading a buyer has before purchasing a product, the less likely he will regret his decision afterward. Reading reviews, comparing prices, and looking for price-matching deals give confidence to the buyer for making smart purchases without the hassle of visiting multiple stores. This is because knowing what he is buying he gets the answer of "Whether this product will solve his problem or not?". It will reduce the impulse purchases made by the buyer.

Waiting before making the purchase: Buyer must keep eye on and wait before purchasing anything expensive rather than running to the store immediately. Creating a buffer between a stimulus (the item a buyer wants to buy) and the final response (buying or not buying that product/service) can help a buyer determine whether he bought something on impulse or if it's something that is of great importance to him and will add value.Experts recommend contemplating a purchase for at least 72 hours before making a choice. If a buyer still wants the product after this period, he is less likely to be disappointed with his purchase.

Making a budget before and sticking to the shopping list: Markman(2012) suggested that a buyer must generate a budget for what he can spend before he starts shopping. He should also make a full list of the products he wants to buy before purchasing so that he doesn't end up buying things he doesn't need and regret afterward. If a buyer is tempted to make a purchase that is not mentioned on the list he has made, he must remind himself of the impact it will have on his budget. Thus, this list can help a buyer stay on track. For instance, before a buyer starts looking for an LCD television or a car, he must set a budget and draft a list of the features as well as the benefits derived, he is looking for in television or a car and list those features he wants.

Prefer cash purchases than through a Card: If a buyer purchases through cash, then there is the probability that he sticks to the budget because

Thinking about the long term as well as a short term: Generally,consumers like to prefer high-functionality in the long term and convenient products in the short term (Lee & Zhao, 2014). Thinking about the long term as well as short term is important and buyers are advised to think about long term use before ever making a purchase.

Gaining the Return Policy: Consumers must enquire about the warranty and return policy before making the final purchase. It will help buyers to gain confidence and could help prevent buyer's remorse.

Walking Away: Customers are advised not to be lured by the marketers' tricks "Limited time offer! Act now!" as these encourage impulse purchases leading to a feeling of remorse. If the customer feels pressured by a salesperson or advertisement, he should not be influenced by them and just walk away.

Encouraging Customer Loyalty by reducing Customer Remorse

Customer loyalty shows how delighted customers are with their purchasing experience and how likely they would be to share that experience with others. That's because loyal customers are your company's most valuable asset. Marketers want to make their customers feel satisfied with their purchases. A marketer devotes a significant amount of effort and resources to build strong customer relationships and never wantstheir customer to feel dissatisfied which could affect the relationship between the customer and marketer. Preventing buyer's remorse always pays off in terms of a better brand reputation and long-term sales. The following measures may be adopted by the marketer to prevent or reduce the remorse and increase customer loyalty.

Conducting Research: The marketers must conduct customer surveys to know about their customers' needs& wants and how do they help the customers to fulfill their needs& wants. The following points can be researched by the marketers about the customers to know why the customer should purchase from the marketer.

- What is the biggest challenge, frustration, or problem of the customer in finding the right product?
- What made a customer choose our product or service?
- What happens post-purchase rationalization that motivates them to buy the product?
- What problem does our product/service solve for the customer?
- Did the marketer take a look at the competition during the research?
- What are the shortcomings of the product and services?
- What questions or doubts could arise when the buyer buys something?
- How can we improve our product according to the customer needs?
- The end benefit of our product in the words of our customers.

After getting the answers to the above questions, marketers can devise strategies to prevent buyer's remorse by facilitating the purchase.

Providing Value to The Customers: Customers expect to be valued by the marketers and expect to be provided a good customer experience. Thus, a marketer should analyze their customers' journey and know their customers very well. Thiswill help them in building the foundations of their relationships with the customers. It will also help the marketersto seethe situations through the eyes of the customer, thus, allowing them to focus on actions that will benefit them in the future. As a result, the customers will be less prone to have post-purchase remorse.

Focusing on Benefits more than Features: Features are the characteristics of the product such as its appearance and features. For example, the feature of the refrigerator might include speed chilling and temperature control. Benefits can be the answer to why those features matter to the customer. Benefits outline the question of how the product could help them and solve their problems.

Generally, a customer buys a product or service for its benefitand not for its features. For example, people don't want to buy a jumping rope or a gym subscription – they want to buy a slimmer and healthier version of themselves. As Theodore Levitt once said, "People don't want to buy a quarter-inch drill. They want a quarter-inch hole!"

The marketer has to highlight not only the features of the offering but the benefits of their product to assure that customers make the right decision.

Marketing experiences, not objects: Rosenzweig & Gilovich (2011) said that the level of buyer remorse varies across two types of purchases Viz., Material purchases & Experiential purchases. Material purchases include purchases of physical objects like computers, cars, houses, washing machines, LCD, etc.Experiential purchases include experienceslike holidays, restaurant meals, movies, live matches, Olympics, etc.

They found that material purchasesare certainly bound to prompt buyers' regret since they are "exchangeable." The present market has multiple options for any specific product. This often leads to the dreadedparadox of choice(when an abundance of similar options causes psychological stress). The opportunity cost of discarded choices grows in tandem because the number of choices has increased. When a buyer finally chooses one option, the compounded effect of these missed opportunities causes buyer's remorse, even if the item fulfills buyer needs. But we are far less likely to regret an experience when there is no paradox of choice and every experience is unique.

If the marketer positions their material offerings through the experience, buyers will get after using it, then this effort can mitigate buyer's remorse. For example, A BMW isn't a car; it's the "Ultimate Driving Experience." Coca-Cola isn't a soda; it's a sentimental journey on a train with new friends. Marketers are well aware of this and must adjust their marketing efforts accordingly. For example, to a customer merely owning a nice car won't make him happy unless the customer has engaged with it consistently enough to justify the resources,he has put into it.

For improving customer loyalty, the marketer must emphasize selling the experiences than the material or core product only. Customer remorse can be reduced drastically if experiences are unique as almost all marketers sell the same featured product.

Providing correct information to customers: if the marketer provides precise and thorough information about his offering transparently to the customers, it is key to avoiding buyer's remorse as it reduces the chances of misleading potential buyers. Marketers can also use social media to disseminate information besides using traditional methods.

Formulating a feasible Guarantee, warranty, and return policy: For building trust,the buyer must be at peace of mind.It can be done by providing augmented benefits to the buyer like a Guarantee, warranty, and return. The buyeris not satisfied with the purchase, he will return the bought product and get his money back as soon as possible. Hence, a flexible return policy is praised by every customer and, also, it helps the marketer to earn the trust of the consumer. The customers will be relieved as now they have enough time

to test the product and determine if it fits them or not.

Providing Contact Information and Timely Responses: Marketers must provide their contact detailsfor all the customers so that they can be contactedif there are any concerns. It helps the customer to shareviews,queries, and grievances & get solutionswithin a certain amount of time. A well-designed feedback system will assist the customers to find answers to their queries in the shortest period. Thus, a company on one hand can generate more leads and sales opportunities and can reduce the level of remorse if it responds promptly to its customers' inquiries.

Giving a "Thank you"message: For every successful sale to a customer, the marketer can leave a positive and lasting impression by offering the customers a token of appreciation by sending a "Thank you" message or email to its customer. This way, the marketer will open the door for further interactions with them and this also helps the marketer to build a more trusted network that the company cares for its customer. "Thank you" messages and e-mails make buyers feel good and important as a customer.

By satisfying the needs of the customers and affirming customers' purchasing decisions, the marketer has paved the way to turn them into lifetime customers. After the purchase, the marketer should always reach out to its customers because it adds a personal touch to a transactional relationship. It shows them that the organization is trustworthy and values customers as people.

Conclusion

The truth is that each person has experienced buyer's remorse from time to time. Buyer's remorse is the feeling of regret that the buyer goes through after making a purchase, specifically an expensive purchase. This regret is often doubled with stress, which leads the buyer to return the purchase immediately. At times, we might not be able to avoid the buyer's remorse as the regret is glued in our brains. We can diminish the regret we feel after contemplating big purchases.

Post-purchase rationalization happens after the customer realizes what hehas purchased because customers are held captive by their purchasing decisions. The customer doesn't like to admit he was wrong so he convinces himself that he has made the right decision. The brain of the person stores memories in a choice-supportive way that is why the customer places a higher value on things he already owns.

When buyer's remorse sets in, post-purchase rationalization fails. Marketers always want their customers to not regret their decision as to when they regret it, chances are that the customer won't be coming back. A marketer has to answer an important question: Why do people buy our product? To uncover this truth, the marketer must try to gather information about the need, want & motivation of customers through customer surveys.

Marketers want their customers to have positive experiences as the marketer spendsenough time and resources to make good relationships with their customers but unfortunately, some customers begin to feel buyer's remorse as they regret their decision to buy under the influence of the marketer and may resent that relationship. This is a great challenge to the marketer as the marketer needs to prevent customers from feeling dissatisfiedwith their purchase, the marketermust ensure that the customer completes their purchases feeling satisfied and happy. Customers need to know that they spend their hard-earned money on the product/service, so their purchases offer great value for the money. It is the responsibility of the marketerthat he should focus on cultivating happy customers and positive relationships between them by understandings the needs of the customers and providing the best to reduce the buyer's remorse.

Buyer's remorse is related to customer attrition. So even if the customer doesn't immediately experience remorse, we must explore & pay close attention to the dissonance areas & signs. Any sign of dissonance should be addressed as soon as possible as a long-term CRM strategy because the marketer never knows when the regrets will creep up. If a marketer successfully tackles buyer's remorse, it can convert a one-time customer into a permanent customer.

Scope for Future Research

The present study is a descriptive study to know about buyer remorse and identify the causes & remedies of buyer remorse as mitigation of buyer's remorse leads to customer loyalty leading to upliftment of business. Future researchers may conduct conclusive research on industry or product-specific buyer remorse research to get an insight intothe effect of remorse on customers of a specific industry or product category. Future researchers can also research on generalizing the determinants of buyer remorse based on the factors like money spent, time and effort involved, celebrity involvement as an influencer, etc.

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FOOD WASTE: AN ISSUE THAT DEMANDS POLICY, RESEARCH AND ACTION TO PREVENT ITS GENERATION

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ABSTRACT

Food waste is a growing concern throughout the world, especially in developed countries a huge of food is wasted every day. Food waste has gained attention not only because of its socio-economic impact but also due to its environmental impact. Food waste dumping not only harmful for the land, it is equally harmful for the ecosystem (8% GHG production). Food loss and waste can be seen at every stage of the supply chain. According to the definition given by (FAO, 2013), globally 1/3rd of the food produced for human consumption is dumped in garbage cans or landfilled, which is estimated to be an economic loss of US$900 billion. Whereas (Martin-Rios et al., 2018) estimated that 842 million people live below the poverty line, which means they spent their night hungry. Various antecedents were found responsible for food waste, such as consumer behaviour, government policy and law, and loopholes in mitigation approaches. United Nations' SDGs suggested for structural changes to achieve a significant reduction in food waste. Policymakers should take this concern more seriously using a multi-dimensional strategy. A consumer behavioural approach can play a key role in developing a sustainable society. Consumer behaviour is an epicentre of food waste, which can be curbed if its impact on the environment, hunger and undernourished data is added to the educational system. Food waste mitigation approaches and their negative impact should be added to the school syllabus, and regular campaigns on food waste should be made mandatory in the school education system. More study must be conducted on this issue in developing countries, especially India and find to determine the most effective mitigation approaches, to provide food to everyone.

***Keywords**: Food waste, Food waste behaviour, Sustainability, Food waste policy, Food waste mitigation approaches.*

Introduction

According to the report published by (FAO, 2013), globally 1/3rd of the food produced for human consumption is dumped in garbage cans or landfilled, which is estimated to be an economic loss of US$900 billion. Whereas (Martin-Rios et al., 2018) estimated that 842 million people live below the poverty line, which means they spent their night hungry. After looking at the food waste data and below the poverty line population, the UN included food waste-growing concern in their sustainable development goals (SDG). Responsible Consumption and Production(Sustainable & Goals, 2016) has targeted reducing food waste to halve during its consumption stage and later on its generation at the production and supply chain stage. (Vittuari et al., 2016) recommended for sustainable food practices while eating out-of-home (catering sectors) can be a commendable effort to reduce the amount of avoidable food waste and to achieve sustainable development goals (Sustainable & Goals, 2016).

Demand to feed the uncontrolled growing global population is a challenging task for society. The factors associated with food demand harness natural resources, overload the environment, and aggravates poverty (Godfray et al., 2010). The concern of food waste is increasing every day due to its socio-economic and environmental concerns (Parfitt et al., 2010). The impact of food waste, except for economic and environmental concerns, also has a social impact, such as 1 in 9 people in the world is undernourished, which is 11.3% of the total population (FAO, 2014).

Food waste is a growing concern worldwide, yet it is not included in the mainstream (D, 2016). Researchers and policymakers identified that the current food waste prevention method is not enough to fight against this burning problem and effort taken to mitigate food waste is not enough to feed the global population of 9.74 billion by 2050 (Thyberg & Tonjes, 2016). The catering sector

is considered the third largest sector in food waste generation in EU-28, after households and agriculture/food processing sectors (Platt et al., 2014). Food waste is classified into avoidable and unavoidable waste, where 75% of food waste is avoidable, highlighting food waste reduction in the catering sector (Oliveira et al., 2016). Food waste mitigation can play a significant role in feeding the growing population and fight against food insecurity (Godfray et al., 2010).

The hospitality industry is an integral part of the travel and tourism industry, which offers various services. It includes a wide varieties food and beverage and its services known as catering services. These services generate waste and substantially impact the environment globally in climate change (Baldwin, 2012). Various factors were found responsible for the emission of greenhouse gases (GHG) and carbon footprint. The operational inefficiencies, including poor planning while preparing food, lack of storage space and techniques, lack of training to waiting and kitchen team, spoilage, and careless consumer behaviour. The role of irresponsible and poor food consumption behaviour equally contributes to the emission of carbon GHG (Bohdanowicz et al., 2011). To avail the services of the food and beverage provision sector and lengthen sustainability, its operational loopholes need to be identified and rectified by making the consumer more responsible while consuming food and making them more accountable toward society and the environment (Hall, 2013).

The social marketing approach helps enable the behaviour changes of an individual for the benefit of society and self (Truong & Hall, 2013). Social marketing can be helpful in enabling 'nudging' strategies that refer to change the consumption pattern and change the consumer behaviour positively (Bucher et al., 2016). To save the environment (sustainability) and benefit society, authors have identified 'social marketing' and 'nudging' strategies as effective tools that can also facilitate consumer choice (Dinan & Sargeant, 2000).

There is a broad scope in the food and beverage industry to design the consumer eating choice, which can be achieved by integrating social marketing techniques into traditional marketing strategies (Kotler & Zaltman, 1971). Nudging' customers regularly and more actively can also be an effective technique in this regard (Thaler & Sunstein, 2008). The penetration of 'nudging' and 'social marketing' has increased drastically in various sectors, and the demand is increasing day by day (Truong & Hall, 2013). Food consumption is a voluntary action that is difficult to alter. Therefore, the external invention is required either in the form of 'nudging' or keep reminding the consumers about the environmental impact (carbon footprint) of food choice and its consequences on society (healthy diet) (Kallbekken & Sælen, 2013; Truong & Hall, 2013). The restaurant menu can be used as an architect of consumer choice, which is the least explored research area (Spaargaren et al., 2013). It can act as a 'nudging' tool in the catering establishment (Mont et al., 2015). The food consumption pattern is difficult to alter as it is voluntary (Mont et al., 2015).

Methodology

During the review process, 44 research papers and articles were reviewed published between1971 to 2021. The purpose behind the literature review is to understand the factors generating food waste, behaviour related to it and policy framework related to its mitigation. Literature and reports were taken from government sites (http://www.fao.org, https://www.eu-fusions.org) and Science Direct database (https://www.sciencedirect.com) with the search keyboards such as food waste, food waste behaviour, sustainability, food waste policy, food waste mitigation approaches. Google search engine was also used to check the latest update and development.

Findings

This section of the study highlights the factors generating food waste, prevention techniques adopted by industries and households to mitigate food waste and policy implementation in mitigating food waste suggested by various researchers as the problem has spread widely.

Antecedents of food waste

Food waste is a global concern that can be seen at every stage of the food supply chain. Food waste generation causes financial,

environmental and social concerns. Intentionally or unintentionally, consumer behaviour generates a considerable amount of food waste. It was found that consumers are the epicenter of food waste generation and prevention of food waste as well. About 1/5th of the food supplied to catering institutions is lost. The plate waste contribution was found as the biggest food waste contributor ranges between 11 to 13% of produced food (Engström & Carlsson-Kanyama, 2004).

Food waste is a consequence of household food practices. When social and material contexts were studied together, it was found that food waste emerges because individuals make negative choices towards food and get involved in food waste behaviours. Food waste is generated due to households negotiating the contingencies of day-to-day life (Evans, 2011). Food waste is not a result of single behaviour but the result of multiple behaviours, which reduces or generates food waste at the household level (Quested et al., 2013).

Behavioural theories help to understand this multi-dimensional issue of food waste. Behaviour was found to be influenced by psychological, situational, demographic and socio-economic factors (Principato et al., 2020). Consumer-generated food waste is observed under the Theory of Planned Behaviour (TPB) lens (Visschers et al., 2016) with the other contextual factors such as financial attitudes, food choice intentions, social relationships, planning routines, Ramadan (Qatar), and surplus food. Habits, emotion, subjective norm, perceived behavioural control and intentions (variable of TPB) play an important role in determining the food waste behaviour of an individual. Emotions and habits were found as the main drivers of food waste generation and suggested that these drivers need to be focused more, compared to the attention given to them in the past. On the other hand, three main reasons for food waste at the catering establishment are consumer food eating behaviour (leave uneaten food), wider menu choice (consumers' preferences) and overproduction (wrong forecasting). It was also found that global food waste is a global challenge that will remain in the coming future (Russell et al., 2017).

Changing eating habits during specific periods of the year can impact food waste behaviour (Aktas et al., 2018). Consumer convenience orientation and consumer trends toward greater convenience food were the main drivers of food waste in emerging countries either at the household level or store. Value consciousness determines lower food waste, while slightly lower food quality increases food waste. Consumers' food waste can be minimised but cannot be abolished (Aschemann-Witzel et al., 2015).

Prices and food choices were found as significant food waste drivers. Food waste studies in developing countries are few (Abdelradi, 2018). There are lots of discrepancies between reported and collected food waste in households. Actual household food waste was found three to ten times higher than the data. It was observed that efforts must be taken to improve the data collection method to complement the definition of "food waste" (Jörissen et al., 2015). The food waste definition is not clear and difficult to understand by an ordinary person. It needs to be defined clearly to understand the problem of food waste. Food waste for householders was considered a financial loss rather than an environmental loss (Wakefield & Axon, 2020).

Various literature highlighted consumer-related material and socio-cultural drivers responsible for food waste, which can help mitigate household food waste. During the review process, different aspects of consumer food waste behaviour were identified, such as consumer behaviour, attitudes, beliefs and values, food waste quantities and their composition, avoidance of waste and different practices followed. Both socio-cultural and material factors are required to combat consumer food waste practices (Hebrok & Boks, 2017).

Food waste mitigation

Consumer's behaviour is a major contributor to food waste, which is influenced by so many factors such as household behaviour, which are difficult to change. In contrast, behavioural factors like shopping routines, food handling and provision are easy to change. An essential step towards the anti-waste pattern of behaviour can be taken by creating anti-

wastage social norms, raising awareness and developing anti-wastage behaviour. Changing prevention behaviour is not an easy task as influencing recycling behaviour (Diaz-Ruiz et al., 2018).

Policymakers, food marketers and retailers can play a major role in enhancing sustainability while mending consumer behaviour toward food waste. When tested with attitudes and behaviour theories, psychological theories found this mechanism as a useful way to reduce food waste (Stangherlin & de Barcellos, 2018). There are various determinants of consumer engagement in food waste mitigation of restaurant food waste, such as pro-environmental behaviour (environmental impact of food waste) and environmental-concern and emotions. The former can be used as a precursor of effective food waste mitigation, whereas later can trigger consumer emotions, i.e. anticipated regret, which can act as another driver (Filimonau et al., 2020).

Consumers' perceptions of accepting food waste messages frame a higher level of intention towards mitigation for food waste. Campaigns regarding behaviour change toward food waste can be made more effective if messages are stated with emotions (Septianto et al., 2020). Food waste-designing policies and television campaigns to mitigate food waste need to be considered a factor under the behavioural model that can help reduce food waste at the household level.

Food waste mitigation can be done by promoting ethical and environmental beliefs, improving household food purchasing, storage and food production (Oliveira et al., 2016). Religious beliefs of the consumers associated with food waste and related behaviour can act as nudging factors to mitigate food waste. To reduce the impact of food waste on the environment, mapping of food waste practices and framing strategies are required. Guilt and bad conscience drivers were also identified (Djekic et al., 2019). Education and proper training could be effective strategies to reduce food waste (Abeliotis et al., 2018).

Food waste is a delicate topic that is connected with social responsibility and value regarding the environment, economy and society. The best prevention measures were identified as proper forecasting of food production and distribution of extra cooked food. The second measure is to get in touch with food banks and food rescue programs, which collect food and distribute it to the needy. Extra food from every source may be collected, and a commonplace can be arranged where hungry people can come and have their meals (Sureshkumar & Kanchana, 2020).

Food waste mitigation at the household level starts at shopping behaviour where a consumer is trapped with psychological traps. Other factors like designing portion size as per the consumers' nutritional needs and increasing consumers' awareness about sustainability are also important in this context. Habitual behaviour is equally responsible for food waste which is difficult to control in the short term (it requires long-term effort) (Schneider, 2008).

Action related information was found helpful in increasing consumers' intention to reduce food waste, whereas system information was found ineffective. It was recommended to emphasize action-related information, which can be valuable in changing consumer behaviour through campaigns and developing educational material. Since consumers were seen as the main food waste contributors, changing their behaviour and mitigating food waste can be an essential step towards mitigating food waste, which will indirectly help fight against climate change (Neubig et al., 2020).

Campaign should be designed to inform the individual about the negative environmental impact, social injustice and economic cost of food waste. Behaviour changes must change the buying and storing behaviour, cooking behaviour (more than required), and keep check on spoilage. More emphasis should be given to distributing extra cooked food instead of throwing it into the bin (Pearson & Perera, 2018). A performance indicator related to food waste sustainability for events was designed by the name of FRESH number. This unique matrix can compare food waste generated during the events worldwide and can be used as a benchmark for hotels to manage their waste (Pirani & Arafat, 2016).

The most significant barrier to eliminate food waste and loss is the corporate control of worldwide food systems. It was found that

waste brings power, either encouraging unhealthy overconsumption through marketing campaigns or encouraging over-production (developed countries) to use it as a profit-making business to control it through food aid. It was recommended that consumers come together to reshape and re-build a global food system through which food security, sustainability, health, and well-being can be taken care of resiliently (Varzakas, 2015).

Various efforts were taken globally (33 countries), either in hospitality sectors in retail/wholesale systems, to mitigate food waste. It was found that legislative policy, awareness campaigns and monetary benefits can be an effective tool to fight against the problem of food waste. These measures can help reduce food waste in the HORECA sector by half or even more (Chalak et al., 2018).

Marketing and sales strategies found to be negatively impacted consumer behaviour toward food waste. Moral attitudes and Perceived behavioural control were found major components behind intentions, whereas Subjective Norms and Perceived Behavioural Control were found to be major determinants behind food waste behaviour (Mondéjar-Jiménez et al., 2016).

It was found that individual characteristics and attitudes help in developing food waste behaviour. Different strategies should be targeted in the store and in the household to tackle this problem. A value consciousness strategy should be adopted in the home, while a price orientation strategy should be adopted in the store to minimise food waste (Aschemann-Witzel et al., 2018).

Recommendation

Food waste is a global phenomenon and will continue to grow until and unless it is not controlled through policy, consumer intention, research and education. Food waste prevention is an ignored and least explored area in developing countries like India. More attention must be given to fight against this problem through recycling, redistribution and recovery. Plate waste can be minimised to zero.

Framing of food waste mitigation policy should address the wide range of behaviours and the intentions for wastage. Consumer's values, developing skills to prevent food waste and logistic support to encourage prevention should be targeted to overcome this problem.

In developing countries like India, food loss is more compared to food waste. India has a diverse spending power from north to south and east to west. States like Gujarat, Maharashtra and Delhi (Union territory) are considered rich in industry, income, and high spending power. Strict policy and rewards should be offered to consumers and the caterers when found engaged in food waste prevention.

Consumer behaviour is an epicentre of food waste, which can be curbed if its impact on the environment, hunger and undernourished data is added to the educational system. Food waste mitigation approaches and their negative impact should be added to the school syllabus, and regular campaigns on food waste should be made mandatory in the school education system.

Conclusion

Food waste concern needs to be handled carefully either by the government or by the consumer. Food waste generates 8% of Green House Gases (GHG), which is harmful to the environment and negatively impacts our ecosystem. Consumer behaviour is a significant food waste contributor along with taste, bigger portion size, and overproduction. There is not enough enforcement of food waste prevention policy and laws related to food waste. Catering business loses huge revenue from food waste, which can be reduced if more study can be done on food waste generators and factors behind its generation. United Nations' SDGs suggested for structural changes to achieve a significant reduction in food waste. Policymakers should take this concern more seriously using a multi-dimensional strategy. A consumer behavioural approach can play a key role in developing a sustainable society.

Implication

This study highlights the drivers and reasons for food waste and various approaches that can be used for food waste mitigation. The study's findings and recommendations may be used by the policymakers and the stakeholders of the food business to develop approaches and standard operating procedures.

Limitation

Food waste is mainly studied in developed countries (European), and scarce study has been done in developing countries. Little literature is available in the context of developing countries, which makes the task a little challenging for the researchers. More study on food waste is required in developing countries to understand this topic in a broader way. Also, the present study includes only one database that is Science Direct.

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HATE SPEECH DETECTION IN SOCIAL MEDIA

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ABSTRACT

Online hate speech is a latest problem in our society this is growing at a consistent pace via leveraging the vulnerabilities of the corresponding regimes that characterise maximum social media structures. This phenomenon is mostly fostered via offensive remarks, both for the duration of consumer interaction or within the shape of a published multimedia context. nowadays, massive corporations own structures in which thousands and thousands of customers log in every day, and safety from exposure to comparable phenomena appears to be necessary so as to comply with the corresponding law and hold a excessive degree of provider first-rate. A sturdy and reliable device for detecting and preventing the uploading of relevant content can have a massive impact on our digitally interconnected society. numerous components of our each day lives are undeniably connected to our social profiles, making us at risk of abusive behaviours. As a result, the shortage of correct hate speech detection mechanisms could seriously degrade the general consumer enjoy, even though its misguided operation would pose many moral worries. in this paper, we gift 'ETHOS', a textual dataset with two variants: binary and multi-label, based totally on YouTube and Reddit comments validated the usage of the parent-eight crowdsourcing platform. moreover, we gift the annotation protocol used to create this dataset: an lively sampling procedure for balancing our data with regards to the various factors defined. Our key assumption is that, even gaining a small quantity of labelled records from this type of time-consuming system, we will guarantee hate speech occurrences within the tested material.

***Keywords**: Hate Speech, Dataset Presentation, Machine Learning, Binary/ Multi-label Classification, Active Learning*

Introduction

Hate speech (HS) is a shape of insulting public speech directed at particular individuals or agencies of humans on the premise of characteristics, such as race, religion, ethnic origin, country wide starting place, sex, incapacity, sexual orientation, or gender identity2. This phenomenon is manifested both verbally or physically (e.g., speech, text, gestures), selling the emergence of racism and ethnocentrism. due to the social prices springing up out of HS, several nations keep in mind it an unlawful act, especially when violence or hatred is advocated [9]. even though a fundamental human right, freedom of speech, it's far in struggle with laws that protect people from HS. therefore, nearly every u . s . has responded by using drawing up corresponding legal frameworks, even as studies which is associated with mechanisms that attempt to treatment such phenomena has currently been accomplished by using the records Mining and gadget gaining knowledge of (ML) research groups [22]. every other essential problem is that the prevalence of HS phenomena is rising in the social media ecosystem, distorting their initial ambition of favouring communique among their corresponding members independently of geographical regulations and enriching comparable activities [48]. The anonymity of social media is the number one cause of the increase of such phenomena, as is the planned avoidance of next law. big groups, like Google and fb, are consequently obliged to get rid of such kind sof violent content material from their systems. As a end result, synthetic Intelligence (AI) methodologies are hired to stumble on (semi-)mechanically HS in real time, or maybe to save you users from publishing similar content material with appropriate warnings or bans. the solution of quarantining in an online fashion has these days been verified [53], looking to smooth the censorship and the possible dangerous effects of HS assaults, at the same time as getting to know from short-text segments blooms in the ultimate years [49]. of the maximum essential features accompanying the short-textual content segments, sparseness and the presence of noise [51], settle HS detection, a tough assignment for the creation of fully computerized answers. whereas issues of scalability get up while big quantities of

records are virtually collected without pre-processing or filtering. those points are of primary importance to this work. To reap high performance in real-international responsibilities, AI methodologies require balanced, accurate, and impartial datasets. This requirement, however, is not often met with out making use of right annotation stages [6, 20]. this is the route in which our paintings aims to make a considerable contribution, encouraged via the HS use case, supplying additionally a everyday-based protocol that might be prolonged to a huge variety of learning obligations. To be more specific, the applicable literature currently incorporates a huge variety of manually created HS datasets [57, 60]. but, due to the fact the general public of them had been no longer carefully accumulated during the corresponding sampling ranges, they're essentially huge sets of annotated samples on which undesirable phenomena arise often. in particular, noticeably imbalanced classes or redundant data prevent the subsequent applied mastering fashions from successfully harnessing the underlying patterns. moreover, by means of sampling the regions of feature area which specific simplest a restricted stage of uncertainty while unlabelled statistics are queried can also settle the studying approach myopic. these kinds of phenomena violate the formerly targeted preferred requirements ensuing in answers with low variance and/or high bias [41]. moreover, maximum of them are involved with binary or multi-magnificence class tasks, whilst overlooking the extra realistic case of multi-label type (MLL). Label dependencies and the semantic overlap that occurs on MLL can not be left out whilst safety from hateful feedback is the main task. considering the fact that a web comment can healthy to multiple described label on the identical time, instead of being constrained to just one final results, investigation of the latter situation seems to be extra powerful (see discern 1). This component is likewise studied right here due to the fact the problems defined formerly are enforced below the MLL situation.

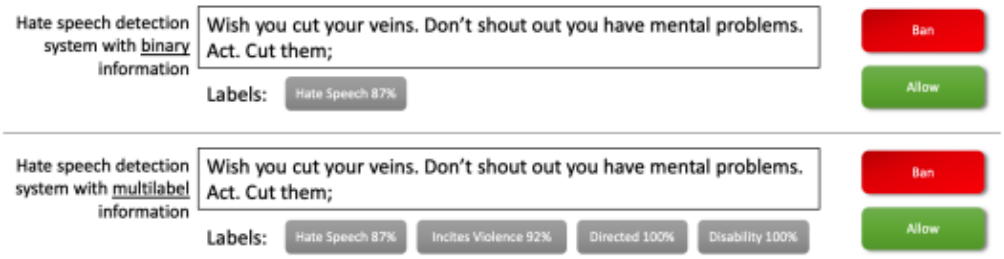

Figure 1: A realistic example of informing a human reviewer about an investigated comment on binary (top) and multi-label (bottom) level

A simple software that makes use of the MLL schema provided by using the proposed HS dataset might be an assistance device for human personnel reviewing comments on social media structures. this will make it simpler for the reviewer(s) to decide if the message contains HS content by using presenting more insights. for instance, if a remark is provided as targeting people with disabilities, directed at a person, and encourages violence, it will be extra beneficial for the reader to conclude and condemn it for holding HS in place of being supplied with a single label (e.g., 'may also incorporate HS':{'yes','no'}). In terms of the ethical troubles that emerge inside the case of HS, it appears that a proper manipulation protocol is required for stopping feasible defects. Such protocols have addressed wider or more focused research topics, inclusive of information articles, even though similar directions have recently been explored within the field of HS detection [42]. on this paper, we gift the procedure of creating a multi-labelled dataset with a step-via-step narrative, to keep away from the results that usually arise in tries with information that depend on social media platforms, and to increase the chance of mining greater informative times. even though the layout of the proposed protocol can healthy with any goal domain certainly, we're currently specializing in addressing the HS state of

affairs and provide a few insightful analysis of this use case. in this strive, an existing dataset mined from popular social media systems has been exploited, whilst a crowdsourcing platform changed into used for validating the very last result. The proposed annotation protocol's outcomes are mentioned in detail and visualised using explanatory methods. Following that, a series modern day experiments are being conducted to determine the baseline overall performance contemporary this particular dataset using (SOTA) techniques. From conventional ML algorithms and ensemble fashions to neural networks (NNs) with and with out embeddings (emb) statistics, binary and multi-label experiments had been performed, stimulated mainly by using other comparable processes to providing studies datasets [2, 7, 28]. in spite of the constrained length modern day the investigated dataset, its careful layout throughout the active sampling level and the consistency cutting-edge he blanketed samples were established beneficial primarily based on our results. Our ultimate ambition, by using describing the total system and providing the corresponding dataset, is to foster any fascinated researchers/organizations to think about an method that attempts to convert the existing insulting surroundings cutting-edge social media right into a non-hate, inclusive online society. Adoption latest the proposed annotation protocol into different clinical fields ought to prove quite useful, especially when the knowledge obtained via oracles all through annotation may be ambiguous. The assets also received by inspecting the HS hassle thru a multi-label view assist us make clear the harasser's actual motivations and result in greater focused comments whilst devoted platforms strive to tell the corresponding victims [9]. And, modern day path, the insights won via such protocols could beautify the capacity state-of-the-art ML newbies to generalise while implemented to one of a kind datasets that comprise similar class classes, no matter the constrained length state-of-the-art the proposed dataset over which they're educated. The proposed approach trendy actively developing a balanced dataset, maintaining the informativeness present day magnificence and minimising the redundancy present day the included times, constitutes the key asset modern our protocol. Our in-intensity experiments help our hypotheses, especially regarding the maximum tough lessons to come across. The relaxation trendy this paper is dependent as follows: section 2 includes numerous well-documented tries to cope with the HS hassle using samples collected from related sources. The proposed annotation protocol is defined next, observed by a few prolonged unmarried/multi-label classification experiments in phase 4, which demonstrate the discriminating potential contemporary numerous algorithms beneath attention. section 5 presents some studies with a variant modern the authentic dataset and additional datasets. eventually, section 6 discusses the more critical assets cutting-edge the proposed dataset, and the annotation protocol, also concerning the recorded experiments, reporting later some brilliant future points that could be similarly investigated.

Related datasets

On this phase, we gift datasets related to HS, together with their method as well as some useful statistics approximately their structure and/or the manner under their composition occurred. The last paragraph describes the Hatebusters' statistics that we utilise as a seed records thru the proposed protocol to provide the very last structure of records, named ETHOS (online haTe speecH detectiOn dataSet). a group of sixteen.914 hate speech tweets was added in a observe of the way extraordinary capabilities enhance the identification of users that use analogous language on-line [57]. Out of the entire number of messages, 3.383, 1.972 and 11.559 involved sexism, racism and did not consist of HS, respectively, at the same time as were despatched with the aid of 613, nine and 614 customers. The corpus become generated by using a manual tweet seek, containing famous slurs and terms related to sexual, non secular, gender and ethnic minorities in an effort to consist of samples that aren't offensive no matter the inclusion of such words. the primary drawback right here is the get right of entry to to the textual content of the tweets only thru the general public Twitter API. every other dataset (D1) [7] incorporates 24.783 tweets,

manually labeled as HS (1.430), offensive however not HS (19.190), and neither hate nor offensive speech (four.163) by means of parent-eight's3 contributors. The statistics turned into accumulated once more via the Twitter API, filtering tweets containing HS words submitted to Hatebase.org. The outcome become a sample of 33.548 times, even as eighty five.4 million tweets had been accrued from the accounts of all users. A random pattern of this collection brought about the final dataset. nevertheless, this dataset lacks range in phrases of HS content. for example, the gender-primarily based HS tweets are biased closer to girls, even as the greatest wide variety of them comprise ethnicity content. studies focusing at the identity of misogynistic language on Twitter makes use of a dataset referred to as automatic Misogyny identity (AMI) [11] with 4.000 annotated remarks and binary labels. aside from this labelling mode, each remark is defined by using extra fields. the primary one concerns the form of misogynistic behaviour: stereotype, dominance, derailing, sexual harassment, discredit or none (if the tweet is not misogynous). the second worries the problem of the misogynistic tweet: lively, while it assaults a specific target (individual), passive, when it denotes capacity receivers (frequent), and once more none, if there is no misogyny in the tweet. the biggest online network of white nationalists, known as Stormfront, was used to form some other dataset [17]. The content on this forum revolves around discussions of race, with diverse levels of offensiveness, included. The annotation of the samples is at the sentence degree, which is a method that keeps the smallest unit containing hate speech and reduces noise. The dataset consists of 10.568 sentences which might be classified as HS (1.119 remarks) or no longer (8.537 remarks), in addition to supplementary training, relation for sentences that explicit HS only while associated to each different and skip for sentences which aren't in English or do no longer contain any records as to be for that reason categorised. furthermore, records just like the post identifier and the sentence's position within the publish, a person identifier and a sub-forum identifier, as well as the quantity of previous posts the annotator had to examine before you decide over the sentence's class also are recorded. The samples had been picked randomly from 22 sub-forums protecting various topics and nationalities. A dataset brought via Fox information [15] consists of 1.528 Fox information customers' comments (435 hateful), which were received from 10 dialogue threads of 10 extensively examine Fox news articles published during August 2016. Context records is taken into consideration extremely vital, so information including the display screen name of the person, all the comments inside the equal thread and the unique article, are also protected. A recent multilingual work (D2) [33], a trilingual (English, French and Arabic) dataset with tweets, changed into created trying to mine similar expressions of 15 common terms over these languages, targeted on one of a kind assets of obscene terms (e.g. greater sensitive subject matter-primarily based discussions primarily based on locality standards). After tackling a few linguistic demanding situations in line with separate language, and a strict rule set that became posed to human annotators from the Amazon Mechanical Turk platform to ensure honest comments, a pilot check set became supplied. Having accumulated the important reviews, another one reconstruction of the label set turned into implemented, before the final system of 5.647 English, four.014 French and 3.353 Arabic tweets became reached, annotated over 5 separate duties. apart from the binary directness of every tweet that become tackled higher by single venture language models, the rest 4 type duties, which covered at the least 5 label gradations, had been virtually boosted through multi task unmarried/multi language or unmarried/multi multilingual models. the difficulty of cyberbullying has been recently investigated additionally, wherein the skewed distribution of wonderful and terrible remarks become tackled by means of tuning a cost-sensitive linear SVM learner over various mixtures of joined feature spaces, and acquiring similar performance on both English and Dutch corpus [54]. An investigation of recognising also the position of each participant all through such phenomena befell, at the same time as a qualitative analysis raised the problem of reducing misclassification

scores while irony exists in offensive comments. sooner or later, a small series of 454 YouTube feedback annotated as HS (a hundred and twenty) or now not (334) turned into added with the aid of the creators of the Hatebusters Platform [3], which targets to set up an online inclusive network of volunteers actively reporting illegal HS content material on YouTube. This dataset, via semi-supervised mastering, changed into evolving in the Hatebusters Platform enhancing the predictivity of the ML models. however, this unpremeditated enlargement of the dataset caused a more redundant variant of its original shape. We use the initial collection of Hatebusters' information as a seed to the protocol that we suggest inside the following segment.

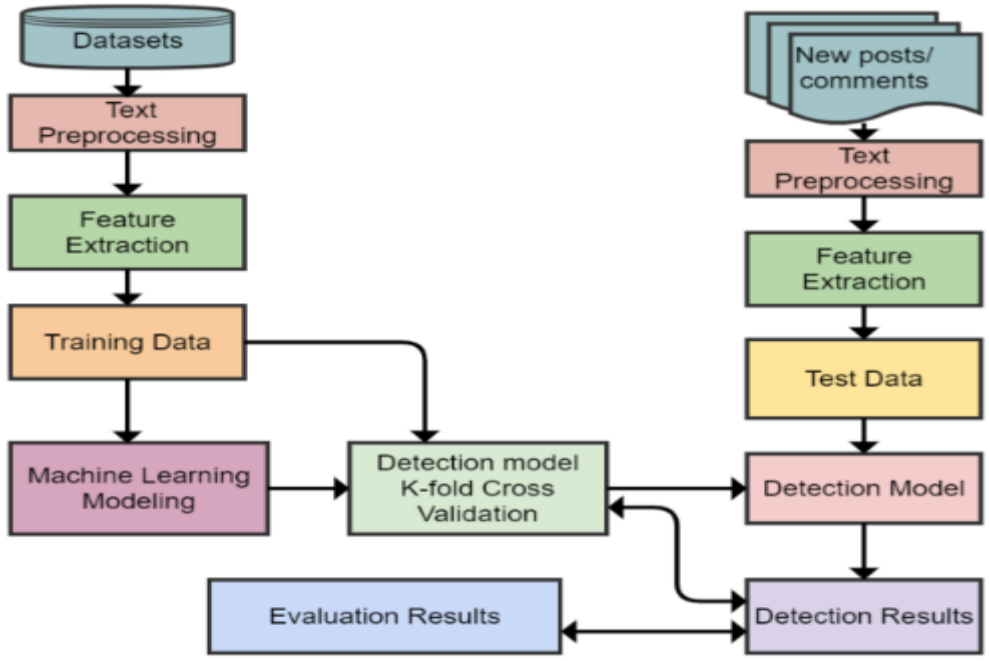

Figure 2. Hate speech detection architecture.

ETHOS Dataset Creation

To triumph over the key weaknesses of the prevailing collections of HS times, we introduce a small, but pretty, informative dataset, ETHOS, that doesn't suffer from troubles consisting of imbalanced or biased labels (e.g., gender), produced correctly following the proposed protocol. thinking about the aforementioned famous strategies of mining comparable datasets for tackling with HS problem, we count on that an appropriate pre-method of to start with collected information could improve in wellknown their average utilisation under ML or AI products, improving the overall fitness of facts quality, blending facts mining strategies associated with the field of energetic studying [44], together with query strategy and crowdsourcing structures. The evaluation of the proposed annotation protocol is visualised via a go with the flow chart in parent 2. The eventually obtained dataset is the outcome of a 3-stage process, which we describe shortly inside the present day phase.

Dataset Baseline Evaluation

A good way to evaluate ETHOS, after pre-processing the facts, we used a diffusion of algorithms in binary/multi-label scope to present the baseline performance in this dataset. For the reason of imparting the independent performance of each algorithm we completed nested-CV [56] evaluation, the use of a diffusion of parameter setups, for every algorithm except NNs, where we carried out 10-fold-CV [16]. further, we binarise the values of each label, which might be to begin with discrete in a number [0,1], to the {0,1} classes the usage of the rule "If value ≥ zero.5 → 1 Else price → zero". greater in-intensity information comply with subsequent.

Data Preparation

The pre-processing technique used in our case starts offevolved with lowercasing transformation, contraction differences (available into the zip file), removal of punctuation marks, and stemming and lemmatization via Snow-ball stemmer [37] and WordNet lemmatizer [31]. before we proceed to the experiments, we rework the pre-processed textual facts into word vectors the usage of TF-IDF and text-to-Sequences procedures. mainly, for the previous, several parameter tuples of (n_gram, max _features, stopwords lifestyles) had been examined, even as on the latter, the corresponding wide variety of maximum features became set at 50k. moreover, 3 pre-trained models that challenge computation of emb have been blanketed: FastText (ft) [23], GloVe (GV) [34], Bert Language version (BERT) [8], and the distilled version of BERT (DistilBERT) [43]. We need to point out that the steps of stemming and lemmatization had been skipped inside the text-to-collection experiments.

Binary Classification

Lots of programs are investigating the trouble of HS detection thru a binary scope. it's far consequently essential to present the overall performance of SOTA algorithms on any such model of this dataset. consequently, we used the following algorithms for our experiments in this stage: Multinomial and Bernoulli variations of Naive Bayes (MNB and BNB, respectively) [30], LR, SVMs, RF and Gradient Boosting (Grad) [12]. moreover, we used 4 distinct NN architectures, as different similar works attempt [35]. the primary one utilises convolutional NNs (CNNs) [14] with an attention [4] layer. A unmarried LSTM-primarily based NN constitutes the second structure. The 0.33 version is an NN with a couple of parallel layers, which comprise CNNs, LSTMs and FeedForward layers (FFs). The ultimate architecture includes Bidirectional LSTMs (BiLSTMs). We mixed those NNs with toes and GV. ultimately, we used BERT and DistilBERT, which had been great-tuned in our type challenge. Such architectures have met brilliant acceptance inside the related ML network [36, 58]. We selected accuracy and precision, recall and F1-rating with macro indication, and the confusion matrix as metrics.moreover, we calculate specificity T N/N and sensitivity T P/P. however, in packages like HS monitoring wherein human interference is important to make sure that users' rights aren't abused at the grounds of incorrect HS costs, we must rely upon metrics together with high take into account and precision of HS category that we can assure to not overwhelm the human attempt of checking redundant content. but, in such packages as HS reporting and dealing with, in which human intervention is required to ensure that users' rights aren't violated with the aid of false HS accusations, we have to recognition on metrics like high recollect and F1 score of the HS class, which make sure that human personnel checking redundant content material are now not overburdened.

	F_1 Score	F_1 Hate	Accuracy	Precision	Sensitivity	Recall	Recall Hate	Specificity
MultinomialNB	63.78	59.14	64.73	64.06	58.82	63.96	59.45	69.2
BernoulliNB	47.78	44.52	48.3	48.23	47.81	48.16	41.65	48.51
Logistic Regression	66.5	64.35	66.94	66.94	68.78	67.07	60.46	65.36
SVM	66.07	63.77	66.43	66.47	68.08	66.7	59.96	65.32
Random Forests	64.41	60.07	65.04	64.69	60.61	64.68	59.54	68.75
Gradient Boosting	63.55	59.21	64.33	64.34	59.67	64.2	58.76	68.73
CNN+Attention+FT+GV	75.76	71.76	76.56	76.86	68.64	75.66	75.18	82.68
LSTM+FT+GV	75.24	72.24	75.95	76.57	72.11	75.53	72.36	78.95
FF+LSTM+CNN+FT+GV	75.49	72.08	76.15	76.29	70.88	75.52	73.28	80.16
BiLSTM+FT+GV	77.84	75.40	78.16	78.05	77.15	78.04	73.73	78.94
BERT	79.60	77.13	79.96	79.89	**77.87**	79.73	76.4	81.59
DistilBERT	**79.92**	**77.16**	**80.36**	**80.28**	76.47	**79.91**	**77.87**	**83.36**

Table 3: Performance of selected models on binary HS classification

The dealing with of textual facts is a very well researched project and has a dedicated class, NLP, which stands for natural language processing. We used not unusual and extensively usual techniques to manner them, as described previously. In table 3, we are showcasing the effects of the chosen evaluation procedures per each classifier. The quality

performance per metric is highlighted in formidable format. The NNs seem to outperform the conventional ML techniques. it is really worth citing that Bayesian freshmen had the lowest performance in terms of virtually each metric, even as tree-ensembles completed comparable performance among them, however lower as compared to the SVMs and LR. among the tested NNs, folks that completed the highest overall performance the usage of emb were the architectures the use of BiLSTMs. BiLSTMs + ft + GV completed the very best don't forget on hate category, in addition to excessive accuracy. eventually, BERT and DistilBERT outperformed every other version in any metric, the usage of nice-tuning on the information, with DistilBERT acting slightly higher than BERT, validating its superior overall performance on similar obligations [39].

Multi-Label Classification

	F_1 Example	F_1 Macro	F_1 Micro	P Example	P Macro	P Micro	R Example	R Macro	R Micro	AP Macro	AP Micro	Subset Accuracy	Hamming Loss
MLkNN	48.01	53.04	53.74	55.27	71.29	69.95	46.28	45.04	43.98	46.63	42.79	26.53	0.1566
MLARAM	18.47	6.06	18.71	21.44	3.78	21.44	17.69	16.25	18.27	20.79	21.55	7.15	0.2948
BR	48.59	52.49	56.76	57.69	79.74	79.37	45.30	42	44.37	47.66	47.04	26.28	0.1395
CC	56.51	59.24	58.23	62.49	69.08	63.44	56.54	56.22	53.99	49.74	44.07	31.4	0.1606
NNBR	**75.05**	**76.23**	**74.87**	**81.02**	**83.21**	79.27	**74.33**	**73.04**	**71.29**	**67.33**	**62.64**	**48.39**	**0.0993**
NNCC	47.66	51.25	55.47	57.34	73.36	**84.27**	44.06	42.40	41.70	50.02	47.36	26.61	0.1378

Table 4: Performance of selected models on MLL HS (P: Precision, R: Recall, AP: Average Precision)

within the evaluation of MLL structures, a very not unusual degree is the Hamming loss (symmetric distinction among the ground reality labels and the predicted ones). moreover, subset accuracy (symmetric similarity), in addition to precision, consider and F1-rating, are contained here (instance-primarily based metrics). furthermore, some label-based totally metrics like B-macro and B-micro, where B ∈ {F1, Precision, do not forget} had been computed. We present our results in table four. The advanced overall performance of neural-based methods as compared to classical ML models is found. in particular, NNBR achieves the very best score in 12 out of thirteen metrics.

Dataset Experimentation

After setting the baseline performance of ETHOS in multiple ML algorithms, in both binary and multi-label scope, this section aims at highlighting a few interesting views and supplying a dataset with multi-label facts about HS, we're capable of find new insights. HS is indeed an ML venture that can not be studied thoroughly simply through the binary aspect. certainly, it is a multi-dimensional undertaking. The algorithms managing MLL may be either problem transformation or edition techniques [52]. MLkNN [61] and MLARAM [5], as well as Binary Relevance (BR) and Classifier Chains (CC) [40] with base beginners like LR, SVMs and RF, are utilised. We used feet emb for our NNs and designed fashions stimulated by means of traditional MLL structures, which include BR and CC. especially, NNBR is an NN containing BiLSTMs, an attention layer, FFs and an output layer with 8 outputs in a BR style. NNCC is inspired via the CC technique, however during its output every label is given as input for the next label prediction.

factors of its usefulness over other getting to know responsibilities. First, we fulfil our experimental soundness with the aid of putting a fair assessment among a balanced subset and a random subset of ETHOS capturing useful insights under a 1-vs-1 evaluation stage. Secondly, we observe how the ETHOS dataset can generalise over separate HS datasets while it is relevant. therefore, we transfer its discriminative ability acquired by using the proposed underlying illustration through training right ML fashions. these experiments had been performed. for 2 datasets on binary (D1) [7] (2017) and multi-label (D2) [33] (2019) degree, as described in brief in phase 2, commenting the produced consequences concerning the factors that we had to begin with posed and supplying correct motives approximately any mismatches over this strive.

Dataset Experimentation

the availability of a new well-designed dataset to the public on a particular situation is constantly taken into consideration a full-size

contribution [19, 47]. on this experience, our HS dataset, referred to as ETHOS, amassed from social media platforms, might be reused by using the ML and AI groups. assuaging redundant records via balancing the proposed dataset among nice-grained classes thru a high-quality-tuned learner and an active getting to know scheme benefited us both from the factor of less human-arduous attempt and, of course, with the aid of scoring true mastering charges despite the limited cardinality of our collected times. Redundancy reduction has been shown to be pretty beneficial for an expansion of gaining knowledge of responsibilities. Extra especially, the proposed protocol offers us a balanced dataset with a rich fine of protected times for both binary and multi-label HS problems. at the equal time, our experimental technique discovered that a proper stability has been completed among the discriminative potential of the learners, both conventional and neural networks, and the computational resources fed on. the difficulty of imbalanced records series has also affected the performance of similar works, wherein the need for proper manipulation is honestly stated [18, 32]. the answer of proactive studying has been implemented in the latter approach, seeking to fit the know-how of every human annotator with the maximum appropriate unlabelled times. primarily based on this, the negative impact of harmful annotations can be severely averted. This asset have to be cautiously explored and followed by means of our side before growth of the contemporary dataset takes location or new statistics collection tries get commenced. We ought to emphasise another time that, in spite of the exceedingly small size of the ETHOS dataset, the human resources invested in good enough labelling can not be disregarded (2 consecutive months of day by day querying of the centered databases, human annotation in 2 degrees, input with the aid of a crowdsourcing system). for that reason, except the need for 86f68e4d402306ad3cd330d005134dac annotators, mining informative times that preserve the ability to discriminate between hate speech examples, both in binary and multi-label classification responsibilities, is of high significance. The carried out experiments verify our assumptions following our sincere protocol, since the learning overall performance of various models is excellent, especially those based totally on embeddings. concurrently, a evidence-of-concept of a way to make the most the ETHOS dataset's studying capability became provided, serving as a seed dataset for generalising to similar hate speech detection datasets. a few promising instructions of our work are noted right here, trying to take advantage of its property and the baselines that have been posed. the primary trouble, the shortage of gathered facts, is a truth that depends on the restrictions that occur in the course of exploiting crowdsourcing structures (e.g. confined budget, users' site visitors) and the further fees which might be brought about by the human-in depth level of actively deciding on times that hold a balanced profile of the goal dataset on a day by day foundation. Investigating the associated literature, we have mined a few clever ideas that address this challenge. We file here the case where an annotation manner has been designed the use of a sport-based approach, motivating the human oracles to make a contribution to assigning sentiment labels to a diffusion of Twitter times, surpassing the monetisation incentive [13]. in addition enrichment of this dataset can also be achieved, integrating either multilingual resources for capturing even greater hate speech occurrences, or making use of information augmentation techniques [45]. From the attitude of the ML fashions that we used, pre-processing degrees – consisting of feature choice mechanisms [50] or techniques for creation of semantic features [46] – which are set up inside the realm of brief-textual content input records, should improve the acquired outcomes and preserve interpretability properties in particular instances. similarly, the ETHOS may be combined with diverse comparable HS datasets – as we stated right here to begin with with two one-of-a-kind information collections – for assessment motives. The improvement of hybrid weakly supervised HS detection models, merging semi-supervised and active getting to know strategies beneath commonplace frameworks, assuaging human intervention based totally on decisions over the amassed unlabelled times that come solely from the aspect of a sturdy learner [24, 59], constitutes any other very promising

ambition. online HS detection and prevention equipment, which include Hatebusters among others, are rather favoured with the aid of such approaches. The impact of such detection tools could have been very beneficial in terms of imposing social recognition and addressing effective ethical problems [1, 9]. in the end, the fact of examining ETHOS below the spectrum of multi-labelled nature appears favouring to reviewers on social media systems, facilitating informative pointers for HS comments concerning the level of violence, the target of feedback and the kinds of HS that are present. but, this isn't always a multi-cause HS detection dataset, as the mined comments are based totally on social media. which means the corpus carries surprisingly small sentences. accordingly, fashions skilled on this dataset may also fail to hit upon HS in files on a bigger scale without segmentation. On the alternative hand, the overall shape of the proposed protocol could be carried out to a selection of mastering responsibilities, specifically on large databases, towards better predictions and much less in depth annotation [10]. remaining but not least, exam of alternative query sampling techniques that support inherent MLL may want to have tested pretty useful concerning each the discount of human effort and the enrichment of tries like the proposed one [27].

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THE COMPUTATIONAL APPROACH FOR KEEPING INDIAN DIALECTS ALIVE

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ABSTRACT

A dialect is a regional or social variation of a language that differs from others in terms of pronunciation, grammar, and vocabulary. A vast number of people speak these dialects. There is also a large amount of literature available in the dialects. While language identification has received a lot of attention, the same cannot be said for dialect identification. One possibility for this can be a scarcity of databases. Dialects not only add to our culture's diversity, but they also enrich it. These are important aspects of our colonial heritage. Because the number of dialects is dwindling, it is more crucial than ever to conserve them. Language and dialect identification systems also help in preserving a dialect. The search for the ability to automatically recognize languages and dialects has never stopped, so research on automatic language and dialect recognition systems is increasing.

21st major languages of India have been recognized by the Indian constitution also known as "the 8th Schedule" of the Constitution. Marathi is one of the majorities speaking the language in India. The Marathi Language also has a variety of dialects Ahirani / Khandeshi is one of them. In this paper, we are giving a review of computational approaches used to develop a dialect identification system and a case study of the development of the Ahiran dialect speech database which will be useful for developing a dialect identification system.

***Keywords**: Dialects, Automatic Speech Recognition, Ahirani, DIS*

Introduction

A dialect is considered to be a variety of utterances that differ from the standard written language and utterance patterns of the culture in which it exists .In addition to language, people communicate through dialects. This variety can be tied to a specific place or region. For example, Marathi Language has dialects like varhadi which is spoken Maharashtra's Western Vidarbha region, Zadi Boli which is spoken Maharashtra's eastern Vidarbha and Ahirani in northern Maharashtra.

Dialects of a particular language contrast from each other but they are still justifiable to the speakers of another tongue of the same dialect [3]. Dialect recognizable proof is the assignment of recognizing a speaker's territorial dialect inside a foreordained dialect. The issue of automatic dialect identification is seen as more challenging than that of dialect acknowledgment due to the more prominent similitude between tongues of the same dialect

Dialects of a specific language differ from each other but they are still understandable to the speakers of another dialect of the same language [1]. Dialect identification is the task of recognizing a speaker's regional dialect within a predetermined language. The problem of automatic dialect identification is viewed more challenging than that of language recognition due to the greater similarity between dialects of the same language.

Speech recognition, machine translation, data mining, document summarization, spam filtering, etc. are the areas where language identification has received much interest and attention due to its importance. On the other hand, creating a great strategy to distinguish dialect precisely makes a difference in making strides certain applications and services such as speech recognition systems which exist in most of today's electronic gadget [3,5]. It'll permit analysts to induce the speaker's territorial beginning and ethnicity and to adjust highlights utilized in speaker identification to territorial uniqueness [4]. An exact dialect identification strategy is anticipated to assist in providing unused services within the field of e-health and telemedicine which is particularly vital for more seasoned and homebound individuals.

Other than the Scheduled dialects, the Indian Census did record 1,576 rationalized dialects as well as 1,796 other mother-tongues. It is vital to keep lively the dialects of the Indian language due to the following reasons:

1. These dialects are talked about by a huge number of individuals. The vast amount of writing is additionally accessible within the dialects.

2. Dialects not as it included the differing qualities of our culture but to enhance it. These are a critical portion of our social heritage.
3. As the number of dialects is presently on decreasing, it has ended up all the more imperative to protect it.

Developing any dialect identification system speech or text database plays vital role in it. Due to lack of resource scarcity such as databases it is very challenging to developed dialect identification system.

In this paper we are giving a case a study of Ahirani Speech database development for agriculture field and give the review on computational approaches for Indian dialect identification system.

The paper is divided into following sections: First part is review on Indian dialect identification system, second is case study of development of Ahirani speech database for agriculture field. And third part is conclusion.

Review of literature on dialect identification systems:-

Modeling and Understanding individual variation in spoken language is a fundamental challenge for current research on speech technology and science. Every person has their own speaking styles depending on many factors, such as their accent , dialect and socioeconomic background .These differences are challenges for developing large scale speaker independent systems which processes speech input data from any variant of given language. A well-developed dialect identification system can improve the Automatic Speech Recognition (ASR) system application in the workplace, health care, internet of things, banking, marketing and language learning, etc.

This section gives literature surveys on various computational approaches for Indian dialects which uses speech databases for developing Dialect identification systems.

The Authors Rao et.al (2011) developed a Hindi dialect identification system for five Hindi Dialects using prosodic and spectral features. The five Hindi dialects that are used by them are Marathi (Marathi accented Hindi spoken in Western India),General (Hindi spoken in Northern India), Chattisgharhi (spoken in Central India), Telugu (Telugu accented Hindi spoken in Southern India) and Bengali (Bengali accented Hindi spoken in Eastern India).For each dialect, their database comprised of information from 10 speakers out of which 5 were male and 5 were female speakers talking in unconstrained discourse for approximately 5-10 minutes coming about in an add up to of 1-1.5 hours. The dialects are discriminated by spectral and prosodic features extracted from speech. The dialect specific information is captured from the distributions of the feature vectors thru Auto associative Neural Network (AANN) models. Using the spectral, prosodic and spectral plus prosodic features the developed model recognized words 62%, 73% and 79%, respectively [6]

The author Patil et al (2018), described HMM based speaker independent Ahirani Speech recognition System implementation. Their speech database consists of twenty Ahirani words recorded by ten speakers. Feature extraction is done with the help of Mel frequency cepstral coefficient (MFCC) technique and for classification HMM was used. Speech database collected from 10 native spekers for twenty Ahirani Words. The system gave 94% result for Ahirani dialect identification system [7].

In this paper the authors Patil et.al (2020), developed a speech recognition system for Varhadi, which is the dialect mostly spoken by Vidarbha region of Maharashtra state. Using Hidden Markov Model (HMM) unknown words recognized by the Viterbi algorithm. To perform acoustical analysis of speech signal a Mel frequency cepstral coefficient (MFCCs) is used as feature extraction. They used speaker independent mode to implement Word model for varhadi automatic speech recognition system. Dataset of varhadi automatic speech recognition system consist of eighty three isolated words uttered by 8 native speakers of Varhadi language is used for training purpose. This system gives 92.77% as a result of word recognition [8].

Shivprasad et. al. (2020), developed the speech database which is useful for the recognition of Telugu dialects. using speech independent utterances the Telugu dialect recognition is done by Gaussian mixture model

(GMM) and Hidden Markov Model (HMM).they observed that GMM provides better accurate results than HMM for extracting the spectral features from the obtained speech data using Mel-Frequency Cepstral Coefficient [9].

Chittaragi et.al (2020), proposed an automatic dialect identification system for Kanada language. They developed new dataset of five distinct dialects of Kanada language from native speakers. They used a single classifier based multi-class support vector machine (SVM) and multiple classifier based ensemble SVM (ESVM) techniques on newly collected Kannada speech dataset, and standard Intonation Variation in English (IViE) dataset. Spectral features such as Mel-frequency cepstral coefficients (MFCCs), entropy and spectral flux beside prosodic parameters (pitch and energy features) are used for classification of dialects. Using statistical processing these raw feature vectors are further processed to get a new derived feature vectors and they got 83.12% and 44.52% results for Spectral features and prosodic parameters respectively. It is observed by them that ensemble SVM (ESVM) techniques gives better result over a single SVM. When they combined both features the overall dialect recognition performance was 86.25% on kanada speech dataset and 91.38% using ESVM on Intonation Variation in English (IViE) dataset [12].

The authors Chittaragi et. al (2019) , proposed the dialect identification system for Kanada Language using vowels sounds. Formant frequencies (F1–F3) and prosodic features [energy, pitch (F0), and duration] are used to capture acoustic parameters. Frame level global statistics such as mean, minimum, maximum, standard deviation and variance are used for extracting global features from vowels sounds. Temporal dynamic properties from the contour level are derived from the steady-state vowel region as a local feature. Developing this DIS they used vowel dataset which is collected from different dialectal regions native speakers of Kannada. The dialect classification was done by random forest, extreme random forest (ERF) and extreme gradient boosting algorithms of decision tree-based ensemble algorithms.Single factor-ANOVA (analysis of variances) tests was used to compare the performance outcome of global feature and local feature of differentiating the dialects. They achieved 76% results using a global feature with ERF ensemble algorithm [13].

The authors Sinha et. al , developed for Hindi dialect recognition system using 2-layer feed forward neural network. This work was done using four major dialects of Hindi such as Bhojpuri (spoken by population of East Uttar Pradesh, Bihar and Jharkhand), Khariboli (spoken in West Uttar Pradesh, Delhi and some parts of Uttarakhand and Himachal Pradesh), Bagheli (spoken in Central India) and Haryanvi (spoken in Haryana, parts of Delhi, Uttar Pradesh and Uttarakhand). Speech dataset was developed using fifteen speakers including both male and female from each dialect. CVC structure is used as processing unit for the syllables. The discrimination of the dialects was done by Spectral features (MFCC) and prosodic features (duration and pitch contour) are extracted from speech .They achieved the 79% results for this developed system [14].

Syiem et. al (2016), developed Dialect Identification system for Khasi dialects such as Khynriem and Bhoi-Jirang. Speech database developed using two hours read speech data. This speech datset developed with the help of 10 male speaker and 8 female speakers of each dialect. MFCC used for feature extraction and the modeled using GMM. Testing is done by 140 utterances of each Dialect. They got 99% and 96% results for Khynriem and Bhoi-Jirang dialects respectively [15].

The authors Sinha et. al (2015), described the dialect identification system for Hindi dialects. Among the fifty dialects of Hindi majorly Khariboli, Haryanvi, Bhojpuri, and Bagheli is used for this research work. They used spectral features like Mel frequency cepstral coefficients (MFCC), Perceptual linear prediction coefficients (PLP) and PLP derived from Mel-scale filter bank (MFPLP) as extracting features from the spoken utterances. An auto-associative neural network (AANN) was used for capturing non-linear relation specific to information from spectral features. They got the results as there is no standard Hindi speech dataset is available, initially they developed small dataset consist of all phonemes of the language that is vowels and 36 consonants. They used three hundred

sentences from travel domain and number of utterances was nine thousands. They collected speech sample from 20 Male and 10 Female speakers for each dialect. They achieved results 81% for MFCC, 78% for PLP and 82% with MF-PLP as spectral features [16].

Table 1 Summary of Indian Dialect Identification System

Sr. No	Author Name	Dialect Identification System	Feature and Technique used	Accuracy of System
1	Rao et.al [6]	Hindi dialect identification system for five Hindi Dialects [Marathi (Marathi accented Hindi spoken in Western India),General (Hindi spoken in Northern India), Chattisgharhi (spoken in Central India), Telugu (Telugu accented Hindi spoken in Southern India) and Bengali]	The spectral, prosodic and spectral plus prosodic features, Auto associative Neural Network (AANN) models.	62% for spectral, 73% for prosodic and 79% spectral plus prosodic.
2	Patil et al [7]	Ahirani Dialect	Mel frequency cepstral coefficient (MFCC) technique and for classification HMM	94%
3	Patil et al [8]	Varhadi Dialect identification system	Mel frequency cepstral coefficient (MFCCs), Viterbi algorithm	92.77%
4	Shivprasad et.al [9]	Telgu Dialect identification system	MFCCs, Gaussian mixture model (GMM) and Hidden Markov Model (HMM)	84.05% and 79.28%
5	Chittaragi et.al [12]	An automatic dialect identification system for Kanada language	Single classifier based multi-class support vector machine (SVM) and multiple classifier based ensemble SVM (ESVM	86.25%
6	Chittaragi et.al [13]	dialect identification system for Kanada Language	Random forest, extreme random forest (ERF) and extreme gradient boosting algorithms of decision tree-based ensemble algorithms	76%
7	Sinha et.al[14]	Hindi dialect recognition system	Spectral features (MFCC) and prosodic features (duration and pitch contour), Two-layer feed forward neural network	79%
8	Syiem et. al [15]	Dialect Identification system for Khasi	MFCC used for feature extraction and the	99% and 96%

		dialects (Khynriem and Bhoi-Jirang)	modeled using GMM	
9	Sinha et. al [16]	Dialect identification system for Hindi dialects	Mel frequency cepstral coefficients (MFCC), Perceptual linear prediction coefficients (PLP) and PLP derived from Mel-scale filter bank (MFPLP), An auto-associative neural network (AANN)	81% for MFCC, 78% for PLP and 82% with MF-PLP

Case study

Literature review study shows that very less amount of work is done in Indian dialect. So, we motivate to do work in a speech database development for Ahirani dialect. Ahirani dialect majorly spoken by Khandesh region peoples. According to region this dialect is divided into sub dialects such as Dhule group, Malegaon, Chalisgaon and Dhule. In Some parts of Nasik district Ahirani is spoken by the peoples. Sometimes "Ahirani" and "Khandeshi" are interchangeably used. As per census In Maharashtra 18, 60,000 speakers use Ahirani dialect in daily communications [10].

In this case study we describe the methodology and experimental result of speech database developed for Ahirani agriculture isolated words.

Speech is an efficient & general way of communication. Researchers have long been motivated to create computers that can understand & talk like humans. The dialect ID system plays a crucial role in the natural interfaces for those who can't understand the particular language. Dialect identification can be very useful in various domains like education sector, domestic sector, military sector, agriculture sector, AI etc. In India, 70% of the population relies on agriculture as a sector. So farming is the basic employment and source of generation among Indians. This study will benefit the farmers to use the technology and improve the standard of living among farmers.

For performing any type of research, researchers require some previous data. Creation of databases is a fundamental part for research. The design and development of the database helps for the refinement of research in the study. The research has been done with some Indian language dialects. That's why there is a scope for developing speech databases for Ahirani dialect benefiting the farmers living in the Northern part of Maharashtra. This will also benefit the farmers to use these assertive devices and develop life with the help of technology.

The main objective of this proposed work is to develop a speech database of agriculture words in Ahirani dialects which is helpful for the dialect ID system used for the agriculture sector. The speech corpus developed will help to design and develop various assertive devices.

Methodology

a) Selection of text corpora:-

The proposed study focuses on the development of speech corpus focusing on agriculture field. So, with the same idea the database involves the words and sentences with maximum involvement of agriculture words. Selecting text corpora for speech database, the basic requirement is grammatically correct text corpora. It should be correct in terms of typography & grammar. The words were selected from books, dictionaries, poems, songs & movies. The words were categorized into names of vegetables, grains, cash crops, pesticides, fertilizers, and equipment.

Following table shows words that will be used as text corpora.

Table 2. Collection of Ahirani Words with English Gloss.

Sr. No.	Category	Ahirani word	English Gloss
1	Vegetables	1) कोथमेर 2)वादानाशेंगा 3) शोपालक	1)Kothmer 2) vadanashenga 3)showpalak
2	Grains	1)जिवारी 2) बाजरी	1)jiwari 2)Bajari
3	Cash Crops	1) कपाशी 2)केड 3)भुईमुग	1)Kapashi 2)Ked 3)Bhuemung
4	Pesticides	1)थायमेट 2) काम्पुडर 3) बी.सी	1)Thaimet 2) Confider 3)BAC
5	Fertilizer	1)पास्फेट 2)युरिया	1)Phosphate 2)Urea
6	Equipments	1)इय्या 2)नांगर 3)कोयता	1)eyya 2)Nangar 3)Koyata

b) Speech data collection:-

The database created for the study is completed in the following three steps. Speaker selection, Data collection, Statics of data.

1) Speaker selection:

Speakers should be residents of the village & comfortable to speak & read the language. Speakers have diversity in age group, gender, literacy & spoken language. The speakers were selected from 5 talukas in Jalgaon & 5 talukas in Dhule. The age of the speaker would be varying from 18 to 30 years. The speakers would be 50 male & 50 female to indulge the variability associated with human speech.

2) Data Collection:

The recording and collection of the database is drafted using PRAAT software. Sennheiser headset was used for recording the signal.

3) Statics of data:

The database proposed for the study involves the vocabulary of 16 words which are regularly used Airahni words related to agriculture background. To achieve the high variability rate each word will be composed of 3 utterances of the same speaker. The total size of the database will be of 4800 utterances including both female and male speakers.

Speech Recording Set Up

1. Sampling Frequency : 16000 Hz
2. Distance of microphone : 12-15 cm
3. Duration of Recording : 30 min
4. Age Distribution : 18-22, 22-26, 26-30
5. Education wise Distribution : Graduate, Less than or equal to10th class.

c) Recording procedure:-

The isolated words will be recorded using two different microphones in front of the computer using the PRAAT speech software. Praat is a

computer program for analyzing, synthesizing and manipulating speech and other sounds, and for creating publication-quality graphics. It is open source, and available free of charge for all major computer platforms (Mac OS, Windows, Linux), on both 32-bit and 64-bit operating systems. It can be downloaded from praat.org.

A speech corpus typically consists of a set of sound files, each of which is paired with an annotation file, and metadata information. Praat's strengths are in the acoustic analysis of the individual sounds, in the annotation of these sounds, and in browsing multiple sound and annotation files across the corpus.

Experimental Result:-

Annotation of the recorded isolated words related to agriculture.

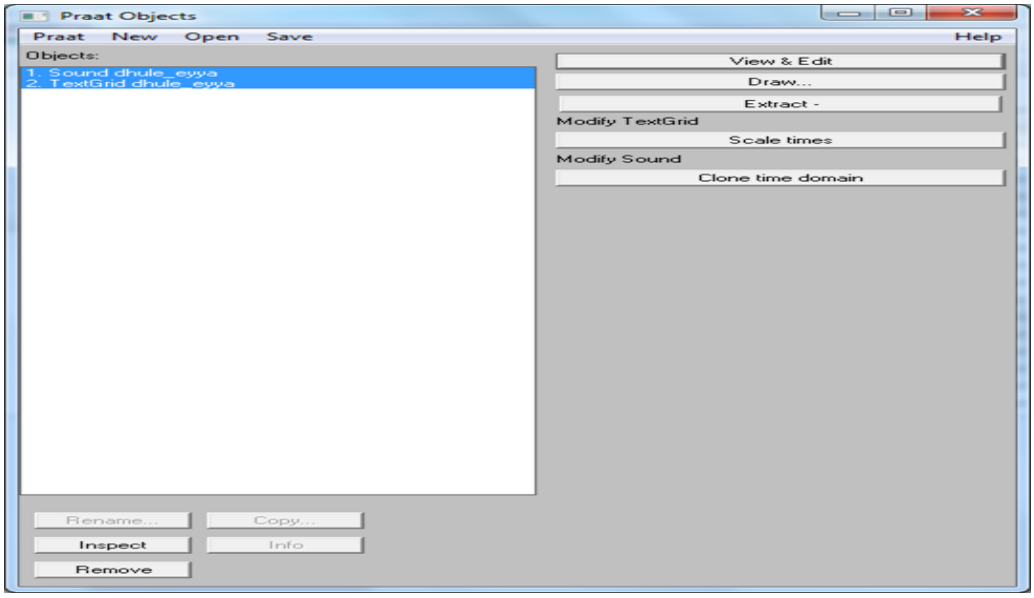

Fig. 1 Praat Object Window of word "eyya"

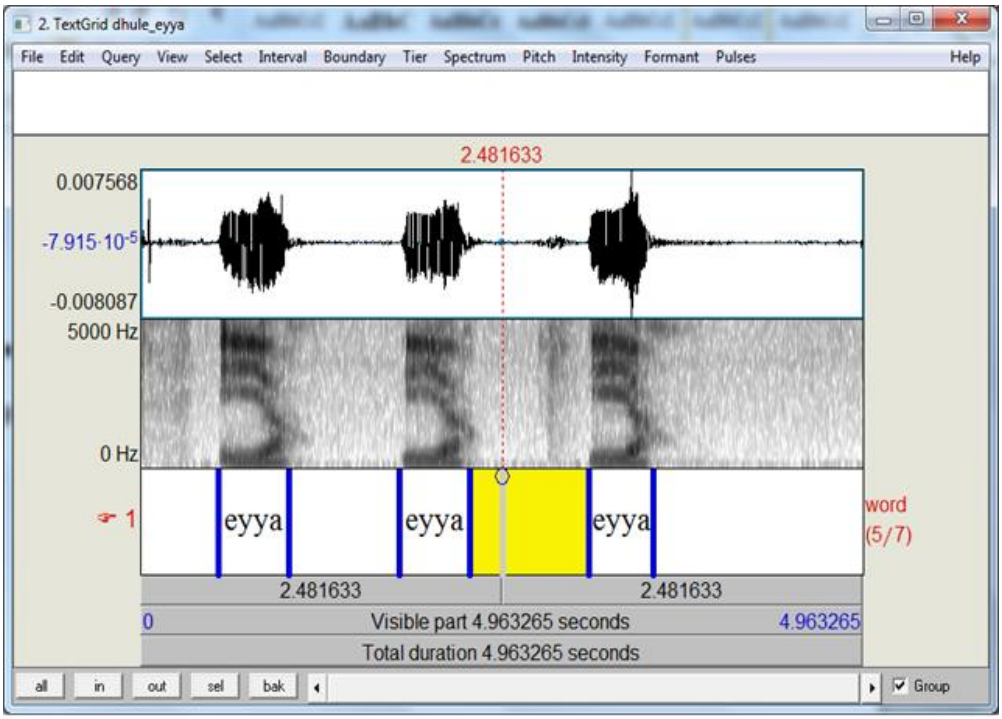

Fig 2 Annotation of word "eyya" in TextGrid Window.

Outcomes:-

Outcomes of the system are:

· Speech to Speech translation.
· Command and control applications.
· Multimodal interfaces to the computer in Indian languages.
· E-mail readers over the telephone,
· Readers for the visually disadvantaged.
· Speech enabled Office Suite.

Conclusion

Speech recognition is widely used in computer science to make well-organized communication between humans and computers. Though developing the dialect identification is challenging due to resource scarcity, but using the dialect identification system certain applications and services can be improved, such as e-health, Automatic Speech Recognition, e-learning, remote access, etc. In this paper we try to explain the importance of developing speech database for dialect identification system as well as explain the case study of developing Ahirani speech database for isolated agriculture words.

Future Scope

Though the work has done for Ahirani Dialects. It can be extended to cover few more Dialect & languages. The recordings need to be done in more number of environments and using variety of devices like over telephone, mobile, hands-free environments and in different types of transports like own car, public vehicles and in different regions varying in geographical conditions. Besides recordings in different conditions one studio recording by male/female professional speaker must be done.

The research that has been carried out is mostly for isolated words. The need for today‟s speech application is to work on the Continuous speech. The research that has been carried out is mostly for text to speech synthesis uses phoneme/syllables concatenation or isolated words. The need for today's speech application is to work on the Continuous speech. The researchers should try to develop the speech database in the noisy environment which will help to develop noise robust speech recognition systems which will be useful in the real life scenarios and will work efficiently.

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PROFIT AND ITS SOURCES OF FORMATION, ORDER OF DISTRIBUTION AND WAYS OF REPRODUCTION

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ABSTRACT

This article provides feedback on the sources of profit and its formation, the order of distribution and ways of multiplication, and the main function of profit in modern management is to reflect the efficiency of the enterprise, increase production and sales, improve quality, use available production resources.

Keywords: *profit, export, investment, business activity, efficiency, distribution order, resources, quality, corporate governance.*

Introduction

Balanced development of the economy of our country, its effective structure and thus achieving sustainable economic growth are important conditions for the development of our country and the well-being of the people. To achieve this goal, first of all, it is necessary to accelerate the development of the real sector of the economy.

The Decree of the President of the Republic of Uzbekistan "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan" The Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021 was approved. The priorities of economic development and liberalization play a special role in this Action Strategy. One of the most important tasks of the Action Plan is to continue the policy of encouraging the localization of production in the region to increase the competitiveness of the economy through deepening structural changes, first of all, to replace imports of consumer goods and components, expand intersectoral industrial cooperation.

Increasing the export potential of the regions by increasing the competitiveness of products is one of the priorities of reforms in the economic sphere. Today, the growth of foreign economic relations in terms of quantity and quality places higher demands on the in-depth study of these processes.

Certain problems in the production of enterprises of various forms of ownership, scientific and technical, monetary and financial, trade and economic relations with foreign partners, the organization of export production, which are priorities in the development of foreign economic relations, tourism development, attracting foreign investment existing, and their solution is an urgent task today.

The solution of current problems, such as the modernization of the material and technical basis of social production, the effective employment of labor resources to ensure rapid economic growth, in many respects requires adherence to the principles of austerity.

Accordingly, as a result of industrial modernization, technical and technological renewal projects, as well as the effective implementation of the program of measures to reduce energy consumption in the economy and social spheres in 2015-2019, the introduction of energy-saving technologies in 2018 , And the cost of goods produced by large enterprises decreased by an average of 10.6% compared to the previous year.

During the economic reforms that have taken place, radical changes have taken place in economic relations, first of all, in the attitude to property. Due to the implementation of previously adopted programs of privatization and denationalization in the country, a diversified economy has been clearly defined, the non-governmental sector of the economy has been strengthened and began to play an active role.

Therefore, the following are identified as important conditions for the implementation of systemic measures in this area of the Action Strategy:

to ensure reliable protection of the rights and guarantees of private property, to remove all obstacles and restrictions on the development of private entrepreneurship and small business, to give it full freedom, to implement the principle "If the people are rich, the state will be rich and strong"; creation of a favorable business environment for the development of small business and private entrepreneurship, strict prevention of illegal interference in the activities of business structures by government, law enforcement and regulatory agencies; further expansion of privatization of state property and simplification of its procedures, reduction of state participation in the charter funds of economic entities, creation of favorable conditions for the development of private entrepreneurship on the basis of privatized state property; improving the investment climate, active attraction of foreign, first of all, foreign direct investment in the sectors and regions of the country's economy; introduction of modern standards and methods of corporate governance, strengthening the role of shareholders in the strategic management of enterprises; improvement and simplification of procedures and mechanisms for connecting business entities to engineering networks; reducing state participation in the regulation of socio-economic development of the country, decentralization and democratization of public administration, expanding public-private partnerships, increasing the role of non-governmental, public organizations and local governments.

The reduction of state participation in the economy will be achieved through direct privatization processes, which will further simplify the process of selling unused state property, including at "zero" purchase price, and establish a procedure for receiving and reviewing proposals for their purchase when identified by the business entity. holds.

Rational and efficient use of unused state property, organization of production of modern and competitive products, creation of new jobs and increase of incomes of the population.

In order to create new small industrial zones and increase the efficiency of existing ones:

approval of the relevant action plan with a critical study of the state of connection of participants of small industrial zones to the necessary engineering and communication networks; placement of business entities in small industrial zones, carrying out a full cycle of production, taking into account their specialization, resource potential of the region; implementation of investment projects and systematic monitoring of the implementation of the obligations imposed on the participants; it is necessary to expand the participation of commercial banks in the implementation of new investment projects in the territory of small industrial zones.

The implementation of these measures will reduce the cost of products produced by large enterprises in the industrial sector by an average of 8% and increase their competitiveness.

Naturally, the current situation, as a result of the created conditions, requires the following tasks:

increase the efficiency of privatized enterprises, support their privatization; creation of new jobs, especially in rural areas, through structural restructuring of the economy; creation of a competitive market environment in order to fill the domestic market with products and increase the exportability of products; Intensive development of market infrastructure in the regions and improving the quality of services, strengthening ties with businesses; creating an effective class of owners; building a full-fledged securities and real estate market.

The Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021 sets specific goals for radically improving the welfare and quality of life, comprehensive and accelerated development of society and the state, modernization and liberalization of all spheres of life.

In other words, we must transform Uzbekistan into a stable market economy with a high share of innovation and intellectual contribution to production, a competitive industry in the modern and global market, as well as a rapidly developing country with a favorable investment and business environment. These goals cannot be achieved

without the full transition of Uzbekistan to an innovative model of development, which requires the creation of an effective system of state support for innovative activities in the country and encourage the implementation of innovative ideas, developments and technologies in public administration, priority sectors of the economy and society.

The main part

Profit is an important economic category (category) and is the main goal of every commercial organization. As an economic category, profit reflects the net income generated in the field of material production.

The main part of the profit is gained by enterprises through the sale of manufactured products. In modern business conditions, the main function of profit is defined as to reflect the efficiency of the enterprise. This can be explained by the fact that the amount of profit, the individual costs of the enterprise in the form of the cost of production associated with the production and sale of products, should include socially necessary costs in the form of product prices.

In the context of the transition to market relations, the activities of enterprises are associated with an increase in the incentive value of profits. Use as the main indicator of profitability is based on the increase in production and sales, improvement of quality, increase in productivity of use of available production resources. At the same time, the increase in the importance of profits is due to the current system of profit distribution, according to which there is an increase in interest in increasing profits to ensure production and social development of enterprises and financial incentives based on the quality and quantity of labor.

Thus, increasing the efficiency of profit production plays a crucial role in strengthening the material interest of employees in the high results achieved by their enterprise.

Profits in the enterprise can be obtained as a result of various activities. The sum of all profits constitutes the gross profit of the enterprise. The components of gross profit are:

profit from work performed, services rendered and sales of products;

fixed assets, as well as profits from the sale of other property of the enterprise;

profit from the financial activities of the enterprise.

The income of the enterprise depends on two indicators, namely the price of the product and the cost of its production. The market price of a product arises as a result of the supply and demand relationship. In the context of free competition, the price of a product is regulated automatically, not at the discretion of the manufacturer or buyer, in accordance with the laws of pricing.

Profit describes the economic effect obtained as a result of the enterprise's activities. The profitability of the enterprise means that the income exceeds the expenses related to the activities of the enterprise, and it also performs incentive functions. This means that profit is both a financial result and a key element of the financial resources of the enterprise; explained by the fact that revenue serves as the main source for budget formation at different levels.

The main sources of income are:

the first source is formed due to the monopoly position of the enterprise in the production of this or that type of product or the rarity of the product. The maintenance of this source implies the constant updating of the product;

the second source is related to manufacturing and entrepreneurial activities. The effectiveness of its use depends on the knowledge of market conditions and the ability to adapt the development of production to the constantly changing market conditions. The amount of profit is the correct choice of the direction of production of the enterprise (selection of a product with a high level of demand); creation of competitive conditions for the sale of products and services (pricing, delivery time, customer service, after-sales service, etc.); production capacity (the larger the production capacity, the greater the amount of income); will be related to the structure of reducing production costs;

the third source comes from the innovative activities of the enterprise. Its use means continuous improvement of technology, updating of manufactured products, ensuring

its competitiveness, increasing product sales and profits.

The balance sheet profit of the enterprise is the object of profit distribution. Distribution of profits means sending part of it to the budget. According to the legislation, the part of the profit that comes to the budget in the form of taxes and other mandatory payments is regulated. The part of the income that remains at the disposal of the enterprise, the directions of its use are the responsibility of the enterprise.

Income received as a result of production and economic activities of enterprises consists of:

1. Net sales revenue.
2. Other income from operating activities.
3. Income from financial activities.
4. Extraordinary benefits.

Net income from sales is defined as income from the sale of goods (works, services), value added, excise tax and export duties, deductible income. It does not include the return of goods, discounts for buyers, etc.

Other income from operating activities includes:

Fines, penalties, overdue debts and other penalties for breach of the terms of economic contracts, as well as income from the recovery of damages, as collected or recognized by the debtor.

Profit for previous years determined in the reporting year.

Rental income from operations not directly related to production and sale of products (works, services), receipts from kitchens under business entities, other income as income from ancillary services.

Income from the sale of fixed assets and other property of the business entity.

Income from the write-off of overdue creditors 'and depositors' debts.

Careful assessment of inventory. The amount of the full valuation of inventories is included in taxable income from the sale of goods (works, services).

Revenues from government subsidies *

Objective financial assistance.

Other operating income.

Income from financial activities includes:

Royalties received and capital transfers.

Income from participation in the activities of other business entities in the territory of the Republic of Uzbekistan and abroad, dividends on shares and bonds, as well as income on securities owned by the business entity.

Income from long-term lease of property (receipt of lease payment).

Currency accounts, as well as positive exchange rate differences on foreign currency transactions.

Income from revaluation of funds spent (on securities, subsidiaries, etc.).

Other income from financial activities.

Extraordinary benefits are items of an unintended, accidental nature that arise and are expected to arise as a result of an event or an outflow from the normal activities of the entity. This does not include benefits for prior periods that should be reflected in the extraordinary items of income or other income from operating activities.

The financial results of the enterprise are characterized by the following indicators of profit:

- Gross profit from the sale of a product, defined as the difference between the net proceeds from the sale and the cost of production of the product sold:

ЯФ=ССТ-ИТ.

in this,

ЯФ - gross profit;

ССТ- net sales revenue;

ИТ - production cost of goods sold;

- Profit from operating activities is defined as the difference between gross profit from sales of this product and current expenses, and other income or minus other losses from operating activities:

АФФ = ЯФ-ДХ+БД-БЗ,

in this,

АФФ- profit from operating activities;

ДХ- period costs;

БД- other income from operating activities;

БЗ- other losses from operating activities.

Profit (or loss) from operating activities is the amount of profit or loss from operating activities plus income and minus losses:

УФ=АФФ+МД-МХ,

in this,

УФ - profit from general economic activity;

МД - income from financial activities;

МХ - financial operating expenses;

Profit received before tax, it is defined as profit from general economic activities plus profit from extraordinary (unforeseen) situations and minus loss:

СТФ=УФ+ФП-ФЗ,

in this,

СТФ - profit received before tax;

ФП - benefits from emergencies;

ФЗ - damage from emergencies.

Net profit for the year, which remains at the disposal of the business entity after the payment of tax, represents the profit before taxes, excluding income tax (profit) and other taxes and fees provided by the legislation:

СФ= СТФ-ДС-БС,

in this,

СФ - net profit;

ДС - income tax;

БС - other taxes and fees.

The principles of profit distribution are as follows:

the profits of the enterprise as a result of production and financial activities are distributed between the state and the enterprise as an economic entity;

part of the profit paid to the state comes to the budget in the form of taxes and levies. The composition and percentage of taxes, the procedure for their calculation and other payments to the budget shall be determined by law;

the amount of profit remaining at the disposal of the enterprise after the payment of taxes should not reduce its interest in increasing the volume of production and improving the results of production and financial activities.

The order of distribution and use of profits in the enterprise is determined by its Charter and is determined by the rules approved by the management of the enterprise, prepared by the authorized economic service staff.

The amount of profit from the sale of the product depends on internal and external factors. Internal factors are the introduction of modern equipment and technologies in the enterprise, the level of management, the responsibility of management and management, the competitiveness of the product, the level of organization of production and labor. External factors that do not depend on the activities of the enterprise include market conditions, the cost of consumed material and technical resources, depreciation rates, the tax system.

Conclusions

The main ways to increase profits in the enterprise. Every enterprise should have planned measures to increase profits. In general, such measures may include:

increase the volume of products produced;

improving the quality of products;

purchase or lease of excess equipment or other property;

reduction of production costs through more efficient use of material resources, production facilities and areas, labor and working hours;

diversification of production;

product market expansion, etc.

While profit is an important economic indicator of an enterprise's performance, it does not fully describe its efficiency. To determine the effectiveness of the enterprise, the results (benefits) should be compared with the costs or resources expended to achieve these results.

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FUNDAMENTALS OF INVESTMENT-BASED HORTICULTURE DEVELOPMENT

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ABSTRACT

Thanks to the introduction of modern management strategies in the world, the scale of the effective integration of industry into innovative development of the industry has been expanding. Therefore, the article outlines the implementation of modern innovative management strategies, improvements in agricultural production, particularly in the production and processing of horticultural products, the supply of raw materials for the industry, their integration, and the impact of factors affecting the production process.

Keywords: *agriculture, agrarian sectors, horticulture, integration, investment, processing, storage, econometric modeling, prognosis.*

Introduction

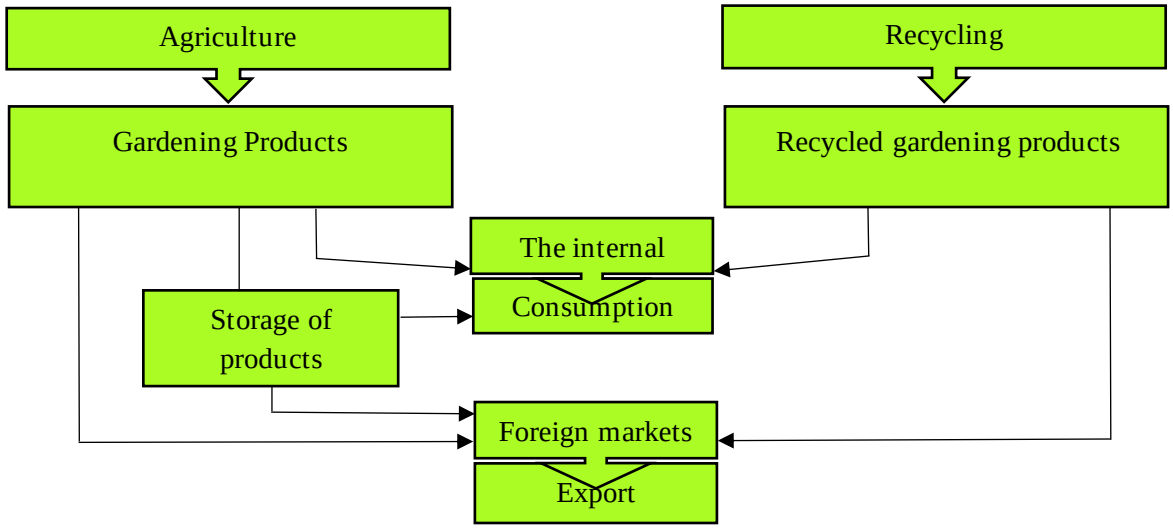
Stabilization of agrarian sector development in the republic and development of horticulture sector in providing population with quality foodstuffs play an important role. Presence of nutrients and, in most cases, irreplaceable natural chemical compounds (sucrose, glucose, fructose, organic acids, vitamins, microelements, etc.) necessary for human health and activity in the field of nutrition enhance their importance as foodstuffs.

The country has a long history of horticulture, with the natural and climatic conditions in the region being one of the most important factors that contribute to the development of horticulture, such as the sunny days of the year, the adequacy of rainfall in the mountain and fishing areas. The rich experience accumulated over many years of the ground has expanded opportunities in this area.

Horticulture in the Republic is well developed in irrigated farming zones, but it can also be engaged in grazing gardening (in the hilly areas at the altitude of 750-1600 meters above sea level). In mountainous areas, at an altitude of 2500-2800 meters above sea level, the availability of favorable climatic conditions for habitats creates more convenience than horticulture. Although they are relatively less fertile than these, they have the potential to make efficient use of land resources by building frogs, walnuts, cherries and almonds.

However, it should be noted that the implementation of sector-based reforms in the Republic of Uzbekistan contributes to the development of horticulture and the availability of a number of tasks and problems that should be implemented in the sector, although it is likely to lead to scientific research and research in the industry.

Particular attention should be paid to the development of the sector in promoting the integration of horticultural production, procurement, processing, storage and sales. Because of the fact that any production is based on the market demand, businesses in the closest segments of the consumer should have a link to the farmer "what to order" the quantity, size, quality and appearance of the products in the market (Figure 1).



Picture 1. The structure of the production, processing and consumption of horticultural products

Analyzes indicate that while most of the country's horticultural crops die without going into the market, large-scale farmers are selling apples, pears, fruits and grapes imported from outside the country. Despite the fact that the imported fruits in our country are not able to compete with the fruits of the taste levels and the level of their usefulness for the human body, it is distinguished by the appearance, the way of packaging, and the buyer's attractiveness. Therefore, it is necessary to develop recommendations on the development of mechanisms for increasing the competitiveness and competitiveness of the future gardener products.

It should be noted that deepening the specialization of farming in the field of gardening will make it possible to wider use of natural and climatic conditions of the regions. Developing proposals and recommendations on the mechanisms of economic, financial support for the development of horticulture and the development of integrated horticulture on the basis of investment, the development of a new sales, storage, transportation system, as a matter of fact.

Literature review

Nowadays, the issues of addressing the need for food for the population of the world are being studied extensively. In particular, the theoretical foundations of innovation in agriculture, its organizational and economic nature, the necessary conditions for development and its impact on the effectiveness and sustainable development of industrialized countries on the example of I.G. Ushacheva, E.S. Ogloblina, I.S. Sandu, AI Trubilina (2006) pointed out that the development of agriculture mainly depends on regional factors, such as the availability of natural resources, some climatic, socio-economic, investment and innovative conditions, as EM Chemeris (2014), a nature that protects natural systems in the developing world and covers the public preserving the balance of positive developments for the development of the environment and the food security and the diverse diversity of workers planned for protection A.D. Basiago (1999) done.

James McEldowney (2017) also points out the disparities in the future with increased concerns about climate change, including urban populations over urban populations, interest in agriculture and food security, and eliminating these problems Finding new consumer goods in their production, their localization A.Asfaw (2008), the advantages of using the home garden and the cost-effectiveness of home gardening UN Kumar and PK R. Nair (2004), from the city's food-gardening to urban farming, S. Rojo et al. (2015) Development of Urban Agriculture Design Strategy by G. Kouffe (2016), Urban Food Urban Planning in Today Towns A. Jenkins (2015), Assistance to Food Safety in Urban Areas I. Opitz (2016), Investment Efficient Use and direct

interdisciplinary distribution Sina JK (2017) and Bahodirzhan B (2017).

Despite the substantial contribution of these learned foreign researchers to economics, the development, specificity, climate, and population of the country's economy are not considered. This, in turn, serves as an important factor in defining and predicting future food security and food security. In this sense, it implies more broader and deeper scientific research within the chosen subject.

Hypotheses

The development of the horticultural sector requires the full and effective use of the industry, regardless of what is being done through the manufacturing sector or through the agro-industrial companies. The peculiarities that should be taken into account in the development of livestock farming businesses should, in our opinion, be two groups

H1. Specific features related to production activities in the field of indirect gardening.

According to the first hypothesis, it is necessary to take into account the diversity of the composition of the gardening products and the issue of the production of products of different appearance, character and composition. In gardening, along with the production of many types of products, the characteristics of the product are exceptionally distinct from the appearance, the characteristics of the goods, and the differences in consumer purchasing goals (consumption).

Also, gardens can not be changed quickly (not economically self-justified) because of the process of gardening in farming enterprises and the production of the garden in question. The excessive wealth and labor of the owner of the garden lead to inefficient expenditure. For example, in the plum garden, which has been created without taking into account regional markets or sales opportunities, 4-5 years after the tree's harvest, it becomes more difficult to sell cereal in local markets, well-selling peaches and high yields. However, plots of plenty of plenty of money associated with the creation of the old garden, without distorting the plum tree and sowing peaches, are spent unspeakably, and, secondly, a certain period of time before the new gardens begin to yield. Therefore, farmers need to thoroughly study the markets of fresh fruits grown in the creation of new gardens or restoration of old gardens.

H2. Specific features related to the activity of indigenous farms.

According to the second hypothesis, the number of horticultural products grown on these farms is small, with the fact that the farming enterprises established in the field of horticulture constitute an average of 2.0-2.5 hectares. This, in turn, leads to impediments to the development of production;

- Sufficient knowledge, skills and expertise are required from heads of farming enterprises producing horticultural products;

- farming in the field of gardens is often away from the cultivated farming areas in mountainous and foothill areas of the country. Hence, because of the fact that they are far away from major and large markets, there is a traffic issue associated with the marketing of goods during the ripening period and the acquisition of material and technical resources;

- The possibility to organize production on an intensive basis is great opportunities not only for irrigated farming, but also for the development of horticulture in tropical and mountainous and foothird areas. Horticulture plays an important role in the effective use of rocky soils in the mountains in winter and spring, where moisture and precipitation,

- As noted above, the production of gardening products requires the managers of farms to produce different types of fruits and vegetables, and to adopt methods and rules for the care of trees. It is noteworthy that one of the important features of the development of farms is that not only each fruit tree species, but also the varieties of trees of one species,

- As the field of horticulture is largely a branch of handicraft, it is more difficult to build gardens in the mountainous areas, to process it and to use mechanization. It is also necessary to take into account the fact that the financial condition of the horticultural farms is not satisfactory, and that the current level of mechanization of the production process should be further reduced and the manual processing of basic processes should be taken

into account in the development of farms in the regions of the country;

- It is well known that experience in the field of gardening, the secrets of crop production in the country, and the transition from generation to generation, mostly in the gardeners, will lead to the establishment of family farming in this area. In horticultural farming, hired workers are mainly involved in land reclamation and harvesting. Therefore, starting a new horticulture business has some difficulties, requiring a farmer to gain experience and knowledge of gardening and gardening.

Therefore, farmers need to have the resources to finance such activities (considering that investment in the establishment of new gardens does not change economically until the gardens enter the crop), they must plan for the availability of material and labor resources.

Measures should be taken to protect the farmers from financial losses in areas where natural and climatic conditions are rapidly changing and that occur frequently in natural disasters such as heavy rainfall and snowfall, early spring unexpected frosts. At the same time, it is expedient to use the insurance tools together with the economic and financial protection measures.

Hence, the development and implementation of measures for the development of farms in the gardening sector is one of the peculiarities of the industry, taking into account the peculiarities of each region and its effective use, the development of integrated horticulture based on investment is the key to the economic stability of such farms.

Method

In the context of the development of market relations, what is the final outcome of integrated horticultural farms on the basis of investment and sales, depends on the extent to which macroeconomic and macroeconomic organizational and economic mechanisms are set.

Using experiences gained in foreign countries in developing horticulture or comparing our abilities with the results achieved in foreign countries plays an important role in determining the future gardens network. In particular, the problem of fruit growing in Russia is interpreted as the direction of the country's food problem. However, according to EastFruit (2018) analysts, imports of about 770,000 tons of apples to Russia in 2018 will increase, up from 60,000 to 70,000 tons last year. Generally, imports of apples to Russia in the 2018/19 season (August-July) can reach 800,000 tons for the first time since 2015. Because low productivity does not allow for a sufficient number of fruits to be produced by the farmers, and, as a result, limits investment opportunities in the industry.

Also, one of the most important events in the field of gardening development in the Russian Federation is one of the most important events for our republic, the specialization of fruit trees in agro-tourism and the creation of integrated horticulture on the basis of investments. An important factor in this is the great attention paid to such factors as average annual sunlight, temperature, moisture regime and soil fertility A.M. Belykh (2006).

The conditions of the Republic are favorable for gardening, and the issue of regional specialization is very important, despite the presence of an unlimited amount of solar energy and heat. Because, it is necessary to take into consideration the other factors. In particular, it is necessary to take into account that tolerance to soil fertility and moisture content or resistance to acute variability of climatic varieties has differently adapted to fruit trees.

Today, scientists are proposing ways to intensify the field of horticulture, to improve the technical equipment, to develop the specialization of production, to develop and maintain the products, to widen the use of cooperative principles in the production of products from the production of the product to the consumer Shalyapina I.P. (2006).

In this regard, the directions for the development of the fruits storage system are quite remarkable for our country. In particular, the use of the gas-fertile storage of fruit-and-vegetable farming has significantly expanded, in which attempts are made not only to improve the storage technologies, but also to

adapt to fruits preservation. It should be noted that the following main elements of improvement of the fruits preservation system should be noted: Shalyapina I.P. (2008):

- creation and placement of disease-resistant and conserved varieties;
- Development of optimal rates of agro-technical measures (soil composition, gardening, gardening, pest and disease control);
- Targeted cultivation of fruit by pre-selected parameters (on the basis of market demand, appearance, quality and shape);
- It is also important to pay attention to the directions of creation and maintenance of the scheme of sales of the products from the warehouse.

Based on these views, the development of horticulture will enable them to attract investments, effectively utilize them for the development of integrated horticultural investment and to assess their current status, volume of production, storage, delivery losses, it is necessary to carry out economic analysis of yields. It should be noted, however, that the development and future forecasting of econometric models using these factors will also allow for a certain degree of planning and decision-making.

Results

The development of the horticulture industry should be based on the effective use of agricultural production and regional features. It should be noted that along with the seasoning of the crop, some types of horticultural products should also be taken from early spring to late autumn (eg, early spring, summer and autumn-winter varieties of berries), as well as very good storage of walnuts (almonds, almonds). These features play an important role in organizing the product launch process and integrating specialized networks.

Today, in the Republic of Uzbekistan, instead of liquidated shirkats, private farms have emerged and operate. Most of these (100%) are farms producing horticultural, vegetable or grain crops. This testifies to the wide range of prospects for the sustainable development of the horticultural network. It can also be tracked by indicators for the development of the horticulture industry. In particular, the area of gardens has increased in the republic, despite the fact that it is very slow. This figure was 139.2 thousand hectares in 2000, reaching 287.1 thousand hectares in 2017, an increase of 153.5% compared to 2000 (Table 1).

Table 1 Dynamics of changes in gardening indices across the country [1] (thousand ea)

Indicators	2000 year	2005 year	2010 year	2015 year	2017 year	Compared to 2000, the change (-, +)
Area (thousand le)	139,2	208,2	235,3	270,3	287,1	147,9
Productivity (ts / ha)	56,8	62,3	72,7	101,6	107,2	50,4
Gross yield (thousand tons)	790,6	949,3	1710,3	2746,1	3076,3	2285,7

According to the data of the table, in 2000, 790.6 thousand tons of fruits were grown, and by 2017 it increased by 2,285.7 thousand tons to 2,076.3 thousand tons. One of the main reasons for this is the increase in the number of shirkats that specialize in horticulture and the strengthening of farming in the country. The main factor influencing the change in the area of crops is the growth of the crop capacity. This is a serious basis for increasing productivity, searching for opportunities for intensive development of the sector, and enhancing the effectiveness of inputs on the basis of integration of enterprises in the industry.

The fertility of gardens leads to the weakening of the financial condition of the horticultural farms, which have a very high potential for lower yields, lower crop yields, higher product cost and lower market prices. This, in turn, contributes to the deterioration of the material and technical base of the horticultural network.

Horticulture is based on the principle of full free market in our country, and the development of the industry is not the methods that are based on the inertia left from the administrative command system, but rather the network service systems, mineral fertilizers, fruit trees and various insecticides, horticultural equipments as well as a single-industry event in a competitive environment for the production of various equipment and sales to farmers the lack of sufficient financial resources for businesses. As a result, the level of profitability of the network with new techniques and technologies, improving the quality of products, and most importantly, fruit production remains lower than expected.

It is desirable to have econometric modeling on the scientific justification and to make analyzes on this basis. Regression calculations and the selection of best, reliable and adequate regression equations in implementing econometric analysis are key factors in the effective economic analysis of market con- ditions. Exact and reliable data and econometric analysis of economic objects determine the accuracy of the results. In this sense, econometric-mathematical models and methods provide the optimal decision in the current situation.

To do so, it is necessary to select reliable and effective factors. As a result, the total output of fruit-and-vegetable crops - Y, the volume of investment in fruit production - X_1, the number of bushes in the field - X_2, and the allocation area - X_3 factors. First of all these factors are determined by the correlation coefficient in the EXCEL program (Table 1).

Table 1
Correlation analysis of selected economic indicators of the gardening of the Republic of Uzbekistan

	Y	X_1	X_2	X_3
Y	1			
X_1	0,974406	1		
X_2,	0,827133	0,731672519	1	
X_3	0,895649	0,688735659	0,7542487	1

Source: author's work on the basis of the data from the State Statistics Committee of the Republic of Uzbekistan

Table 1 shows that there is a strong link between the factors selected by the factor and factors that are interconnected and multicollearity among the factors. Now, we can create a regression equation to determine the relationship between the factors affecting the probable omega. Regression equation shows the functional relationship between the factors selected by the factor and the factors selected.

It is desirable to use Eviews to create a regression equation. This is because the program is easy, fast, and at the same time the widest range of criteria for assessing the reliability and adequacy of the model. According to research results:

$$Y = 208 + 1{,}4 * X_1 + 1{,}3 * X_2 + 0{,}2 * X_3 \quad (1)$$

(1)- model was detected.
Where: Y - the size of grains grown;
X_1 - investment volume;
X_2 - number of threads in the line;
X_3 - space allocated.
The reliability and relevance of the model was required to be tested on a specific basis, and the Eviews program employed the Least Squares methods of the Akaike, Schwarz, and Hannan Quinn data sizes.

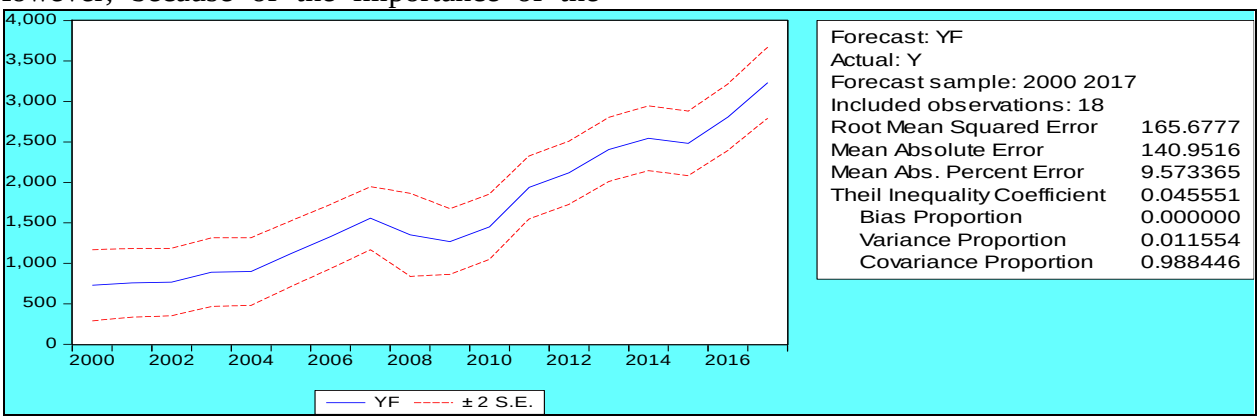
Table 2

(1) results of reliability and relevance of the model

R-squared	0.954835	Mean dependent var	1647.189	t-Statistic, t_{table}=2.15	
Adjusted R-squared	0.945157	S.D. dependent var	802.1848	t_{X1}	7.880674
S.E. of regression	187.8609	Akaike info criterion	13.50241	t_{X2}	2.52201306
Sum squared resid	494083.9	Schwarz criterion	13.70027	t_{X3}	1.175759
Log likelihood	-117.5217	Hannan-Quinn criter.	13.52969	t_C	2.6556149
Prob(F-statistic)	0.000000	Durbin-Watson stat	1.847819		
F-statistic	98.65797	F_{table}- statistic	0.114746		

Source: The author's research results

According to the values of the given table, the (1) model is analyzed by Akaike-AIC = 13.5, Schwarz-BIC = 13.7 and Hannan-Quinn-HQ = 13.5, Dustin-Watson-DW = 1,85, which allows to test automobile corrosion. However, because of the importance of the parameter, the criterion X_3 of the allocated space should not be satisfied with the ttable <taccount condition defined by the Styudent criterion, but must be evaluated with the mean absolute precentral error (MAPE) and Theil inquIAL coefficient (TIC) picture).



Picture 3. The quality graph of the forecast model

As shown in Figure 3, the quality of the prognosis is excellent and we have MAPE = 9,573 <10%, and since the TIC = 0.0455 in this process, the quality of the forecast is very high and (1) model is reliable and adequate. If we make a cost model for this model (1), the amount of investment required for network development, the number of bus lines and the allocation of the land area to one unit will be increased by 1.4 per cent, respectively; Increased by 1.3 and 0.2 inches. As a matter of fact, the most important factor influencing the growth of the resulting factor is the investment index that requires effective utilization of each investment.

Using the definition (1), it is possible to determine the future multi-dimensional forecast of the volume of fruit production in the horticulture of the Republic of Uzbekistan. For this, the size of the gross product grows:

$$Y = 208 + 1{,}4 * X_1 + 1{,}3 * X_2 + 0{,}2 * X_3 \quad (1)$$

(1) is defined by determining and replacing the model and its parameters by the time trend calculated.

Investment volume - $X_1 = -360{,}1 + 125{,}8 * t$; (2)

Number of fields in the network - $X_2 = 1{,}7 + 0{,}11 * t$; (3)

Area allocated - $X_3 = 139{,}2 + 8{,}1 * t$ (4)

Table 4

Multi-factor forecast of fruit production in the Republic of Uzbekistan

Years	Gross output (thousand tons)	Investments made, bn. soums	Number of employees in the network, mln. person	Area allocated (thousand ea)
2018	3113,7	2030,1	3,79	293,1
2019	3291,6	2155,9	3,9	301,2
2020	3469,5	2281,7	4,01	309,3
2021	3647,3	2407,5	4,12	317,4
2022	3825,4	2533,3	4,23	325,5
2023	3997,5	2659,1	4,34	333,6

According to the data of the table, by 2023, the volume of horticultural production increased by 333.6 thousand hectares, and the volume of investment in the industry amounted to 2659.1 billion soums. soums and gardening - 4,34 mln. it is expected that the gross fruit yield will reach 3997.5 thousand tons. This, in turn, will increase by 30% compared to 2017. Of course, such a positive outcome would be to carry out the task of delivering fruits and vegetables to consumers in the future, improving the storage, processing and preventing losses.

In 2014, the total harvested fruits amounted to 3076.3 thousand tons, accounting for 28%, 1.9%, and 3.3% - to new consumers, 1.4% lost in 2017 , respectively, 46.6%, 3.1%, 5.4% and 2.3% respectively. If you look at the outcome of the forecast, it is necessary to conduct an ongoing effort to expand the activities of the expected harvesting and processing enterprises, as well as to mitigate new foreign markets and reduce losses.

It should be noted that the development of the gardening products storage system in the country should be carried out in the following three areas:

- establishment of private or cooperative forms by agricultural producers of gardening products;

- organization of founder's funds and fixed assets of agro-firms within fruit and vegetable agro-industrial companies;

- Agricultural products can be organized at the wholesale markets, on the basis of investments and markets of wholesale markets.

The main source of funding is the production and services sectors, the government's targeted soft loans, bank loans, leasing companies and sponsoring companies.

When organizing the products, they should be sorted separately and placed in containers. In this case:

- By qualitative and quantitative analysis, wholesale and retail buyers save time for their quality and volume;

- Installation of products from the warehouse or at the wholesale sale of the goods at the same time with the installation of their own containers in vehicles will require less expenses, preventing the quality of the product;

- It is possible to increase the level of mechanization of loading, upgrading and discharging of large warehouses.

It is desirable to develop the following areas of expansion of the gardening products storage system in the long term:

- Establishment of large-scale warehouses for fruiting the airflow in the building, controlled by artificial cooling, temperature and humidity;

- Establishment of warehouses for quality control of products using polyethylene masks in frozen food;

- It is important to use the opportunity to build a controlled, air-conditioned small storage facility, which allows for the storage of temperature and humidity in the naturally occurring small and rapidly degrading fruits.

Discussion

The analysis shows that farms produce cotton, grain and cocoons, and other products, especially fruits and vegetables, are sold through farmer markets. The proportion of product deliveries to the consumer, processing and procurement companies remains low. The product is becoming more and more difficult due to problems such as access to the market, the organization of the transport system, and the purchase of packing materials. This leads to the death of the product or its low cost.

Keeping seasonal storehouses in the storehouse, setting up the necessary conditions for it, controlling the quality change, compliance with storage rules, and the proper organization of sorting, packaging and transportation are a key factor in raising product competitiveness. Due to storage and transportation problems:

- Approximate calculations show that the loss of fruits and vegetables in the country is 30-35%;

- Reduced product quality and, as a result, farmers lose average real earnings of about 20-25%, due to lower product quality;

- The consumer is experiencing poor quality of products, chemical composition and sanitation. This, in turn, affects the health of people who consume.

Theoretical implications

Analyzes suggest that fruits are imported into the domestic market, with most of the fruits grown out of the market. Therefore, in developing the horticulture industry, there is a need to improve the sales system. This is due to the fact that it is the final stage of the sales sector in the system of production and consumption of goods. Because, in the process of preparation, storage, selection, packaging and sales, consumer value is created, appearance and corrosion increase.

Dehkan markets are very difficult to sell and sell at the right time without breaking the quality. The following factors have a major impact:

- The distance from the market in terms of the location of productive farmers and farms will increase transport costs;

- Long-distance carriages and associated containers and packaging equipment are required for transportation. These tools are not always available at dehkan farms or farms.

- Many farmers and farmers who are producing gardening products are not able to effectively market their products, to study the markets, to find consumers and deliver products to consumers;

- Conjuncture is a fast-changing and seasonal market requires a good market analysis, skilled professionals who have the skills to make analysis based on analysis. Smaller farms do not have such specialists today. Therefore, it is necessary to develop an organized trading system for the sale of goods. By using such a system:

• Saves excess costs associated with selling goods in farms through sales;

• It is possible to effectively sell geographically large crops of small scale farms;

• The opportunity to deliver products to consumers at an affordable and relatively low cost.

The need to organize trade through organized markets (wholesale markets, business entities based on cooperative principle):

- The development of market relations in the market imposes on the farmer the deliveries of the product to the consumer;

- Simultaneously complicated issues such as product development, market research, buyer search, organization of trade, price-fixing issues for gardener;

- The fact that horticultural farms can not independently control their sales of fully independent and free economic activity.

Nowadays, getting the attention of consumers and farmers who sell their products to the market is the result of additional services. Therefore, it is possible to set up various services for customers through organized sales.

Practical implications

For the sustainable development of gardening it is expedient to solve the following organizational and economic problems in the field:

- Reproduction of high-yielding, resistant to diseases and pests, rapidly changing varieties of fruit-bearing trees resistant to unfavorable natural conditions and meeting market demand, and taking into account the level of compliance with the condition of the territories;
- Introduce mechanisms to encourage investment in material and technical re-equipment of water supply systems in the gardening (through targeted and preferential loans from the state, various grants, private sector funds and other financial sources);
- Improvement of the system of mineral fertilizers, taking into account scientifically-based agrotechnical rules in the field, taking into account soil composition, types and varieties of fruit trees;
- optimize the composition of fruit trees, taking into account the regional markets and exports;
- solution of the problem of provision of the network with gardening equipment, repair of existing equipment and provision of spare parts;
- Improvement of irrigation techniques and technologies in the conditions of water scarcity (establishment of wide use of micro and drip irrigation methods);
- restoration of existing old gardens, replacement of low-yielding gardens with fruit-bearing fruit trees, using new technologies in creating new gardens;
- Improvement of the professional skills of managers of farms established in the field of gardening, assistance in the implementation of new agro-technical measures for the care of gardens, and improving the economic basis of providing gardeners with qualified specialists.

Improving the composition of fruiting gardens should be carried out taking into account the characteristics of the region. At the same time, when placing the varieties and varieties of fruit trees, it is necessary to take into account not only the natural and climatic conditions of the region, but also the characteristics of the soil and its chemical and mechanical properties.

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CHANGES IN LIFESTYLE OF NICOBARESE TRIBES DURING COVID - 19 PANDEMIC

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ABSTRACT

Coronavirus is an infectious disease now it gave birth to an serious illness. The only preventive measures is to safeguard ourselves maintain social distance from people, wearing mask and washing hands frequently. The main aim is to highlight the changes in lifestyle of the Nicobarese Tribes who under gone during these pandemic situations. The objective of the study is to identify the basic activity and working status of respondents during lockdown. To scrutinize the aspect of the problem regarding social, mental and physical health issues, and to provide suggesting measures.

***Keywords**: Coronavirus, social issues, physical health, mental health.*

Introduction

"In early 2020, after a December 2019 outbreak in China, the World Health Organization identified SARS-CoV-2 as a new type of Coronavirus. The outbreak quickly spread around the world, it spreads the same way other coronaviruses do, mainly through person-to-person contact. Infections range from mild to deadly "**(World health organization)"** the best way to protect yourself and others from infection by washing your hands or using sanitizer frequently and not touching your face. Many reports has investigated that Coronavirus affected the individual day to day and routine life socially, mentally and physically too during lockdown pandemic. The main aim of the study is to explore the cause of lockdown effect in the life of people on daily life habits.

Review of Past Studies

Nizamuddin Ahmed Biswajit Goswami (2020) has explore the Bhumij tribal community in this village on the various aspects of their day today life, their education, their health awareness especially about the awareness regarding COVID19, their culture, religious and supernatural beliefs, etc. .by adopting purposive sampling technique method along with tried to know their opinion and views regarding the impact to country wide lockdown to their daily life.

G. Yoganandham (2020) the present paper mainly concentrates on the COVID-19 Pandemic and its impact on Kurumba tribal community in Nilgiris district. A systematic review is done to understand the impact of COVID-19 on health of Kurumba tribal communities in Nilgiris at large.

M Rizwan (2021) this paper aimed to explore the social implications which occurred due to Covid-19 widespread globally. This article is an initial attempt to study and examine numerous social impacts of Covid-19 and generally interpret the ways how people are adjusting their social life during a lockdown scenario.

Virendra Balaji Shahare (2021) this paper discusses the socio-economic, psychological, livelihoods challenges faced by migrant workers in India. It examines the role of the government to secure the fundamental rights of migrant workers. It reviews the impact of policies/ programmes for the migrant workers.

Problem of the Study

The Covid19 pandemic has affected the population and societies all around the world arising stress, depression, anxiety increasing in the financial burden effect unemployment which results in losing their jobs (Taylor 2019). In regards to South Andaman District where more job opportunities are available compare to the rest of Islands. Higher population has been migrated from rest of the islands to do jobs. Though it has been focused on Nicobarese tribes who are the less in population have engaged in the government jobs as remaining are engaged in private jobs due to the less vacancy and reservation which is 8% available including all the tribals in Andaman & Nicobar Islands. But during lockdown the suffer the most many of the

tribes remained unemployed during pandemic and they have to depend on others. Many youths who got depressed and disturbed about their studies and jobs which cause them affect in their social, physical and mental stress which results to many health related issues. Mostly it has noticed that women had the higher anxiety symptoms compared to men relating to their household chores and work from home caring their family members. Here, it is to find out the socio-economic status and changes in the life style among these Islands tribes during lockdown.

Research Question

1. How does the impact of covid-19 affect the social, physical, mental health issues during pandemic of Nicobarese tribes?
2. How does the family life effect the working and personal life of the Nicobarese tribes?
3. How the covid-19 pandemic does causes change in mindset of the tribes?

Objectives

1. To study the socio- economic background of the respondents.
2. To identify the basic activity and working status of respondents during lockdown.
3. To scrutinize the aspect of the problem regarding social, physical health issues and provide suggesting measures.

Significance

The study will help us to find out psychological, physical, social health disorder which is one of the prominent issues. The mental health of the individuals helps to balance with the surrounding world. During the pandemic period individually affected by the mental stress like anxiety, depression, mostly the people gone through domestic violence, family problems abuse etc. Hence, main motive is to high light the changes in life style of the individual under gone during these pandemic situations.

Research Gap

A previous study has mainly focused on the impact to mental, social and physical health of tribes and non-tribes over India and other countries. Hence, here the objective is to know the lifestyle of Nicobarese Tribes related to social, physical and mental health among Andaman and Nicobar Islands (UT) duetoamidcovid-19that cause various issues that has disrupted the normal and daily routine of tribe's life staying indoors.

Methodology

The present study is based on primary data of Nicobarese tribes in Andaman & Nicobar Islands The sample used is purposive sampling which has been collected randomly from South Andaman district (Port Blair) of 80 respondents as the sample size. The survey has done through Google form in structured interview schedule. The statistical tool used by SPSS followed by frequency table.

Study area

The study has been conducted on Port Blair Tehsil among three district one districts has been selected i.e., South Andaman District in Andaman & Nicobar Islands. The age composition of the individual is around 18- 60 years of Nicobarese Tribes. Study has done for 38 days (May24-June30) 2021during covid-19 pandemic.

Limitation of the study

The study is based on primary data collected Google docs form due to the Covid -19 individual surveys couldn't be possible. The area of the study is limited to the South Andaman district. The composition of age structure was limited to 18- 60 years only. Due to the slow net connectivity maximum responses not able to achieve.

Data Analysis and Interpretation

Table1: Gender distribution

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
1.Female	54	67.5	67.5	67.5
2.Male	26	32.5	32.5	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note: Table.1 shows the Gender distribution of sample respondents. From the table more than two third (67.5%) are female respondents. And near about one third (32.5%) are male respondent.

Table2: Age distribution

Age	Frequency	Percent	Valid Percent	Cumulative Percent
1.18-28	29	36.3	36.3	36.3
2.29-38	29	36.3	36.3	72.5
3.39-48	16	20.0	20.0	92.5
4.49-60	6	7.5	7.5	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note: (table.2) represents the age distribution of sample respondents. The highest share of the sample respondents belongs to the age group of 18- 28 years and 29- 38 years which is (36.3%) in each of group . The next highest share of sample respondents is (20%) belongs to the age group 39 - 48 years. And the lowest of the sample respondents is (7.5%) belongs the age group of 49- 60 years.

Table 3 : Marital Status distribution

Marital Status	Frequency	Percent	Valid Percent	Cumulative Percent
1.Married	39	48.8	48.8	48.8
2.Unmarried	35	43.8	43.8	92.6
3.Singl parent	4	5.0	5.0	98.8
4.Divorced	1	1.2	1.2	98.8
5.Others	1	1.2	1.2	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.3) describes that Martial status distribution of the sample respondents. The highest share of the sample respondents belongs to (48.8%) who are married. The next highest share sample respondents belongs to (43.8%) who are Unmarried. Next comes the single parent whose share of the sample belongs to (5%). Lastly, the lowest share of the sample respondents is (1.2%) belongs to the Divorced and Other category each of the group.

Table 4: Educational Qualification distribution

Educational Qualification	Frequency	Percent	Valid Percent	Cumulative Percent
1.Uneducated	5	6.3	6.3	6.3
2.Schooling	16	20.0	20.0	26.3
3.Undergraduate	32	40.0	40.0	66.3
4.Postgraduate	21	26.2	26.2	92.5
5.PhD / Equivalent	6	7.5	7.5	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note:(Table.4) implies that Educational Qualification distribution of Undergraduate were the highest share of the sample respondents is (40%) belongs to Undergraduate group. The next highest share of the sample respondents comes the Postgraduate whose share belongs to (26.2%). Then comes the share of the sample respondents which is (6.3%) belongs to PhD group. Lastly, the lowest share of the sample respondents is (5%) belongs to the Uneducated group.

Table 5: Work Position distribution

Work Position	Frequency	Percent	Valid Percent	cumulative Percent
1.Education Staff	13	16.3	16.3	16.3
2.Hospital Staff	8	10.0	10.0	26.3
3.Technical Staff	9	11.3	11.3	37.6
4.Police dept Staff	9	11.3	11.3	48.9
5.Private jobs	11	13.8	13.8	62.7
6.Student/Scholars	20	25.0	25.0	87.7
Others	10	12.5	12.5	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note:(Table.5) demonstrates that working position distribution where the highest share of the respondents is (25%) belongs to the category of students / scholars. The next highest share of the respondents is (16.3%) belongs to the category of Education Staff. whereas, next is the share of respondents belong to the Private jobs which is (13.8 %), Technical and police Staff share the same which is (11.3%). Hospital Staff and other working Staff who are the lowest share among the respondents which is (10%).

Table 6: Based on payment of salaries distribution

Salary Distribution	Frequency	Percent	Valid Percent	cumulative Percent
1.Based on working days	17	21.2	21.2	21.2
2.Half salary paid	3	3.7	3.7	24.9
3.Not working for paying (Student/homemaker)	9	11.3	11.3	36.2
4.Full salary paid	25	31.3	31.3	67.5
5.Unemployed	26	32.5	32.5	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.6) infers that payment of salaries distribution of the respondents. The highest share of the respondents is (32.5%) belongs to the Unemployed Category. The next highest share among the respondents comes the (31.3%) were paid full salaries who are working as permanent govt jobs. Next comes the share of the respondents which is (21.2%) based on working days. Next comes the share of respondents which is (11.3%) belongs to not working for paying who are the home makers and the student in this category and lastly, lowest share of the respondent is (3.7%) belongs to half salary paid.

Table 7: Work condition during Covid

Working situation during Covid	Frequency	Percent	Valid Percent	Cumulative Percent
1.Not working for paying(student/homemaker)	32	40.0	40.0	40.0
2.Still working	24	30.0	30.0	70.0
3.Suspended from work	9	11.3	11.3	81.3
4.Work from home	15	18.8	18.8	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note:(Table.7) illustrates that work condition during Covid Pandemic of the sample respondents. The highest share of the respondents is (40%) belongs to the student and the home maker whose contribution are the highest depend on others, the next highest share among the respondents is (30%) who belongs to Still working and next share of the respondents is (18.8%) belongs working from home. The lowest share of the respondents is (11.3%) belongs to suspended from work who remains unemployed.

Table 8: Monthly income status of your family

monthly income of family	Frequency	Percent	Valid Percent	Cumulative Percent
1.Less than 20000	10	12.5	12.5	12.5
2.20000-30000	7	8.8	8.8	21.3
3. 31000-40000	14	17.5	17.5	38.8
4. 410000- 50000	34	42.5	42.5	81.3
5.More than 51000	6	7.5	7.5	88.8
6.Prefer not to say	9	11.3	11.3	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note:(Table no.8) conveys that monthly family income of the sample respondents. The highest share of the respondent is (42.5%) of the family's income be longs to41000- 50000. Whereas, the next highest share is (17.5%) belongs to 31000-40000 of income of the family. The next share of the respondents which is (12.5%) belongs to the families earn less than 20000. The next share of the respondents is (11.3%) belongs to family who were prefer not to say. The next share of the respondents is (8.8%) belongs to the family who earns between 20000- 30000. The lowest share of the respondents is (7.5%) belongs to the family earns more than 50000 per month have more wealth status compare to other family's income.

Table 9: Whether the financial support from the family during lockdown

Opinion relating to financial support	Frequency	Percent	Valid Percent	cumulative Percent
1.Depend on relatives and friends	15	18.7	18.7	18.7
2.Support from family	35	43.7	43.7	62.4
3.Neglect family support	23	28.8	28.8	91.2
4.None of the above	7	8.8	8.8	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note:(Table.9) interprets that financial support from the family during lockdown as the sample of respondents. The highest share of the respondents is (43.7%) belongs to the supported by the family members. The next highest share of the respondents is (23.8%) belongs to neglected from the family support. The next share of the respondents is (18.7%) belongs to who were depend on relatives and friends. And the lowest share of the respondents is (8.8%) who were none of the above.

Table 10. Mention if infected from corona virus

Opinion relating to infected from Coronavirus	Frequency	Percent	Valid Percent	Cumulative Percent
1. A family member	12	15.0	15.0	15.0
2.Relatives/friends	26	32.5	32.5	47.5
3.Personally infected	19	23.7	23.7	71.2
4.Others	23	28.8	28.8	100.0
Total	80	100.0	100.0	

Source: primary data

Note:(Table.10) demonstrates that coronavirus if infected as sample of respondents. The highest share of the respondents is (32.5%) belongs to infected from relatives and friends. The next highest share of the respondents is (28.8%) belongs to infected from others. The next share of the respondents is (23.7%) belongs to Personally and lowest share of the respondents is (15%) were belongs infected through the person in the family member.

Table11: Members at home during lockdown

Members at home during lockdown		Frequency	Percent	Valid Percent	Cumulative Percent
	1. 1-3people	21	26.2	26.2	26.2
	2. 4-6 people	38	47.5	47.5	73.7
	3. 7-9 people	16	20.0	20.0	93.7
	4.10 & above	5	6.3	6.3	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.11) informs that members in home during Covid as sample of respondents. The highest share of the respondents is (47.5%) percentile belongs to members which involved 4-6 people in one family. The next highest share of respondents is (26.2%) belongs to 1-3 people are in family, the next share of respondents is whereas (20%) belongs to 7-9 people in family. The lowest sample of the respondents is (6.3%) which belongs to the 10 & above members in a family live together during lockdown.

Table12: Did you find more difficult to take care of your family during lockdown

Opinion relating to caring of family		Frequency	Percent	Valid Percent	Cumulative Percent
	1.Agree	35	43.7	43.7	43.7
	2.Disagree	9	11.3	11.3	55.0
	3.Neutral	17	21.2	21.2	76.2
	4.Strongly agree	12	15.0	15.0	91.2
	5.Strongly disagree	7	8.8	8.8	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.12) explains that difficulty faced during lockdown as sample of respondents. The highest share of the respondents is (43.7%) belongs who were agree in finding difficult to take care of family. The next highest share of the respondents is (21.2%) belongs to the opinion as neutral. The next share of the respondents is (15%) who belongs to strongly agree. The next share of the respondents is (11.3%) were belongs to disagree. The lowest share of the respondent is (8.8%) belongs to strongly disagree in facing difficulties during pandemic of taking care of their family.

Table 13: Do you feel lockdown was the best opinion in this Islands ?

Opinion relating to the lockdown decision		Frequency	Percent	Valid Percent	Cumulative Percent
	1.Agree	21	26.3	26.3	26.3
	2.Disagree	9	11.3	11.3	37.5
	3.Neutral	18	22.5	22.5	60.0
	4.Strongly agree	26	32.5	32.5	92.5
	5.Strongl disagree	6	7.5	7.5	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.13) presents that opinion of lockdown was the best among Islanders as

sample of respondents. The highest share of the respondents is (32.5%) belongs to strongly agree. The next highest share of the respondents is (26.3%) belongs to agree, the next share of the respondents is (22.5%) opinion seems to be neutral whereas, the next share of the respondents is (11.3%) were belongs to disagree, the lowest share of the respondents is (7.5%) who were strongly disagree from the opinion.

Table 14: Did you suffer any kind of physical/ mental abuse during lockdown?

Opinion related to physical/ mental abuse		Frequency	Percent	Valid Percent	CumulativePercent
	1.Yes	21	26.3	26.3	26.3
	2.No	35	43.7	43.7	70.0
	3.Maybe	9	11.3	11.3	81.3
	4.Not prefer to say	15	18.7	18.7	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.14) points out that suffering of physical or mental abuse as sample of the respondents. The highest share of the respondents is (43.7%) who belongs to not affected from any mentally and physically abuse. The next highest share of respondents belongs to (26.3%) belongs who were affected. The next share of the respondents is (18.7%) belongs who were not prefer to say. The lowest share of the respondent is (11.3%) who were in doubt which maybe can happen.

Table 15: Mention what kind of lockdown effect caused you worry impersonally?

Problems caused worry during lockdown		Frequency	Percent	Valid Percent	Cumulative Percent
	1.Education and training Disruptions	23	28.8	28.8	28.8
	2.Forced to stay indoor	27	33.8	33.8	62.5
	3.Inability to seek medical treatment	4	5.0	5.0	67.6
	4.Inabilitytowork	13	16.2	16.2	83.8
	5.Others	13	16.2	16.2	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.15) portrays that lockdown effect various factors responsible which made worry personally as the sample of the respondents. The highest share of the respondents is (33.8%) who belongs to suffered from forced to stay indoors. The next highest of the respondents is (28.8%) belongs that caused disruption in education and training. The next share of respondents is the same (16.2%) were affected from inability to work outdoor and were suffered from other factors. The lowest share of the respondents is (5%) belongs to affected from inability to seek treatment which is the least.

Table 16: What type of work activity do you engaged during lockdown?

Working activity during lockdown		Frequency	Percent	Valid Percent	CumulativePercent
	1.Watching TV	13	16.3	16.3	16.3
	2.Spending time with family members	18	22.5	22.5	38.8
	3.Studying /reading books	14	17.5	17.5	56.3
	4.Surfing internet	17	21.2	21.2	77.5
	5.Others	18	22.5	22.5	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.16) illustrates that work activity during lockdown as the sample of the respondents. The highest share of the respondents is (22.5%) who were spending time with family members and other activity share the same percentage. The next share of the respondents is (21.5%) belongs were busy in surfing internet. The next share of the respondent is (17.5%) engaged in studying or reading books. The lowest share of the respondents is (16.3%) were engaged in watching TV.

Table17:How often do you perform exercise/yoga during lockdown?

Performance of yoga/exercise during lockdown		Frequency	Percent	Valid Percent	Cumulative Percent
	1.Daily	16	20.0	20.0	20.0
	2.Once a week	14	17.5	17.5	37.5
	3.Two to Thrice a week	13	16.3	16.3	53.8
	4.Rarely	20	25.0	25.0	78.8
	5.None of the above	17	21.2	21.2	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.17) denotes that performing exercise or yoga as the share of the respondents. The highest share of the respondents is (25%) belongs to perform exercise/ yoga activity rarely. The next highest share of the respondents (21.2%) belongs who doesn't perform any of the above activity. The next share of the respondents is (20%) belongs who perform the activity daily. The next share of the respondents is (17.5%) belongs who perform yoga or exercise once a week. The lowest share of respondents is (16.3%) belongs who perform twice to thrice a week.

Table 18: Did you experience any kind of mental health disorder during lockdown?

Problems related to mental health disorder		Frequency	Percent	Valid Percent	CumulativePercent
	1.Anxiety/stress disorder	23	28.7	28.7	28.7
	2.Depression/mood swing	26	32.5	32.5	61.2
	3.Difficulty in eating and sleeping pattern	14	17.5	17.5	78.7
	4.Personality disorder	4	5.0	5.0	83.7
	5.Others	13	16.3	16.3	100.0
	Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.18) indicates that mental health disorder during lockdown as the sample of the respondents. The highest share of the respondents is (32.5%) belongs to depression/ mood swing . The next highest of the respondents is (28.7%) belongs to Anxiety / stress disorder whereas the next share of respondents is (17.5%) belongs to difficulty in eating and sleeping patterns. The next share of respondents is (16.3%) belongs to causes other various disorders. The lowest share of the respondents is (5%) belongs to Personality disorder.

Table 19: When do you usually sleep during pandemic days?

Sleeping routine during pandemic	Frequency	Percent	Valid Percent	CumulativePercent
1.Before 9 pm	5	6.3	6.3	6.3
2. 9 pm-10 pm	17	21.2	21.2	27.5
3.10 pm-11pm	19	23.7	23.7	51.2
4.11pm-12 am	28	35.0	35.0	86.2
5.After 12 am	11	13.8	13.8	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.19) emphasizes that usually sleeping time during pandemic days as the sample of the respondents. The highest share of the respondents is (35%) sleeps by 11pm- 12 am. The next highest share of the respondents is (23.7 %) sleeps by 10pm - 11pm. The next share of the respondents is (21.2%) sleeps by 9 pm- 10pm. The next share of respondents (13.8%) sleeps after 12 am. The lowest share is (6.3 %) who goes to bed before 9pm.

Table 20: When do usually wake up during pandemic days?

Routine of waking up during pandemic	Frequency	Percent	Valid Percent	CumulativePercent
1. Before 5am	11	13.8	13.8	13.8
2. 5am -7am	23	28.7	28.7	42.6
3. 7am -9am	33	41.2	41.2	83.8
4. After 9am	13	16.3	16.3	100.0
Total	80	100.0	100.0	

Source: Computed from primary data

Note: (Table.20) conveys the usually waking up time during pandemic days as the sample of the respondents. The highest share of respondents is (41.2%) belongs to who wakeup at 7am-9am. The next highest share of the respondents is (28.7%) who belongs to wake up during 5am- 7am . The next share of the respondents is (16.3%) belongs to wake up After 9am . The lowest share of the respondents is (13.8%) belongs to wake up before 5am.

Findings

Relating to the sample collected female contribution (67.5%) is more than the males which noticed only (32.5%) ensuing to the work portion status the contribution of undergraduate students/ scholar was highest which has (25 %). Age distribution 18 - 28 yrs group and 29- 38 yrs were contributed the same which has (36.3%). Coming to the marital Status highest contribution were given by the unmarried who was the youths i.e. Students/ scholars which marked as (43.8%). Related to educational Qualification the highest marked was the Undergraduate students which was (40%) and (6.3%) noticed uneducated / illiterate.

It has found that the salary distribution the full salary provided to the govt employees which was (31.3%). Whereas, Unemployed has the highest majority which is (32.5%) who was suspended from work. Related to the monthly income of the family 41000-50000 & have highest (42.4%) and least counted whose family earning is more than 51000 which is (7.5%).

Consequently, to the family members in home 4-6 people in one household were noted highest which has (47.5%). Taking care of the family members which were very difficult during Covid lockdown high percentile of the respondent agree from it which is (43.7%). Related to the financial support it was provided by the family members which has noted (43.7%). There upon to the opinion of lockdown in these islands higher percentile of respondents strongly agree which has (32.5%). Relating to physically or mentally abuse among family (26.3%) were affected and

(43.7%) who were not affected which is highest percentile. Related to the lockdown cause worries among the respondents forcing to stay indoors was high in majority noted as (33.8%). It found that activity done during lockdown mostly the respondents were happy to spend time with their family members and do other kind of activities which has (22.5%). Where upon, the infected of the corona virus relatives and friends caused the more which is (32.5 %) among individual and family.

Ensuing to the mental health disorder mostly the respondents suffered from depression and mood swing which has (32.5%). During the pandemic days routine of sleeping times was 11- 12 am has highest (35%) of respondents, and waking up during pandemic days their time was 7-9am (41.2%) highest among the respondents. Related to the performance of yoga and exercise the respondents use to perform rarely which has found highest (25%) among them.

In consonance to the basic amenities available during pandemic days were responded as strongly disagree as highest percentile (37.5%) because the opening timing of shops and groceries items was only for 2 hrs it was not possible for the consumer to buy the items on time which being in limited quantity.

Conclusion and suggestions

Coronavirus has negatively affected the life of people all around the world. The preventive Measures is to maintain the social distance, wearing mask, and regularly handwash. Lockdown leads to reduced levels of physical activity in the general population. Potential detrimental health effects of lockdown, such as psychological distress and physical inactivity have been noticed people became lazier due to which it causes certain health problems. People use to get distress and aggressive because of being locks at home they are restrict from the social activity but this is the only way to protect ourselves from the virus.

On the context of these tribes after the Tsunami of 2004 these tribes won't come under (PVTGs) since after tsunami administration of Andaman and Nicobar Islands has provided them shelter and jobs too excluding the other tribes who still remain isolated. Nicobarese tribes and non - tribes in South Andaman district were provided the beneficial support from municipal council getting ration regularly in contrast to the Nicobar District Nicobarese tribes who faced much problem compare to south Andaman district. They mostly have to depend on ships due to the lockdown these tribes suffered more they were unable to get the food items. Mostly people were stuck in Andaman no ships where available for them to go home who were doing private jobs and students. Though the price of the product were in hike it was very difficult for people to buy their beneficial items Administration has to put some focus on it. Financial support should be provided for tribes so that they can fulfill their requirements during lockdown. And future studies can also be done on the tribals of Nicobar district during lockdown pandemics which would be enlighten and can serious outlook measures.

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A STUDY ON MEASUREMENT OF EMPLOYEE ATTITUDE TOWARDS ORGANIZATIONAL COMMITMENT: AN EMPIRICAL STUDY WITH SPECIAL REFERENCE TO MSMES IN BANGALORE

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ABSTRACT

Every organization hires people coming from diverse backgrounds for some common goal to fulfil them. Studies have been done for establishing a relationship between the attitude of the employees and the commitment they have for their organization for fulfilling the requirements while following the principles and policies. The main aim of these studies is to understand the impact of the attitude of the employees towards the commitment they have for their organization causing additional loyalty. These studies also try to find out if the attitude of the employee s causes job satisfaction that results in organizational commitment. The assessment of these researches indicates that the organizational commitment happens because of the attitude of the employees that causes job satisfaction. Employees who are satisfied in an organization even if they need to face some challenges such as an uncomfortable work environment, lesser pay, etc. give their best. A sample of 160 respondents was surveyed to know reasons for measurement of employee attitude towards organizational commitment and effect of gender on employee's job satisfaction in MSMEs of Bangalore. T-Test and Chi-square test were applied to get the results. It is found that there are different factors that are significantly important for organizational commitment and there is a significant effect of gender on employee satisfaction level in MSMEs.

***Keywords**: employee satisfaction, organizational commitment, job satisfaction*

Introduction

In today's world where every organization is trying its best to employ an extremely efficient labor force for fulfilling the rising demands, some of the attributes such as commitment for the organization, attitude towards the organization can't be identified easily. A lot of organizational models and different studies state the way employees behave in situations that in return help in analyzing the results. The attitude of the employees that's related to job satisfaction as well as organization commitment is of utmost importance for the domain of organizational behaviour and even for practicing HR management practices. The attitude of the employees for overall commitment for their organization is connected directly with employee satisfaction as well as loyalty. Some researchers say that there isn't any prominent evidence for the relationship between commitment and satisfaction, even though most of the researchers consider commitment and satisfaction to be inter-connected. Although employee satisfaction has got maximum attention regarding all the work concerning attitudes, the commitment towards the organization has become recognized increasingly in researches on organizational behaviour. Thus, it's considered that some of the attitudes might reflect the level of satisfaction of the employees while performing their job (**Balamurugan and Dhivya, 2020)**.
Change is effective only when there's a change in the attitude. The only problem is following the change. It's become a prominent aspect of organizational life. Change is a natural phenomenon and it is not possible to control it. It happens when there's some kind of development in climate, technology, or economy. A prerequisite for organization change management is regarding implementation and initiation of successful changes that's important for conducting a systematic and complete process for the transformation of the realities of the organization. For this, the development of leadership has an important role to play since it's the main factor in this process of transformation of the organization which might

explain the move from competitive level to the other one. The attitude towards the change in the organization could be defined as the overall negative or positive evaluative judgment of the employee which is implemented by an organization. It's the internal state which impacts the choices of the individual. It's some of the regularities of the feelings of an individual, his predispositions and thoughts to act for a particular aspect of the environment of the organization he or she is working in (**Kumari, 2016)**.

Literature Review

Organizational commitment has been described widely as one of the key factors regarding the relationship that exists between the organization and the individuals. Some researchers conceive commitment to be an attitude that reflects the quality and nature of the link between the employee and the organization he is working for. It's the identification of the individual with a specific organization and the goals of the organization for maintaining membership for attaining the goals. There are mainly 3 factors of commitment towards an organization that is: firm belief in the values and goals of an organization, the willingness to put in a considerable amount of effort for his or her organization, and a firm desire for maintaining membership within the organization (**Bashir and Long, 2015)**.

Commitment towards an organization is mainly the relative power of the identification of an individual as well as his involvement in some specific organization. It's the affective response that moves way beyond passive loyalty towards an organization. It's the attitude that reflects the quality and nature of the linkage between the employee and his organization. It's the identification of an individual with some specific organization as well as its goals for maintaining the membership for attaining the goals. It's multidimensional and involves the loyalty of the employee towards an organization, the willingness for exerting efforts on behalf of his or her organization, the extent of goal as well as value congruency with his or her organization, and a desire for maintaining the membership. It mainly refers to the willingness of the employee for exerting additional effort in an organization. It's the feeling of commitment and dedication towards the organization that employs him or her, his willingness for working hard, and an intent to be with the organization (**Jordan et.al. 2017)**.

The commitment towards the organization is the feeling of willingness and dedication for going that extra mile and the willingness for staying within the organization. It's the multidimensional concept which offers a comprehensive insight into the relationship between the employees and their work behaviour. It's a factor that helps in promoting the attachment of an individual with his or her organization. In other words, a high level of performance, as well as effectiveness at the organizational and the individual level, are the result of the high level of efforts which are exerted by the employees having a high level of organization commitment (**Aladwan, Bhanugopan, and D'Netto, 2015)**.

Organizational commitment signifies loyalty as well as an intention of staying with the firm, apart from the personal interests for employment. It's the extent to which the employees feel loyal towards a specific organization. Organizational commitment can be a very crucial factor for understanding as well as explaining the work-related attitude of the employees working in an organization. It's quite beneficial for an organization because it helps in reducing the rate of absenteeism and the turnover ratio. The employees who are extremely committed to an organization contribute towards the performance of an organization. It also reflects the attitude of the employees toward the organization where they work (**Calvin and Mabaso,2018)**.

The organizational commitment holds a lot of significance as it's related to work efforts, turnover rate, and absenteeism, it's also concerned with the extent to which the employees identify within the organization. It's the willingness of an individual for dedicating loyalty and efforts towards an organization. It may be described as the main factor within the link between organizations and individuals (**Wang, 2015)**.

There are 3 main components of conceptualization belonging to the organizational commitment. The first one is

affective commitment which refers to a sense of attachment and feelings of affection towards an organization. It's been associated mainly with the work experience, the traits of an individual, and the structure of an organization. Next, is continuance commitment which refers mainly to the consciousness of costs regarding the job or the organization? The employees having an elevated extent of continuance commitment often stay with the organization since they know about the risks, need, sacrifices, and the low options related to quitting the job. Normative commitment mainly refers to the sense of requirements for continuing employment. The employees who have an elevated extent of normative commitment consider that they need to stay within the organization or the job for a longer time. Normative commitment can be defined as the extent to which the individual is associated psychologically with an organization through the process of internalization of its goals, vision, principles, objectives, mission, and values. The employees experience mainly all 3 forms of commitment. Psychological state reflects the 3 components of the commitment towards an organization which develops as a function of different antecedents. They also have implications for their work behaviour. Most of the managers agree to the fact that it's difficult to look for employees having a high level of organizational commitment as well as task performance (**Haque and Aston, 2016)**.

Change can be defined as the process to assess the past for eliciting the current actions which are needed for the future. The variables of change could be defined in a series of interconnected elements. Organizational changes are at forefront of a managerial and academic environment. It shows the diversity of the organization within its environment and even interaction of human and technical activities which had interconnected dimensions within the organization (**Srivastava and Dhar, 2016)**.

It's important to state that a lot of organizations deal mainly with organization changes regularly. The organizations are mainly purposive and goal-oriented entities. Also, their efficiency is to pursue those influences of goals and quality of life and also the ability for surviving. These unexpected changes would create a lot of cynics who don't really agree with this decision and also feel disrespected. The leader needs to understand that respect that isn't something that can be imitated, but something that you should embody. As such, the managers need to consider a consultation with the employees during this kind of major change (**Anitha and Begum, 2016)**.

The significance of attitude for understanding the psychological phenomena was assigned a formal recognition at the early stages in the history of social psychology. Right from the time of the entry of the concept into the language of psychology till now, the interest in the attitude grows and is also strong. However, in past few years, the attitude has been studied with the help of different methods and emphasis. It's important to precisely define the attitude since several papers have given the description. Some papers define attitude in 2 ways, operational and conceptual. There's a lot of difference in the conceptual definition given for "Attitude" and divergent viewpoints regarding the whole concept have been developed. Attitude is mainly a neural and mental state for the readiness which is organized mainly through experience and exerts directives or the dynamic influence on the response of the individual for all the situations and the objects (**Affum-Osei1, Acquaah, and Acheampong, 2015)**.

Some researchers also define attitude as an evaluative statement and could be either unfavourable or favourable concerning the events, people, and objects. Thus, they reflect the way an individual feels regarding something. Some favourable statements give a positive effect regarding concerned objects, events, or persons whereas the unfavourable statements might give a negative impact. Attitude is a negative or positive feeling or the mental condition for learned, organized, and readiness through experience which exerts particular influence on the response of the individual for people, situations, or objects. The definition has a few implications for the managers too. Firstly, the attitude is learned. Next, attitude defines the predispositions of an individual towards the given attributes of the entire world. Third, attitude provides an

emotional base of the interpersonal relationships of an individual and the identification with the other members. Lastly, attitude is organized and is closed to the core of the personality of an individual. Some of the attitudes are enduring as well as persistent, and still like every psychological variable, the attitude might change. Some researchers state that employee satisfaction is considered to be the extent to which an individual is fulfilled and gratified by the work he or she is doing (**Haque, Fernando, and Caputi, 2019)**.

Objectives of the Study

1. To find the reasons for measurement of employee attitude towards organizational commitment
2. To ascertain the significance of the reasons for measurement of employee attitude towards organizational commitment
3. To know effect of gender on employees' job satisfaction in MSMEs of Bangalore.

Hypothesis of the study

Ho1: There is no effect of gender on employee job satisfaction in MSMEs

Ha1: There is a significant effect of gender on employee satisfaction in MSMEs

Research Methodology

The present study is descriptive in which the reasons for measurement of employee attitude towards organizational commitment have been studied. The sample size of the study is 160. The data were collected with the help of a structured questionnaire on a five-point scale and analyzed with the help of the mean values and t-test.

Table1 Demographic profile of the respondents

Variables	**Number of respondents**	**%age**
Gender		
Male	84	53%
Female	76	47%
Total	**160**	**100%**
Employees attitude plays an important role in the success of the organization		
Yes	106	66%
No	54	34%
Total	**160**	**100%**
Employee satisfaction depends on		
Salary	55	34%
Work environment	41	26%
Incentives	33	21%
Work timings	31	19%
Total	**160**	**100%**
How do satisfied employees contribute to their organization?		
Perform well	69	43%
Help colleagues with their work	42	26%
Voluntarily take up additional responsibilities	49	31%
Total	**160**	**100%**

Table 1 presents the demographic profile of the respondents on the measurement of employee attitude towards organizational commitment. There are 53% males and 47% females in the study. Among the respondents, 66%believe that an employee's attitude plays an important role in the success of the organization and 34% believe that it does not. 34% of the respondents think that employee satisfaction depends on salary, 26% think that it depends on the work environment, 21% think that it depends on incentives and 19% think that it depends on work timings. 43% of the respondents think that satisfied employees contribute towards

their organization by performing well, 26% think that they contribute by helping colleagues with their work, and 31% think that they contribute by voluntarily taking up additional responsibilities.

Table 2 Mean Value of the measurement of employee attitude towards organizational commitment

Sr. No.	Factors for measurement of employee attitude towards organizational commitment	Mean Score
1.	It is important for the employees to be satisfied for making the organization successful	4.19
2.	Satisfied employees often overlook the shortcomings such as difficult work environment	4.09
3.	Commitment is the force that drives the employees to be loyal to their organization	4.11
4.	Employees who have a high organizational commitment are difficult to find	4.05
5.	Change is something that every organization experiences regularly	4.08
6.	Salary is not the only thing on which the satisfaction of employees depend	4.15
7.	Employees need constant motivation to perform well	4.12
8.	Appreciation is one of the biggest motivational factors which impacts employee performance	4.02
9.	Organizational commitment is beneficial for the employee as well as his organization	4.13
10.	Satisfied employees are an asset to an organization	4.07

Table 2 shows the opinions of the respondents. It is observed that it is important for the employees to be satisfied for making the organization successfulwith the mean value of 4.19. It is followed by Salary is not the only thing on which the satisfaction of employees depends (4.15), Organizational commitment is beneficial for the employee as well as his organization (4.13),Employees need constant motivation to perform well(4.12). FurtherCommitment is the force that drives the employees to be loyal to their organization (4.11), Satisfied employees often overlook the shortcomings such as difficult work environment (4.09), Change is something that every organization experiences regularly (4.08), Satisfied employees are the asset for an organization(4.07) and Employees who have a high organizational commitment are difficult to find (4.05) were also considered important. Reasons like Appreciation is one of the biggest motivational factors which impacts employee performance (4.02) were also viewed as important.

Table 3

Sr. No.	Factors for measurement of employee attitude towards organizational commitment	Mean Score	t-Value	Sig
1.	It is important for the employees to be satisfied for making the organization successful	4.19	8.542	0.000
2.	Satisfied employees often overlook the shortcomings such as difficult work environment	4.09	6.869	0.000
3.	Commitment is the force that drives the employees to be loyal to their organization	4.11	6.926	0.000
4.	Employees who have a high organizational commitment are difficult to find	4.05	5.334	0.000
5.	Change is something that every organization experiences regularly	4.08	5.903	0.000
6.	Salary is not the only thing on which the satisfaction of employees depend	4.15	7.461	0.000

7.	Employees need constant motivation to perform well	4.12	7.394	0.000
8.	Appreciation is one of the biggest motivational factors which impacts employee performance	4.02	6.859	0.000
9.	Organizational commitment is beneficial for the employee as well as his organization	4.13	7.552	0.000
10.	Satisfied employees are an asset for an organization	4.07	6.877	0.000

Table 3 shows the results of the t-test. It is found from the table that the significance value for all the statements is below 0.05, hence all the statements regarding the measurement of employee attitude towards organizational commitment are significant.

Table 4: Effect of gender on employee's satisfaction level

Gender	Satisfaction level			Total
	Low	Moderate	High	
Male	11	26	47	84
Female	39	21	16	76
Total	50	47	63	**160**
Value of Chi-square				31.1437
Degree of freedom				2
p value				0.00

Table 4 shows the effect of gender on employee satisfaction level in MSMES in Bangalore. It is found from the table that the p-value is below 0.05 (.000) which is the significant value, hence null hypothesis was rejected and alternate hypothesis was accepted.

Suggestions

The findings of the study provide suggestions to the organizations to address the issues of their employees. They are suggested to provide organizational support to their employees while introducing and implementing any new change in the organization. It is important for the organization to keep their employees satisfied to have their positive attitude towards organizational commitment. The study also suggests that the organization need to motivate their employees by providing them job security, offering them promotions and creating a healthy and positive work environment. All the above approaches will definitely lead the organization towards success and have the employees with positive attitude towards organizational commitment.

Conclusion

Managers might have to adopt a few approaches for handling organizational changes. The dominant culture that exists in the organization might not be that complex as the weak culture or subculture in the organization. It poses the biggest challenge in front of the managers for introducing changes keeping in mind the rapid growth in the present business environment. A change includes people, treating and handling them is crucial for addressing the changes within the organization. Job security may be considered to be a very potent tool that motivates the employees. Studies prove that employees often have a very negative attitude toward it. Management might make its employees understand that they're a partner in their business and the organizational life of the employees depends on constructive contributions that are made by these people. Only a few of the employees are happy and satisfied with their organization.

The study concludes that there are different factors such as employee satisfaction, commitment, loyalty, changes in organization, salary, motivation, appreciation that measures the employee attitude towards organizational commitment and it is found that all the above factors are significantly important for organizational commitment. It is also found that there is a significant difference between the satisfaction level among male and female employees in MSMEs.

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DEVELOPMENT AND PATTERN OF GUJARAT AGRICULTURAL SECTOR (1960 TO 2016-17)

Y.N. Vansiya

ABSTRACT

Indian economy can be broadly divided into three sectors i.e. Agriculture, Industry and service. If we look at the history of any economy of the world, we can find that the agriculture sector is common in their economic development. If we look at the Indian economy the agricultural sector plays a very significant role in economic development as well as social development. In India, the importance of agriculture arises out of the position of agrarian sector which occupied vital role in the context of overall economic growth of the nation. Agriculture, being the largest sector of the economy, plays a crucial role in the economic development of the country through providing food, raw material, and employment to the nation. In the present research paper, it's make a humble effort to study the status of agriculture and agricultural growth pattern in Gujarat. Besides that it can be also known that the development of the states goes in which direction and can be observed that which problem has still remained unsolved. The statistical information or data used in the study is mostly based on secondary sources. The majority of the reports published by the Government of Gujarat have been used in the present research study. The present research paper divided into three parts. First is the methodological part, second is focus on Gujarat agricultural performance and third part focus on important policy suggestions.

***Keywords**: Agriculture, Development, Gujarat*

Introduction

Agriculture has been the backbone of the economy for countries like India. If you study other countries in the world, agriculture has contributed significantly to the economic development of the many countries. After 1870 Japan in the Miazi era, after 1920 Taiwan, Mexico, and after 2nd World War countries such as China, India, Sudan, Israel, Turkestan, Brazil, Thailand and for many more countries agriculture sector give significant contribution for economic development. Like the country of Japan has turned the industrial revolution by placing high taxes on agriculture. The history of the world is witnessed by the fact that agriculture has contributed significantly to economic development. Successful progress in the agriculture sector in various states of India has been achieved during the year. Agriculture has contributed significantly to states like Gujarat. One famous Proverb 'Uttam Kheti, Madhyam Vyapar ane Kanisht nokari' (Excellent farming, medium business, and Inferior service) is no longer found to be true in a state like Gujarat. In the current period, the definition of development has taken a big turn. The current growth of the development seems to have left behind the concept of sustainable development. In the present research paper, it's make a humble effort to study the status of agriculture and agricultural growth pattern in Gujarat. Besides that it can be also known that the development of the states goes in which direction and can be observed that which problem has still remained unsolved.

Objective of the Study

1) To study the changes in the cropping pattern in Gujarat since 1960
2) To check the trends of agricultural production and productivity in Gujarat.
3) To study agricultural inputs and the development of irrigation
4) To check the landholding pattern in Gujarat.
5) To study the development of animal husbandry sector and problems related to it.

Research methodology and data collection

In the present research study, researcher has effort to check the changes in various aspects of agriculture in Gujarat. The statistical information used in the study is mostly based on secondary sources. The data is collected from various reports of Government of Gujarat, various websites etc. For present paper, researcher has used EXCEL software to analyse data and examine the various objective of the study.

Agricultural Development and its Pattern in Gujarat

Agriculture has been an important place in the economy of Gujarat since ancient time. Based on resent Gujarat's Social Economic Review, the contribution of the agricultural sector to

Gujarat's total domestic production is around 13%, and the contribution of agriculture in the employment sector is around 49.6%. Therefore, agriculture is an important place in the employment sector in the state. With the development of agriculture, the changing picture of agriculture and the contribution of the changing times of agriculture in the total household product are very interesting. Studies on the development of agriculture and its allied sector in Gujarat have shown that during the last decade, the growth rate of agriculture has been well-corrected. If we compare agricultural sector growth rate in Gujarat and India than we found that Gujarat agricultural growth rate is higher than India's growth of agricultural sector. The high productivity of non-edible crops in the state has contributed significantly to the state's agricultural development. Gujarat is known as the leading state in the production of vegetables, as it is the forefront of crops such as groundnut, castor, etc.

Cropping Pattern in Gujarat

The effect of the Green Revolution has also been seen in Gujarat, **(which is seen as a result of the green revolution in Gujarat,)** with major changes in cropping pattern along with farm productivity. Cropping pattern means the change in the areas covered under different crops during a certain period. The total area of Gujarat is 1,96,244 km. In which 1,88,840.46 sq.km. covered under Rural area and remaining 7,403.54 sq.km are Urban areas. Approximately 55 percent of the total area is found under the plowing. The total operational area of Gujarat is 9898466 hectares.

In Gujarat, crops such as Groundnut, Cotton, Sugarcane, Oilseed, Isabgul, Tobacco, Vegetables, Fruits and cash crops are taken. Changes in cropping pattern in Gujarat during 1980 to 2016-17 are shown in the below table.

The Area Under Major Crops in Gujarat from 1980-81 to 2016-17 ('000 hectare)

Crop	1980-81	1985-86	1990-91	1995-96	1999-2000	2010-11	2016-17 (@)
Rice	575	585	623	726	720	808	837
Wheat	617	507	609	592	518	1589	997
Jowar	1092	1134	697	490	304	126	103
Barrels	1502	1506	1394	1328	2254	872	431
Corn	313	309	366	415	446	566	450
Total Grains	4324	4213	3800	3634	3207	4014	2825
Tuvar	287	360	429	387	369	277	347
Gram	70	88	130	90	77	176	164
Total Pulses	794	870	949	877	792	890	942
Total Grains	5118	5083	4749	4511	3999	4905	3800
Peanut	2179	1868	1826	1871	1849	1922	1760
Total Oilseed	2651	2492	2818	2912	2864	3110	2771
Cotton	1566	1451	1042	1517	1611	2623	2382
Tobacco	131	129	142	134	142	148	168

Source: Directorate of Agriculture, Gujarat State, Gandhinagar.
@= Fourth Advance Estimate

In the year 1980-81 to 2016-17, the area covered under the production of cereal crop shows that area of rice, wheat and maize has increased, whereas areas under Juwar and Bazar have decreased. The area under the production of rice was increased from 575,000 hectares to 837,000 hectares during 1980-81 to 2016-17. According to the percentage, to the area under total grains cultivation has increased from 13.30 percent in 1980-81, 29.63 percent in 2016-17. The area under production of Juwar was 25.25% in the year of 1980-81, where it was 3.65% only in 2016-17, which shows a significant decrease in this crop area. The area under cereal was 34.74 percent in 1980-81, which was 15.26 percent in 2016-17.

in compare to 1980-81 to 2016-17, there has been expansion trend observed in the case of area under cover for pluses crop. The increased percentage in area the under a crop of Tuvar is found to be higher than area under the Gram crop. The area under groundnut has decreased during the year 2016-17 compared to the year 1980-81. There is constant increasing trend found in the area under cotton and tobacco crop. The present results show that farmers in Gujarat have turned towards cash crops.

Before the year 1980-81, it was almost improbable to bring a changes in cropping pattern in Gujarat. But after that due to weather, provision of irrigation, agricultural production value, new technologies, seeds, fertilizers, Changes in the equipment and government policy (subsidy) etc… have led the changes in the cropping pattern. ***Dr. Arun Patel*** has studied cropping patterns of Gujarat, and according to the findings of his studies, the area under cultivation has decreased during the period 1950-55 to 1989-94. The area under crops such as wheat and rice has increased. In the present time, almost no such picture is received. Researcher has found the decreasing trend of area under grain crops in Gujarat as well as in India also, it seems, that the magnitude of the decline in area of Gujarat is faster than India. As well as in the additional context of cash crops, it is also shows that the increase area in Gujarat is more intense than the rate at which India rises. The results indicate that in Gujarat the farmers are rapidly adopting recent technological changes occurred in the agricultural sector.

Agricultural Production and Productivity in Gujarat

The true picture of agricultural development can be found basis on farm productivity. Growth in agricultural production can also be basis on land, but when it increases agricultural productivity, it can be said that agricultural growth in real terms has been increased. India's agricultural productivity is much lower than many countries in the world. Various states of India have also seen large inequality in terms of farm productivity. The various factors like population ratio, non-economic plowing factors, land ownership practice (land holding), agricultural finance, agriculture marketing, communication facilities, animal husbandry, use of machines (new technology), irrigation facilities, use of chemical fertilizer and pesticides, etc. are responsible to affect farm productivity.

Generally, farm productivity in Gujarat has good enough as in the comparison of other states in which the factors affecting like good monsoon, good facility for irrigation, fertile land etc. are responsible. A detailed information related to farm production in different crops during the year 1980-81 to 2016-17 is given in below table.

Production of Major Crops in Gujarat from 1980-81 to 2016-17 ('000 tons)

Crop	**1980-81**	**1985-86**	**1990-91**	**1995-96**	**1999-2000**	**2010-11**	**2016-17** (@)
Rice	681	550	991	1093	1043	1666	1929
Wheat	1276	887	1296	1232	1077	5013	2743
Jowar	687	420	387	304	243	139	145
Barrels	1227	713	1091	1172	982	1501	931
Corn	400	109	515	428	587	978	801
Total grains	4438	2762	4359	4287	3992	9349	6600
Tuvar	233	264	365	278	297	273	401
Gram	54	45	80	54	39	200	183
Total pulses	520	385	624	486	446	722	818
Total grains	4958	3147	4983	4774	4438	10071	7418
Peanut	1616	473	983	1032	733	3575	2944
Total oilseed	2005	964	2044	2212	1826	5142	4568
Cotton (**)	1738	2122	1531	2408	2146	9825	5042
Tobacco	191	204	244	216	260	281	271

Source: Directorate of Agriculture, Gujarat State, Gandhinagar.

Production of Major Crops in Gujarat from 1980-81 to 2016-17 ('000 tons)							
Crop	**1980-81**	**1985-86**	**1990-91**	**1995-96**	**1999-2000**	**2010-11**	**2016-17** (@)
@= Fourth Advance Estimate, ** = In 'ooo bales of 170 kgs. each.							

Though the development of Gujarat is generally more towards non-agriculture, even though Gujarat has achieved such a good development in the field of agriculture due to availability of perennial rivers (barmasi nadi) in Gujarat. Regarding agriculture production, it is found that rice and wheat production in Gujarat has increased considerably during the years 1980-81 to 2016-17. It has observed that the production of wheat is increased in doubled proportion and production of rice is increased in triple proportion. On the other hand, Juwar and Bajra production found declined trend during this period. Production of maize has doubled in present time period. Production of Rice, Chickpeas, Groundnut, Cotton and Tobacco has increased significantly during 1980-81 to 2016-17.

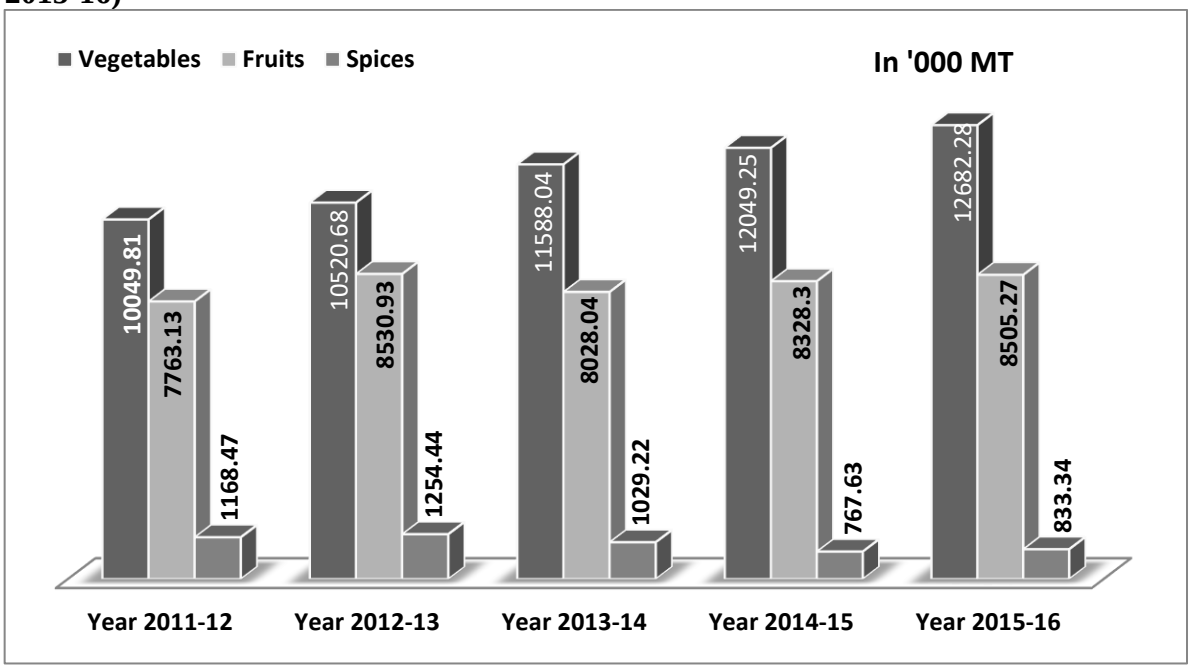
Apart from this, the contribution of Gujarat to the total production of Castor is notable, it is 67 percent that is estimated 80 percent of the country's Castor is produced in Gujarat. Gujarat produces 35 % of the Isugbul in the context of world's total production. The production of groundnut in Gujarat is about 27% of the country's total groundnut production. Production of peanuts is higher in Junagadh, Jamnagar, Bhavnagar, Amreli and Rajkot. In the production of Sesame also, Gujarat is at the top of the country. The demand for Sesame seeds and its produce is very high in the country like America, South Korea, Turkey, Holland and China. Gujarat is in the eighth position in the production of fruits in the country, banana and Chikoo are grown in Gujarat, and these are the important crops of the south Gujarat region. Gujarat occupied first rank (with 27% share) in the production of cotton as well as second and third rank in the production of chikoo and banana respectively in India. Gujarat has contributing about 3% of the total Tobacco production in the world. Gujarat produces about 302,000 metric tonnes of edible masala crops each year. Surendranagar, Bhavnagar, Vadodara, Amreli, Bharuch, Mehsana and Ahmedabad are the major cotton producing districts in Gujarat.

In Gujarat has achieved great success in productivity and production of cotton and its quality is mainly due to BT Cotton and indigenous BT cotton seeds . Farmers of Gujarat are master for preparing seeds for higher yielding. In particular, the farmers of Saurashtra adopt restricted varieties of indigenous BT. In other varieties of Cotton, the production has started in good proportion. Indigenous BT Cotton seeds are available in the price of fourth time lower than the foreign company's prices and because of use indigenous BT cotton seeds, the cost of pesticides is also reduced. It has been notice that Indigenous BT Cotton seeds have been also used in other states like Maharashtra, Madhya Pradesh, Punjab, Haryana, Rajasthan and Karnataka.

In Gujarat, there has been a large increase in the production of horticultural crops, the cultivation and production of horticultural crops in the state is increasing. "Gir Kesar Keri" (Mango) and "Kutchi Kharek" have a unique identity of the country. Gujarat State is known for its production and productivity of Jimmy, Furnal and Isabgul. In Furnal 90% of the country's production produce in Gujarat state. With the efforts of farmers, Gujarat produces as much as to take pride in the productivity of onions and Potatoes. Gujarat is the most productive state in India with Onion (25 MT / ha) and Potato (28.81 MT / ha). Some farmers of the state have achieved significant achievement in Potato productivity (87 MT / ha), which is the highest in the world. In the production of Bananas, Papaya and Lemon, Gujarat is occupied second rank in the rest of the country.

The estimated production of horticultural crops in the state of Gujarat in the last decade has been shown by the below chart.

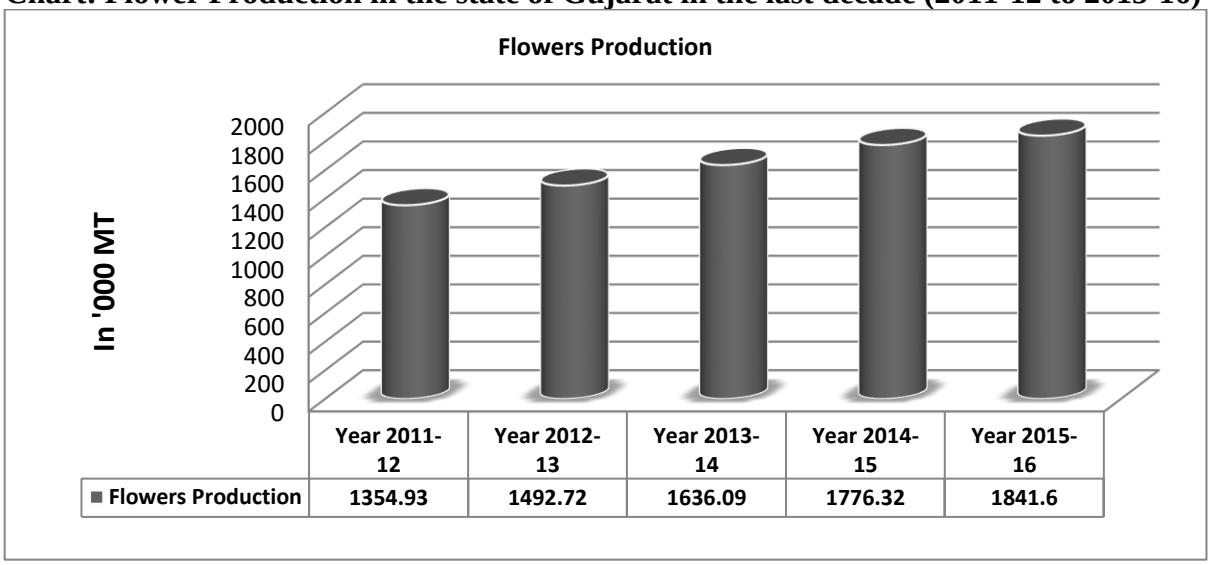
Chart: Production of Horticultural crops in the state of Gujarat in the last decade (2011-12 to 2015-16)



As per the above chart, production of total horticultural crops increased during the year 2010-11 to 2015-16. The above chart shows the production of Vegetables, Fruits and Spices. While the production of vegetables has increased significantly, on the other hand the production of Fruits has increased slightly and Spice production has declined during the year 2015-16 in compared to 2011-12.

In the state of Gujarat, last ten years of Flower production result are given below.

Chart: Flower Production in the state of Gujarat in the last decade (2011-12 to 2015-16)



Data shows in above chart that the flower production in Gujarat is found increasing trend from the year of 2011-12 to year 2015-16. It indicates that Gujarat farmers are inspired to produce flower crop. It is also indicate that the cropping pattern in going to be change during last decade.

The Development of Agricultural inputs in Gujarat

Agricultural inputs have the major role in agricultural development and to increase

agricultural productivity and production. Agricultural inputs include Pesticides, Irrigation, Electricity, Technology, Finance, Chemical fertilizers, etc., in which Chemical fertilizers are an important tool. Agricultural technology can be successfully utilized by the agriculture inputs, and it plays an important role in reducing the food problem, as well as the expansion in agricultural exports. In this part of the study here, we discuss in detail about the use of Chemical fertilizers in Gujarat. In the below table, the changes made to Chemical fertilizers in Gujarat from the year 1960-61 to 2016-17 are indicate.

Chemical Fertilizers use in Gujarat from 1960 to 2017 (in tons)				
Year	**Nitrogen (N)**	**Phosphorus (P_2O_5)**	**Potassium (K_2O)**	**Total (NPK)**
1960-61	7386	3524	161	11071
1970-71	105711	51923	6646	164280
1980-81	204125	117224	35519	356868
1990-91	430746	217147	58493	706386
2000-01	498963	195671	56006	750640
2010-11	1241221	517999	179941	1939161
2016-17	1143488	340062	120902	1604451
Source: Source: Directorate of Agriculture, Gujarat State, Gandhinagar. **Note : Total may not tally due to rounding off.**				

The above data shows that the use of Nitrogen, Phosphorus and Potassium has increased significantly in the years 1960-61 to 2016-17. In Gujarat, there has been a huge increase in the use of Chemical fertilizers in the last decade. Use of Chemical fertilizer is important for proper synthesis with other farm production inputs. At present, some discussions about the use of Chemical fertilizers have been taken place, especially in discussion about the effect on health and other health issues by its use. On the other hand, there is a rise in the class of people who are not promoting Chemical fertilization, known as Organic Farming (Samposhit Krushi), and a class of society which is increasing the consumption of organic farm produce.

Land use and land use pattern in Gujarat

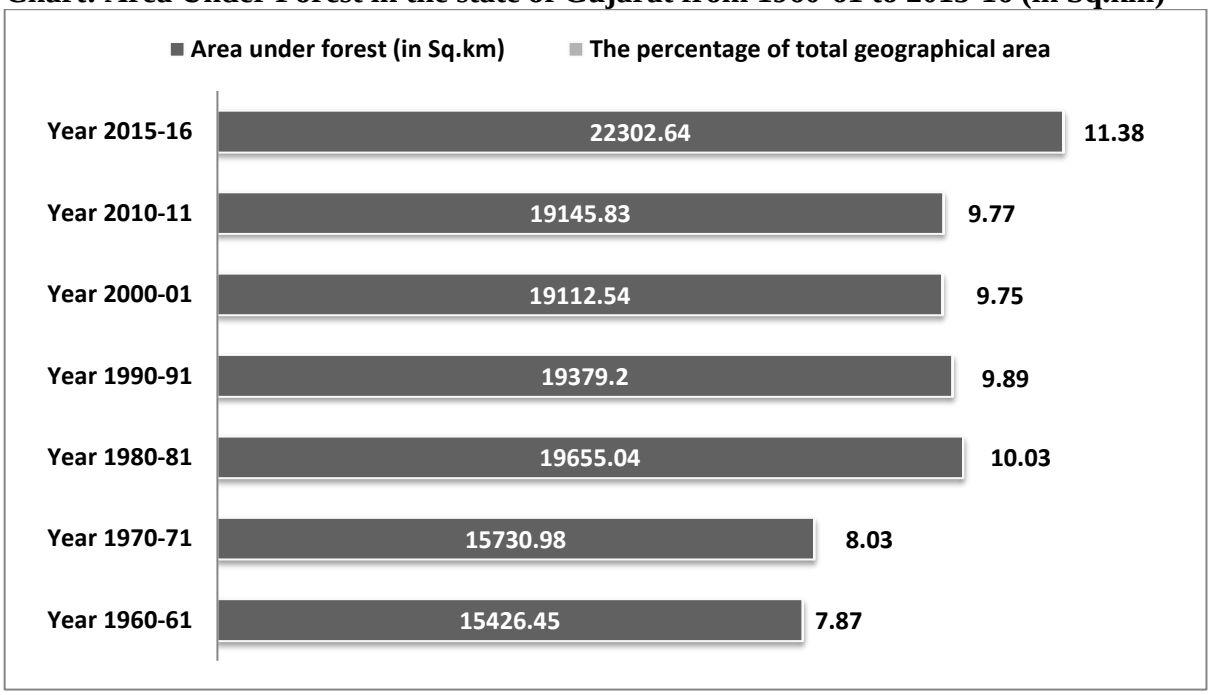
Regarding the development of agriculture, study of land use patterns becomes important. Land use pattern affects geographical factors, economic factors, political factors and technological factors. Generally, the use of production tools makes it more important to get the maximum output. Land is an important tool in the field of agricultural production. Land use classification is done under various sections. In Gujarat, there are very noticeable results of study of land use and its patterns.

Land use Pattern in Gujarat Year 2008-09 (area in thousand hector)		
Land Use (2008-09)	**Area (thousand hector)**	**Percentage**
Total Geographical Area	19602	NA
Area under Land use	18866	100.0
Area under the Forest	1833	9.72
Area under non-farming	3758	19.92
Permanent Pasture and other Grazing Land	853	4.52
Tree Crops and Ground under Grasses	4	0.02
Cultivable Costly land	1976	10.47
Excluded Paid Land	19	0.10
Current Land	623	3.30
Net Sown Area	9801	51.95
Source: India State of Forest Report, 2011; **Land Use Statistics, Ministry of Agriculture, GOI, 2008-09; Area is in thousands Hectares (ha)		

Studies on land use in Gujarat seem to be found in areas under the most extensive area is Net Sown Area, but time being the decreasing trend has been found. Appendix -1 indicate the Land Utilization Pattern in Gujarat from 1984-85 to 2014-15 in '000 hectares. Data shows that Area under non- agricultural uses is increase, Barren and uncultivable land is slide decreases, Permanent pasture and grazing lands is almost remain same, Land under misc. tree crops and groves not included in net area sown is slightly decreases, same trend found in Cultivable waste land, it has found that Current fallow land is rapidly decreases during the year from 1984-85 to 2014-15.

changing trend of forest area in Gujarat from the year 1960-61 to 2015-16 is mentioned in below chart.

Chart: Area Under Forest in the state of Gujarat from 1960-61 to 2015-16 (in Sq.km)



In Gujarat, the area under the forest has been found to be 10% which is very tenacious. Environmentalists said that any country or region should have minimum 33% forests areas, so that the ecological balance remains undamaged. Gujarat forest area is found 50 % less in compare to India, inequality in forest area in various districts of Gujarat has also observed. Collective efforts of Gov. of Gujarat, NGOs and people of the state are required to improve the current situation.

Land Holding Pattern in Gujarat

Land is an important tool for getting economic, social and political status, in developing countries like India, land is an important tool for production. Land ownership can be private, public, cooperative or institutional also. Land acquisition is associated with land holding (ownership). Exposition in population, government policy, urbanization, expansion of industrialization, nuclear family concept, farmers' indebtness etc…factors are increased the proportion of small and marginal farmers in the state. The details of changes in Land holding in Gujarat in the last decade have been observed in the below table.

Types of Farmers and Land holding Pattern in Gujarat from 2005-06 to 2010-11				
Type of Land Holding	**2005-06**		**2010-11**	
	Numbers ('00)	**Area** ('00 hectare)	**Numbers ('00)**	**Area** ('00 hectare)
Marginal farmer (less than 1	1585042	792149	1815634	884823

Types of Farmers and Land holding Pattern in Gujarat from 2005-06 to 2010-11				
Type of Land Holding	**2005-06**		**2010-11**	
hectare)				
Small farmer (1 to 1.99 hectares)	1345348	1959288	1429021	2074884
Half-medium farmer (2 to 3.99 hectares)	1080611	3004213	1079533	2988660
Medium Farmer (4 to 9.99 Hectares)	582229	3380443	512651	2930432
Large farmer (more than 10 hectare)	67784	1133171	48771	1019668
Total Holding	4661014	10269264	48856	9898466
Source: Agricultural Census-2005-06 & 2010-11, Revenue Dept., Gandhinagar. P.10				

According to the Agriculture Census, 2010-11, the total geographical area of the state is about 196 lakh hectares. Out of the total geographical area, 99.66 lakh hectares is under net cultivation area, which is 50% of the total geographical area. The total land holders in the Gujarat state are 48.86 lakh, who have agricultural land with an average of 2.03 hectares. Out of the total land holders, 37.16 percent marginal farmers, 29.25 percent small farmers, 22.10 percent semi-moderate farmers, 10.49 percent middle farmers and 1.00 percent are large farmers.

Types of Farmers and Land holding Pattern in Gujarat from 2005-06 to 2010-11				
Type of Land Holding	**2005-06**		**2010-11**	
	Numbers ('00) in %	**Area** ('00 hectare) **in %**	**Numbers ('00) in %**	**Area** ('00 hectare) **in %**
Marginal farmer (less than 1 hectare)	34.0	7.7	37.2	8.9
Small farmer (1 to 1.99 hectares)	28.9	19.1	29.2	21.0
Half-medium farmer (2 to 3.99 hectares)	23.2	29.3	22.1	30.2
Medium Farmer (4 to 9.99 Hectares)	12.5	32.9	10.5	29.6
Large farmer (more than 10 hectare)	1.5	11.0	1.0	10.3
Total Holding	100.0	100.0	100.0	100.0
Source: Agricultural Census-2005-06 & 2010-11, Revenue Dept., Gandhinagar. P.10				

As compared to the year 2005-06 to the year 2010-11, there is constant increase in the number of marginal farmers and small farmers, whereas half middle farmers, middle farmers and large farmers have got declining trend are found.

Category-wise average size of holdings in 2005-06 and 2010-11 in Gujarat		
Type of Holding	**Average size of holdings (in hectare)**	
	2005-06	**2010-11**
Marginal farmer (less than 1 hectare)	0.500	0.49
Small farmer (1 to 1.99 hectares)	1.46	1.45
Half-medium farmer (2 to 3.99 hectares)	2.78	2.77

Medium Farmer (4 to 9.99 Hectares)	5.81	5.72
Large farmer (more than 10 hectare)	16.72	20.91
All Size Classes	2.2	2.03
Source: Agricultural Census-2005-06 & 2010-11, Revenue Dept., Gandhinagar. P.11		

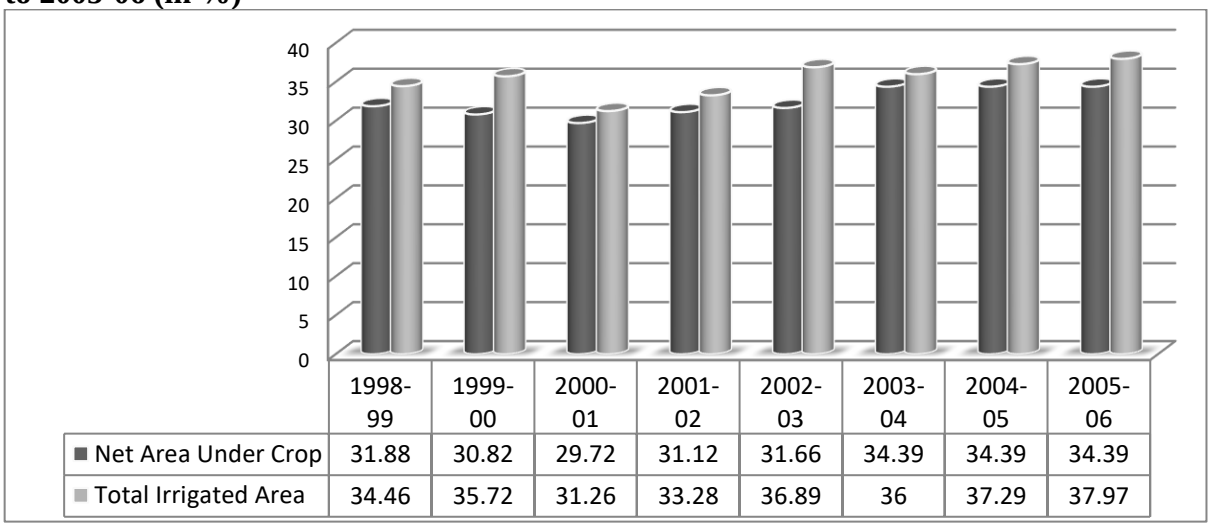
It has been noted that the proportion of small farmers has increased but the total average land holding area has been decreased, that's indicating that the average land holding of marginal and small farmers have declined, the same picture has been observed in the case of marginal farmers. Data also shows that day by day land is divided in very smaller part. It's also indicating that marginal and small farmer's economic condition is going worst in future. It has been also observed from the data 11 percent of the big farmers having 40% of the total land holding that indicates high level of inequality prevails in the state.

Irrigation Development in Gujarat

Irrigation is an important place in various agricultural inputs, irrigation is the only one that can bring a major change in agricultural productivity. Irrigation facilities are found in the origin of the success of the Green Revolution, the important human achievement of agriculture of the 20th century. In India, irrigation facilities were available to 18% of the area in 1950-51. In the year 2015-16, the total irrigated area is 46.93 percent.

The difference has been found in the irrigated areas amongst all districts of Gujarat due to different geographical conditions of the state. Below chart indicates the net area under crop and total irrigated area in the state of Gujarat from 1998-99 to 2005-06.

Chart: Net Area Under Crop and Total Irrigated Area in the state of Gujarat from 1998-99 to 2005-06 (in %)



	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Net Area Under Crop	31.88	30.82	29.72	31.12	31.66	34.39	34.39	34.39
Total Irrigated Area	34.46	35.72	31.26	33.28	36.89	36	37.29	37.97

Data shows that in Gujarat total irrigated area is increasing from 1998-99 to 2005-06, but the improvement are found very less and also its shows that it is not higher than national average. Now a day Gujarat is known as a growth model of India, but on the context of irrigation facility in Gujarat is found very poor, and because of low irrigation facility, the total agricultural production is lower in many crop as compare to others state.

The Development of Animal husbandry in Gujarat

Economic liberalization and globalization have become the accepted policy of our government. In this context, serious challenges have been arisen in the dairy industry. The important thing is that we cannot stay dormant. Instead of looking at private businessmen, private companies or corporates and governments, we should see that what can we do which can lead the development of dairy farmers along with dairy development in the true sense?. In

Gujarat, about 43 lakh families received direct and indirect income through animal husbandry business. According to the 2011-12, the production of livestock is about Rs.141 billion in current prices, of which 86% or 122 billion of milk is found. Total SGDP of Gujarat in 2011, the share of its ancillary sector with animal husbandry was 5%. Considering only agricultural sector and its allied sector, the share of the animal husbandry sector is 23%. Gujarat has the prominent place in milk production. In 2014-15, the milk production in the country remained at third place with 116.91 lakh metric tonnes in the country. During the last decade, Gujarat has registered an average growth rate of 7.33% in milk production.

The livestock count the year of 2007 its shows that the livestock population is 23.5 million in Gujarat dictates an increase of 8.8% in the 2003 livestock census. The number of indigenous animals is 3.5 million, the amount of crossbrid is 0.9 million, and the amount of buffaloes is 7.8 million. In Gujarat, Banaskantha district has the highest in case of milk productivity of cows and buffaloes as well as Sabarkantha and Mehsana get second and third rank respectively in the state.

Besides Dairy industry has facing some challenges in the state, particularly, political interventions are widely seen at every level of dairy sector. Economic uplift in villages and changes in the developmental approach of people as well as still today private traders and private dairy exists in milk trade sector. There are a good number of animals in the country but in the milk productivity per animal we are far behind from other nations. Farmers and ranchers are illiterate and because of that they are not aware of milk productivity and they do not adopt the strategy to increase milk productivity. The strategy of the farmers in the Indian dairy industry is that majority of people's selection is not towards keeping the hybrid cows but the domestic (Desi) cows and buffaloes.

Gujarat is the pioneer of the White Revolution. Gujarat has achieved the sixth place in the total milk production of the country. In Gujarat, the animal husbandry business has provided employment to every class of society and has been an important source of income for the poor families of Gujarat. Gujarat has rich treasure among the various indigenous pure regional castes, including the Gir and the Kankrej species. Buffaloes of Mehsani, Surti, Jafrabadi breed, sheep of Marwadi and Patanwadi breed; Goats of Siroh, Surti, Mehsani, Kuchchi, Gohilwadi and Jalawadi ; Kutchi and Kharai Camels, Kathiawadi breed based horses etc… As per 2012 livestock counting Gujarat has 27128200, which is 5.30% of India's total livestock population.

Potential of Gujarat

Gujarat state has opportunities and capacity to development to agricultural sector, because Gujarat state has many advantages like….

- State has 1600 Km long coastal belt
- Diversified Crops and Cropping systems
- Climatic diversities and Biodiversities
- Well Infrastructure facility like Road, Ports, Airport, Rail etc.
- Strong Agri Marketing system, Agro based Industries & Co-operatives
- Enterprising Farmers having business instincts
- Geographical Location and Fertile land in major part of Gujarat
- perennial rivers (barmasi nadi)

Measures taken by the Gujarat Government for Agricultural Development

1) **Soil Health Card:** In order to increase farm productivity, Government of Gujarat has started the Soil Health Card facility since 2003-04. As many as 11.58 samples of land were collected during the year 2013-14 and 11.46 lakh Soil Health cards were distributed. In the last four years, 111 soil testing centres have been established based on PPP model in place of APMC, Science College, Sugar Co-operative etc. At present there are 133 soil testing laboratories in Gujarat.

2) **Krishi Mahotsav:** Celebrating Krishi Mahotsav since 2005 has been celebrating for the increase of farmers' income and for the movement of other green revolution. The Krishi Mahotsav is an effort by the government to provide an innovative approach to agriculture, rediscover agricultural expansion, reconnect with the farmer to the farmer, and expand the possibilities of production of the farmer. The year 2014-15 was celebrated as "Krishivikas Year" and during the year 2014-

15, the "Ravi Krishi Mahotsav" was also held in the state.

3) **I-khedut Portal:** Online portal for farmers (http://kcc.gujarat.gov.in/) has been started by the Department of Agriculture. In this portal to get benefits of various agricultural schemes an online application is accepted, in particular the detailed list of dealers providing agricultural related equipments, list of banks and institutions which provides agricultural finance, latest technical information related to agriculture, various APMC market prices of agricultural produce, solutions related to agriculture problems, Agricultural land details, etc. information is provided by the government. Total 1533022 farmers are registered under the Eye- farm portal.

4) **Agro Policy and PPP Projects:** Gujarat is keen to encourage investment in agro-based industries, agro infrastructure and hi-tech agriculture. The state government has undertaken several agro-industrial projects for infrastructure, market and research development and facilities. The purpose of the state's agricultural policy is to create world-level supply chain for transport between agriculture and agro-processing zones. The aim of the Government of Gujarat is to promote agricultural research by organizations like Agriculture University.

The state has taken several steps to double its agro processing capacity. This includes the establishment of **food parks**, **agro-processing zones** of international standards and **agro-export zones** to promote the export of food. **Cooperative industries**, private sector industries, Supreme and **Agricultural Product Marketing Committees (APMC)** will provide assistance for setting up excellence centres. In addition, it offers 25% air subsidy on agricultural exports. To carry out research and development activities, it provides 50% financial assistance. To develop large quantities of cold storage, the state uses LNG at Dahej and Hazira, which is more economical.

5) **Vibrant Gujarat Global Agricultural Investors Summit (VGGAS):** Vibrant Gujarat Global Agricultural Investors Summit (VGGAS) in the state was held in September 2013, in which approximately 7000 farmers participated and 3500 farmers of other states participated. Apart from this, 184 national and 14 international companies have participated and they have demonstrated the latest technologies and agricultural products. So that farmers can get information and awareness about agriculture innovation.

Important Suggestions for Agriculture Development (Agronomy)

1) The extent of agricultural credit should be increased, and the subsidy and financing should be provided in land holding limits. Besides, nationalized banks are required to increase the lending of farmers, which in the present era it is very less according to the demand for credit. Medium and long term credit should still be given at a lower rate of interest. To promote simultaneous farming, there should be a very low rate of credit for certain purposes, so that rapid technological changes can be made in agriculture. Apart from this, NABARD is also required to increase the limit of the finance. It is also necessary to encourage short-term finance.

2) It is necessary to make the crop insurance scheme more users friendly, so that farmers avail hassle free services and claims. As in other countries of the world, in the case of crop insurance, premium is shared through 50% of the central government, 25% of the state government and 25% of the farmers, which gives more benefits to farmers under this scheme. Crop insurance should not only protect crops but also the income of the farmer so that their standard of living is maintained. Under crop insurance, it is extremely important to cover all types of crops.

3) If the development area of the land examine program is being implemented to all over the country, district, taluka and village level and its importance has been discussed with farmers then it would be create positive impact on agricultural production, environment and production costs of the farmers.

4) The area under irrigation in Gujarat is just around 38 percent, which is very low, compared to other states. On the other hand, the perennial rivers are more in Gujarat and on the other hand the very less availability of irrigation has been achieved. It is very important to determine the regional policy of irrigation, and as much as 85 to 90 percent of rain water is being transported with sea-borne

elements, due to the problems of irrigation and soil fertility, the water policy for storage and proper measures should be taken by local self-government organization and state to resolve the Irrigation issues. Regarding irrigation, it is extremely important to emphasis on small irrigation programme rather than large irrigation programme or project.

5) As compare to many states of India and many countries of the world, chemical fertilizers use are very low in Gujarat, whereas on the other hand, the use of chemical fertilizers has raised the issue of health issues, examples of states like Punjab and Haryana. On one hand states like Mizoram is emerged as a complete organic state. It is very important that Gujarat has positive approach in this direction too. This can have positive impact on production costs and environment and human health.

6) Proper seeds (HYV) and proper storage facilities in respect of improvement of the seeds, coordination between public and private organizations, in respect of HYV, needs to be amended. The main aim of KVK is that the experimentations on the seeds by Agricultural Universities and KVK should be reach quickly and properly to the farmers, which is indeed one of the key objectives of the KVK too, yet there is still good progress in agriculture could be achieved.

7) In current time it is extremely important to provide subsidy to those who is interested to implement technology in agri-business. In order to increase in agricultural growth in the process of value addition it should be give more importance to agri-business and encourage it. If it can be done, then it would be a true change in the economic life of marginal and small farmers.

8) Even in Gujarat about 8 hours and irregular electricity is given to farmers, it is very important to increase and regularize it. In many areas, many farmers need more than one power connection, they should provide it in nominal price.

9) The problems of farm market is important, in which case the area of APMC reaching even more subtle level is necessary. As well as for the good prices that farmers get for the crop, the APMC's administrators are also required to make value incremental efforts (here it is to be noted that this initiative has been done by Surat's APMC) as well as in the support price, only a few crops have been covered up which is extremely necessary to increase. In Gujarat, there are many cash crops, horticultural crops which are planted in different parts of the state but their supportive prices are not declared, this should be necessary to think seriously by the state.

10) In view of this, in the context of satellite image for the development of agriculture and its supervision, as well as the changes in the atmosphere and its complete information to the farmers, as well as the availability of rain and irrigation water, etc., if those can reach to the farmers in time, they can make a proper decision regarding crop sowing. Besides it seems that Gujarat and India remain poor in this context, so the appropriate research and technology is to be required for that.

11) In concern of the animal husbandry, Gujarat is well known place in the milk production but the productivity element is still needed to be improved, and it is very essential for breeding of Gir cow in terms of nutritious milk, which can also lead to positive changes in human health related issues. Besides, the animal husbandry business remains an important tool for the landless class, and the development of dairy in Gujarat like Sumul, Amul, Vasudhara, Banas, Sabar Dairy etc. have brought improvement in the economic life of many ranchers, yet there are lot of areas where it are deprived and the dairy development and animal husbandry in such areas have not been are not sufficiently developed. It is in quite extreme need that such research should be gained in real worth.

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Land Utilization Pattern in Gujarat (1984-85 to 2014-15) (in '000 hectares)

Year	Geographical area	Reporting area	Gross sown area				Forest area	Area not available for cultivation (Total)
			Total	Net sown area	Area sown more than once	Cropping intensity		
1984-85	19,602.40	18,825.00	10,343.50	9,616.50	727	107.56	1,892.30	3,709.20
1985-86	19,602.40	18,824.90	10,384.00	9,402.00	982	110.44	1,877.70	3,764.80
1986-87	19,602.40	18,821.10	9,925.00	9,062.20	862.8	109.52	1,883.40	3,775.10
1987-88	19,602.40	18,821.00	7,983.90	7,231.30	752.6	110.41	1,887.90	3,773.50
1988-89	19,602.40	18,821.00	10,648.20	9,289.10	1,359.10	114.63	1,888.40	3,772.00
1989-90	19,602.40	18,820.90	10,683.00	9,471.60	1,211.40	112.79	1,884.50	3,725.30
1990-91	19,602.40	18,821.90	10,580.00	9,296.20	1,283.80	113.81	1,884.70	3,731.30
1991-92	19,602.40	18,821.90	10,502.50	9,291.40	1,211.10	113.03	1,884.70	3,729.30
1992-93	19,602.40	18,822.00	11,003.00	9,583.00	1,420.00	114.82	1,886.00	3,730.00
1993-94	19,602.40	18,822.00	10,672.00	9,391.00	1,281.00	113.64	1,886.00	3,731.00
1994-95	19,602.40	18,822.00	11,188.00	9,609.00	1,579.00	116.43	1,887.00	3,732.00
1995-96	19,602.40	18,812.00	10,938.00	9,612.00	1,326.00	113.8	1,871.00	3,730.00
1996-97	19,602.40	18,813.00	11,001.00	9,600.00	1,401.00	114.59	1,861.00	3,742.00
1997-98	19,602.40	18,811.80	11,156.20	9,674.10	1,482.10	115.32	1,859.00	3,744.40
1998-99	19,602.00	18,812.00	11,144.00	9,667.00	1,476.00	115.28	1,865.00	3,744.00
1999-00	19,602.00	18,812.00	10,609.00	9,443.00	1,166.00	112.35	1,865.00	3,745.00
2000-01	19,602.00	18,639.00	10,440.00	9,443.00	1,007.00	110.56	1,706.00	3,729.00
2001-02	19,602.00	18,639.00	10,734.00	9,622.00	1,112.00	111.56	1,706.00	3,726.00
2002-03	19,602.00	18,868.10	10,631.00	9,481.00	1,149.00	112.13	1,854.00	3,753.00
2003-04	19,602.00	18,868.10	11,421.00	9,851.50	1,569.50	115.93	1,853.60	3,752.70
2004-05	19,602.00	18,868.10	11,256.90	9,746.90	1,510.00	115.49	1,853.60	3,754.20
2005-06	19,602.00	18,868.00	11,494.70	9,722.20	1,772.50	118.23	1,860.50	3,748.00
2006-07	19,602.00	18,866.20	11,807.40	9,800.90	2,006.50	120.47	1,833.40	3,758.20
2007-08	19,602.00	18,866.00	12,211.40	9,965.80	2,245.60	122.53	1,834.00	3,722.60
2008-09	19,602.00	19,068.50	11,651.00	10,301.80	1,349.20	113.1	1,834.00	3,722.60
2009-10	19,602.00	19,068.50	11,094.40	10,301.80	792.6	107.69	1,834.00	3,722.60
2010-11	19,602.00	19,068.50	12,257.30	10,301.80	1,955.50	118.98	1,834.00	3,722.60
2011-12	19,602.00	19,068.50	13,085.80	10,301.80	2,784.00	127.02	1,834.00	3,722.60
2012-13	19,602.00	19,068.50	12,599.70	10,301.80	2,297.90	122.31	1,834.00	3,722.60
2013-14	19,602.00	19,068.50	12,487.40	10,301.80	2,185.60	121.22	1,834.00	3,722.60
2014-15	19,602.00	19,068.50	12,773.10	10,301.80	2,471.30	123.99	1,834.00	3,722.60

Land Utilization Pattern in Gujarat (1984-85 to 2014-15) (in '000 hectares)										
Year	**Geographical area**	**Area not available for cultivation**		**Other uncultivated land excl. fallow land**				**Fallow land**		
		Area under non-agricultural uses	**Barren and unculturable land**	**Total**	**Permanent pasture and grazing lands**	**Land under misc. tree crops and groves not included in net area sown**	**Culturable waste land**	**Total**	**Current fallow**	**Other fallows**
1984-85	19,602.40	1,080.70	2,628.50	2,829.50	847.2	4.1	1,978.20	777.5	720.3	57.2
1985-86	19,602.40	1,089.10	2,675.70	2,800.60	846.3	4.2	1,950.10	979.8	937.3	42.5
1986-87	19,602.40	1,097.70	2,677.40	2,780.80	844.9	4.1	1,931.80	1,319.60	1,276.10	43.5
1987-88	19,602.40	1,096.40	2,677.10	2,788.50	848.8	4.1	1,935.60	3,139.80	3,097.70	42.1
1988-89	19,602.40	1,104.80	2,667.20	2,772.60	848.8	4.1	1,919.70	1,098.90	1,039.30	59.6
1989-90	19,602.40	1,116.00	2,609.30	2,829.10	845.7	4	1,979.40	910.4	857.5	52.9
1990-91	19,602.40	1,122.10	2,609.20	2,819.60	845.6	4	1,970.00	1,090.00	1,037.90	52.1
1991-92	19,602.40	1,120.80	2,608.00	2,835.00	848.1	4.1	1,982.80	1,081.80	1,046.50	35.3
1992-93	19,602.40	1,123.00	2,607.00	2,834.00	848	4	1,982.00	789	756	33
1993-94	19,602.40	1,125.00	2,606.00	2,834.00	849	4	1,981.00	980	947	33
1994-95	19,602.40	1,127.00	2,605.00	2,829.00	848	4	1,977.00	765	737	28
1995-96	19,602.40	1,132.00	2,598.00	2,823.00	848	4	1,971.00	776	749	27
1996-97	19,602.40	1,138.00	2,604.00	2,827.00	849	4	1,974.00	783	759	24
1997-98	19,602.40	1,140.10	2,604.30	2,833.20	849	4	1,980.20	701.1	675.6	25.5
1998-99	19,602.00	1,141.00	2,603.00	2,826.00	849	4	1,973.00	710	686	24.4
1999-00	19,602.00	1,141.00	2,604.00	2,835.00	849	4	1,982.00	924	911	13.1
2000-01	19,602.00	1,129.00	2,600.00	2,840.00	851	4	1,985.00	932	919	13.1
2001-02	19,602.00	1,131.00	2,595.10	2,842.00	850.3	4	1,988.00	744	733	11.3
2002-03	19,602.00	1,145.00	2,608.40	2,839.00	850.2	4	1,985.00	941.2	930	11.2
2003-04	19,602.00	1,145.30	2,607.40	2,831.00	850.3	4	1,976.70	579.3	568.1	11.2
2004-05	19,602.00	1,146.70	2,607.50	2,831.00	850.5	4	1,976.50	682.4	670.1	12.3
2005-06	19,602.00	1,148.20	2,599.80	2,827.70	850.6	4	1,973.10	709.6	696	13.6
2006-07	19,602.00	1,163.20	2,595.00	2,831.80	852.5	3.5	1,975.80	641.9	622.7	19.2
2007-08	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	528.6	509.7	18.9
2008-09	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2
2009-10	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2
2010-11	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2
2011-12	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2
2012-13	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2
2013-14	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2
2014-15	19,602.00	1,171.10	2,551.50	2,815.00	851.4	3.6	1,960.00	395.1	378.9	16.2

IMPACT OF COVID-19: AN ANALYSIS OF THREE-DIMENSIONAL ISSUES OF INDIAN MIGRANT WORKERS

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ABSTRACT

It was over a year since Covid-19 arrived in India. Now while the second wave of Corona has returned with an even more frightening form. Corona has impacted not only the health of people but it has also affected industries, medical services, labor force even the lifestyle of the people. But the migrant workers of India, most productive yet most vulnerable sector is got affected very badly due to lockdowns being imposed by the government. This paper tries to analyze issues of migrant workers arising due to Covid-19. For that purpose, problems are categorized on the basis of Social, Economic and health variables. Covid-19 and measures taken by government for prevention of Covid-19 has impacted very badly almost every sector of the country. But this impact can be seen most on the lower-income group or migrant workers and their families.

***Keywords**: Migrant Workers, Socio-Economic Issues, Health Issues, Covid-19*

Introduction

The year 2020 was drastically hit by a dangerous bio-medical virus named covid-19. The rapidly spreading virus negatively impacted every sector of not only the Indian economy but almost every economy, whether developed or developing. The pandemic took the life of 2.28 million people in the time of one year and many risked their life near to death. Apart from the adverse effect of covid-19 on health it also affected psychologically, which resulted in anxiety, depression, mental disorder, panic, and psychometric manifestations (Qiu et al. 2020; Tandon, 2020). Though, the risk of covid-19 has declined drastically in the past few months due to the development of antibodies in the human body and the availability of vaccines for covid-19 in India. Still, the risk prevails for old-age and physically weaker sections.

The most affected sector by lockdown was informal sector. Closure of work places broke the people financially and resulted in downturn in demand of goods and services. Any downturn in economy will highly affect job of migrant workers (Avato et al. 2010). Around 93 percent informal workers lost their job in the first phase of lockdown. In the third phase of lockdown red zones were in mode of complete shutdown. Though, some activities were allowed in 5th phase of lockdown, but with some restrictions (Sirvastava, 2020).

Migrant workers are most disadvantaged segment of informal sector. In compare to native workers, migrants are weaker section of labor as their employment and remuneration is decided under non-formal contracts i.e. they are generally employed under kinship of informal arrangement and hence have no job security. Their low wages do not allow them to cumulate their savings (Sengupta and Jha 2020; Fassani and Mazza 2020). They generally stay at open places and sleep on roads. Many times, they have to stay all night awake due to rain or they do not get proper sleep-in fear of Insects like- snakes, scorpions, mosquitoes etc. Recent lockdown of Corona pandemic showed the real picture of migrant workers. They had left with no choice but to come home putting their life in danger. Sudden decision of lockdown and closure of activities in entire country resulted in job loss of migrant workers and they left with no saving and no food facility (Ahmad, Ahmad, and Shaik 2020; Chaudhari 2020) And in desperation of going back to home, they had to walk 1000 of miles due to lack of proper housing facilities and transport facility. Most of them opted for unsafe transport modes to reach their home, which resulted in their exposure to corona virus and even some of them lost their life in transit (De Haan 2020; Khanna 2020).

Around all over the world businesses are highly dependent on migrant workers. Around 130 million migrant workers in India work as street vendors, contract workers, agriculture

laborers, roadside hawkers and employed on seasonal basis. Still, they are low-paid and most vulnerable segment of labor force. Due to lack of bargaining power and working as third party they mostly struggle for job-security and live their life in financial crisis (Ramesh 2020, Sept. 28).

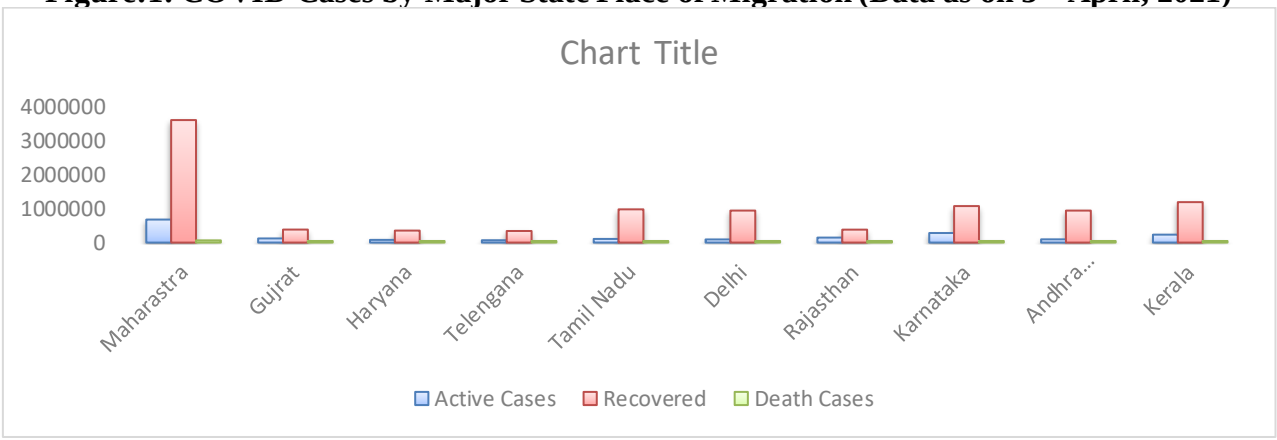
Post-COVID Life of Internal Migrants

According to census 2011, there were 40 million internal migrants enumerated within the country for the reason of employment thus accounting for 3.30 per cent of total population (Registrar General of India 2011). Based on census trend we estimate 50 million migrants in 2020. Out of these 41 million two- third are intra-state and remaining one-third are inter-state migrants (Rajan, Shivakumar, and Srinivasan 2020).

COVID-19 lockdown started on 22 March, 2020 and after passing 4 phases of complete lockdown till 31st May, 2020 country entered in the phase unlocking but with some restrictions. Factories and business houses start working under the guidelines issued by respective govt. but still the migrant workers were not able to return to their work places due to reasons like- job-loss, no place to stay, financial crisis etc. as most of the organizations started downsizing due to drastic decrease in demand of goods and services (Khanna, 2020). Migrant workers left with no choice but stay at their native places with no job and to feed their families they started taking loans which indebted them. Some of them also got involved in illegal activities like- phishing, vishing, card skimming, chain-snatching etc.

The Year, 2020 was very challenging for human being but especially for migrant workers, they not just lost their job but the financial crisis forced them to return to their native place risking their life in absence of proper transport facility (Lancet 2020; Suresh, James, and RSj 2020). Many research has been done during the lockdown, implemented due to COVID-19 pandemic and almost every researcher concluded that internal migrants as most vulnerable segment of informal worker (Chakraborty 2020; Santalahti, Sumit, and Perkiö 2020; Singh and Basu 2020), not only physically but psychologically too (Coope, et al. 2020; Chander et al. 2020). Even in the absence of infection, stress due to compulsion of taking protective measures and isolation during corona outbreak enhanced the vulnerability of migrant workers (Rajkumar 2020; Nayar 2020).

Figure:1: COVID Cases by Major State Place of Migration (Data as on 3rd April, 2021)



Source: Ministry of Health and Family Welfare

This paper analyzes the impact of COVID-19 on the socio-economic as well as health issues of internal migrant workers in India. For that purpose, research is categorized in three major categories one is Economical Impact and other one is social impact. Socio-Economic impact is analyzed on the variables like- employment, wage, demand of workforce, increase in debt of migrant workers, involvement in illegal activities, child labor, and domestic. On the other side, social impact includes variables like sensitivity for communicable Diseases, mental health and malnutrition in children of migrant workers.

Economic Issues of Migrant Workers

Loss of livelihood

Apart from the health issues, migrant workers face many more problems in their daily life. The main concern for them is job-security, because of working on informal agreement they always live in the fear of job-loss (Pacheco et al. 2020; Almeida and Santos 2020). The first confirmed case of CORONA virus was found in Kerala on 30th January, 2020. And around two month later on 23rd March, 2020 central government of India declared a countrywide lockdown. In the process of following rules of lockdown all economic and non-economic activities were ordered to be in shutdown condition during the period. And problem started there for migrant workers, as migrant workers are generally employed on the basis of informal agreements, means no job-security at all. Hence, they lost their job. They lost their jobs due to shut down of factories and work places and waited for few days for any government initiative. But exhaustion of their savings left them with no choice but to return their native places risking their and their family's life **(**Singh 2020).

Wage Discrimination

(Rao et al. 2020) compared the migration pattern of four states and found that most of them are age of 16-35 years and their migration pattern is seasonal and circular. (Abella 2000; Allasino, Venturini, and Zincone 2004; Wang, Guo, and Cheng 2015) found evidence of discrimination at notable level under various sector of migrant labor market not only in developing countries like- India, China, Bangladesh but also in the developed countries like- Australia, Dubai, America etc. Migrant workers experience frequent discrimination in their social life and at workplace too, on the basis of gender, cast, and native state also. (Agesa 2003; Liu 2004; Das and Dutta 2007; Zhigang and Shunfeng 2006) and more researchers from all over the world observed significant wage gap in rural-urban migration. Though percentage of wage gap is not fixed and after considering the factors like- difference in education, difference in skill & experience, data from different sectors narrows the gap. But still wage difference is easily detectable on the basis of economic social-demographic factors. (Bhagat 2017; Magnani and Zhu 2012; Simkhada et al. 2017) gender wage gap is found to be very significant and consistent in-migrant labor market, even in the absence of working hour, skill and educational difference female workers are paid on lower wage rate.

Side-effects of drastic decline in labor demand

During the lockdown phase, production of non-essential services was in complete shutdown state, even in the unlock process, they were given the guideline to work with only 50 percent of labor. And with no cash-in-hand industries were forced to cut-down their labor cost. Which resulted in a huge decline of demand of labor and hence to even lower wage-rate for migrant workers. In these conditions, revival of industries is likely to be very complex and long-drown-out. But on the other side there was an acute shortage of labor in the sectors like- healthcare, supermarkets, delivery services, warehousing etc. (Kapoor 2020).

Chances of Indebtedness

Lifestyle of migrant workers was severely affected by the extended lockdown. Though govt. and some of NGOs were distributing foods and helping with some money also. But it was not enough to survive in cities like Delhi, Mumbai and Bangalore. Even after they flee back to home, the problems did not end there. Soon after losing the job, all their savings also exhausted. Today, it has been almost a year, but many migrants have not been able to return to their jobs. They had to borrow for their small needs, which has put them in debt. Even some of them tried to commit suicide. Till July, 2020, suicide cases of 298 people were reported and out of which 109 suicide cases were due to financial distress.

Social Issues of Migrant Workers

Child-Labor

Children who came back home with their laboring parents. You will be deprived of the facilities provided by the state government. On

one hand, not only their right to education was taken away, but due to lack of economic condition of the house, the chances of child labor also increase. In most of the cases, it is seen that children are pushed into an occupation which affects them not only on their nutrition but also on their mental and physical development (Mansuri 2006).

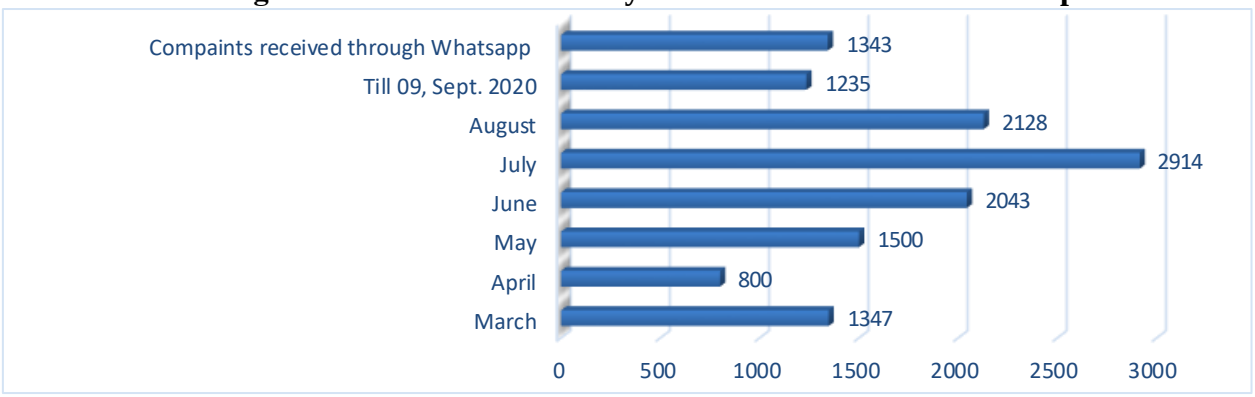
Involvement in Illegal activities

Source of volatile income and recent job loss in pandemic pushed migrant workers into eagle activities like fishing, wishing, smuggling ETC. they were left with no choice but to search for an easy and alternative source of income to feed their families and to fulfill basic needs of life. Due to low literacy most of them opted to do works with low capital requirement like-selling fruits and vegetables, working as farm laborers etc. but some of them got involved in illegal activities like- phishing, vishing, bank frauds, selling ganja, illicit liquor etc. and even in criminal activities like-kidnapping also.

Rising cases of domestic violence

Undoubtedly cases of domestic abuse against women increased significantly during covid-19 pandemic and provoking factors were loneliness, mental depression, and financial depression among men while they were forced to stay at home with no source of income. (Kumar et al. 2020) According to a report of The National Commission for Women (NCW) over 5000 cases of domestic abuse by husband or relatives recorded in few months of lockdown. In June, 2020, 2043 complaints were registered, breaking the record of last 8 months. In the period of March, 2020 to May, 2020 registered no. of cases were 1477 comparing the 607 cases of same time frame in 2019.

Figure-2: Month-wise data of complaints registered/ received under the category "Protection of Women against domestic violence" by NCW since March 2020 till Sept. 2020



Source: Press Information Bureau (pib.gov.in)

Health Issues of Migrant workers

Sensitivity for Communicable Diseases: - Most of the migrant workers do not have proper houses to live or proper sanitization facility. They live in small tents, chawls or sharing rooms, either with their family or with other workers. Where they live and condition they live in, there is not enough space to sleep, being isolation and home quarantine is far from over. Due to small places and poor sanitization facility, they can't afford to be social distancing or maintain level of hygiene required to prevent communicable diseases like Corona, small pox etc. (Choudhari 2020). Impact on mental health The first lockdown took place on 23rd March, 2020 and the problem of migrant workers started from there. First, they lost their jobs and then had to return their home after risking their life in absence of any transport facility. Gradually all their savings exhausted. Pandemic not only affected them financially but psychologically also. Most of them started suffering from psychological disorders like- depression, anxiety, substantial disorders etc. to release mental stress, some of them started resorting to social evils like alcohol, tobacco, beedi etc. and some started venting their anger on their spouses and families. Some of them even tried to commit suicide.

Vulnerability to Malnutrition Covid-19 not just has impacted source of livelihood, but it has some side effect also. With the loss of jobs, food insecurity chances of mal-nutrition also increases, which already has been a serious problem for India. While on the one hand it became difficult to maintain families due to the closure of sources of income, on the other hand facilities like Anganwadi centers and Mid-day meal programs, where primary source of supplement is served to millions of school-going children are also suspended due to covid-19. As in case of every disaster or pandemic, women and children are going to suffer most from undernutrition. UNICEF warned in a report in March, 2020 that due reduction in routine health service coverage, number of children dying from malnutrition in the developing and under-developed countries in the next six months can reach 1.2 million. Out of these the death toll is estimated to be in India which can reach up to 3 lakhs. Even The state of the World's Children Report 2019 by UNICEF showed that 69% cases of death of children under the age of 5 years belongs to India, which means every 2nd child with the age of 5 years is affected from any form of malnutrition. (Mangal 2020, May 21)

Conclusion

We were trying to recover from the devastation that Corona caused last year, that corona was once again back with an even more frightening form. The government still does not have accurate data related to the migrant workers. In which case, it is very difficult to accurately quantify the problem faced by the migrant workers. But one thing is certain that the impact of the difficulties faced by migrant workers can be seen directly on the Indian economy. As they are most vulnerable but most productive resources of the country, their problems need to be taken care of, before it's being too late. Government has to come up with plan and policies to at least meet their basic needs.

In a situation where the country is facing a terrible epidemic, not only the government but also our responsibility is divided that we will contribute to this fight as we can. And in this hour of difficulty, stand together for the sections of society that are unable to meet their basic needs.

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THE HARTLEY TRANSFORM OF THE MOST GENERALIZED HYPERGEOMETRIC AND MITTAG-LEFFLER FUNCTIONS

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ABSTRACT

The Hartley transform is a mathematical transformation which is closely related to the better known Fourier transform. The properties that differentiate the Hartley Transform from its Fourier counterpart are that the forward and the inverse transforms are identical and also that the Hartley transform of a real signal is a real function of frequency. The Whitened Hartley spectrum, which stems from the Hartley transform, is a bounded function that encapsulates the phase content of a signal. The Whitened Hartley spectrum, unlike the Fourier phase spectrum, is a function that does not suffer from discontinuities or wrapping ambiguities. An overview on how the Whitened Hartley spectrum encapsulates the phase content of a signal more efficiently compared with its Fourier counterpart as well as the reason that phase unwrapping is not necessary for the Whitened Hartley spectrum, are provided in this study. Moreover, in this study, the product–convolution relationship, the time-shift property and the power spectral density function of the Hartley transform are presented. Finally, a short-time analysis of the Whitened Hartley spectrum as well as the considerations related to the estimation of the phase spectral content of a signal via the Hartley transform, are elaborated

Introduction

Mathematical Preliminaries:

Historical Background:

Ralph V. L. Hartley was born in Spruce Mountain, approximately 50 miles south of Wells, Nevada, in 1888. After graduating with the A.B. degree from the University of Utah in 1909, he studied at Oxford for 3 years as a Rhodes Scholar where he received the B.A. and B.Sc. degrees in 1912 and 1913, respectively. Upon completing his education. Hartley returned from England and began his professional career with the Western Electric Company engineering department (New York, NY) in September of the same year. It was here at AT&T's R&D unit that he became an expert on receiving sets and was in charge of the early development of radio receivers for the transatlantic radio telephone tests of 1915. His famous oscillating circuit, known as the Hartley oscillator, was invented during this work as well as a neutralizing circuit to offset the internal coupling of triodes that tended to cause singing.

During World War I, Hartley performed research on the problem of binaural location of a sound source. He formulated the accepted theory that direction was perceived by the phase difference of sound waves caused by the longer path to one ear then to the other. After the war, Hartley headed the research effort on repeaters and voice and carrier transmission. During this period, Hartley advanced Fourier analysis methods so that AC measurement techniques could be applied to telegraph transmission studies. In his effort to ensure some privacy for radio, he also developed the frequency-inversion system known to some as greyqui hoy**.**

In 1925, Hartley and his fellow research scientists and engineers became founding members of the Bell Telephone Laboratories when a corporate restructuring set R&D off as a separate entity. This change affected neither Hartley's position nor his work. R. V. L. Hartley was well known for his ability to clarify and arrange ideas into patterns that could be easily understood by others. In his paper entitled "Transmission of Information" presented at the International Congress of Telegraphy and Telephony in Commemoration of Volta at Lake Como, Italy, in 1927, he stated the law that was implicitly understood by many transmission engineers at that time, namely, "the total amount of information which may be transmitted over such a system is proportional to the product of the frequency-range which it transmits by the time during

which it is available for the transmission [2]" . This contribution to information theory was later known by his name. In 1929, Hartley gave up leadership of his research group due to illness. In 1939, he returned as a research consultant on transmission problems. During World War II he acted as a consultant on servomechanisms as applied to radar and fire control. Hartley, a fellow of the Institute of Radio Engineers (I.R.E.), the American Association for the Advancement of Science, the Physical and Acoustical Societies, and a member of the A.I.E.E., was awarded the I.R.E. Medal of Honor on January 24, 1946, "For his early work on oscillating circuits employing triode tubes and likewise for his early recognition and clear exposition of the fundamental relationship between the total amount of information which may be transmitted over a transmission system of limited band and the time required." Hartley was the holder of 72 patents that documented his contributions and developments. A transmission expert, he retired from Bell Laboratories in 1950 and died at the age of 81 on May 1, 1970.

Classical Laplace transform: The Laplace transform is very useful in analysis and design for systems that are linear and time-invariant (LTI). Beginning in about 1910, transform techniques were applied to signal processing at Bell Labs for signal filtering and telephone long-lines communication by H. Bode and others. Transform theory subsequently provided the backbone of Classical Control Theory as practiced during the World Wars and up to about 1960 [12-13], when State Variable techniques began to be used for controls design. Pierre Simon Laplace was a French mathematician who lived 1749-1827, during the age of enlightenment characterized by the French Revolution, Rousseau, Voltaire, and Napoleon Bonaparte. Suppose f(t) is a real valued function defined over the interval $(0,\infty)$.The Laplace transform of *f(t)* is defined by

$$L\left[f(t)\right] = \int_0^\infty e^{-st} f(t)\, d(t)$$

(1.2.1)

Or

$$f(s) = \int_0^\infty e^{-st} f(t)\, d(t)$$

The Laplace transform is said to exist if the integral (1.2.1) is convergent for some values of s.

Classical Fourier Transform: Fourier analysis is named after Jean Baptiste Joseph Fourier (1768 to 1830), a French mathematician and physicist. Joseph Fourier, while studying the propagation of heat in the early 1800's, introduced the idea of a harmonic series that can describe any periodic motion regardless of its complexity. Later, the spelling of Fourier analysis gave place to Fourier transform (FT) and many methods derived from FT are proposed by researchers. In general, FT is a mathematical process that relates the measured signal to its frequency content Heideman et al. (1985). The Fourier series is described in theory and problems of advanced calculus as follows:

If *f(x)* be a function defined on $(-\infty,\infty)$ uniformly continuous in finite interval and $\int_0^\infty \| f(x) \| d(x)$ converges. The Fourier transform is defined by

$$F(f(x)) = \bar{f}(s) = \int_{-\infty}^{\infty} f(x) e^{isx}\, d(x),$$

Or

$$F\left(f(x)\right) = \underline{f}(s) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{isx} f(x)\, dx$$

Where e^{isx} is said to be kernel of the Fourier transform.

Hartley transform:

The Hartley transform is an integral transformation that maps a real-valued temporal or spacial function into a real-valued frequency function via the kernel, $\mathrm{cas}(\nu x) \equiv \cos(\nu x) + \sin(\nu x)$. This novel symmetrical formulation of the traditional Fourier transform, attributed to Ralph Vinton Lyon Hartley in 1942 [1], leads to a parallelism that exists between the function of the original variable and that of its transform. Furthermore, the Hartley transform permits a function to be decomposed into two independent sets of sinusoidal components; these sets are represented in terms of positive and negative

frequency components, respectively. This is in contrast to the complex exponential, exp (*jωx*), used in classical Fourier analysis. For periodic power signals, various mathematical forms of the familiar Fourier series come to mind. For a periodic energy and power signals of either finite or infinite duration, the Fourier integral can be used. In either case, signal and systems analysis and design in the frequency domain using the Hartley transform may be deserving of increased awareness due necessarily to the existence of a fast algorithm that can substantially lessen the computational burden when compared to the classical complex-valued Fast Fourier Transform (FFT). Perhaps one of Hartley's most long-lasting contributions was a more symmetrical Fourier integral originally developed for steady-state and transient analysis of telephone transmission system problems. Although this transform remained in a quiescent state for over 40 years, the Hartley transform was rediscovered more than a decade ago by Wang [3-5] and Bracewell [7-9] who authored definitive treatises on the subject.

The Hartley transform of a function *f*(*x*) can be expressed as either

$$H(v)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(x)\,cas(vx)\,dx$$

(1.3.1)

Or

$$H(f)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(x)\,cas(2\pi fx)\,dx$$

(1.3.2)

Here the integral kernel, known as the cosine-and-sine or cas function, is defined as

$$cas(vx)=coscos\,vx+sinsin\,vx$$

Or

$$cas(vx)=\sqrt{2}\,sin\left(vx+\frac{\pi}{4}\right)$$

Or

$$cas(vx)=\sqrt{2}\,cos\left(vx-\frac{\pi}{4}\right)$$

Fox-Wright Generalized Hypergeometric Function:

The Fox-Wright (Psi) Function is defined as follows.

$${}_p\psi_q\left(\begin{matrix}(a_1,A_1),(a_2,A_2),\ldots(a_p,A_p)\\(a_1,A_1),(a_2,A_2),\ldots(a_p,A_p)\end{matrix}\,|\,z\right)$$
$$=\sum_{n=0}^{\infty}\frac{\Gamma(a_1+nA_1)\Gamma(a_2+nA_2)\ldots\Gamma(a_p+nA_p)}{\Gamma(b_1+nB_1)\Gamma(b_2+nB_2)\ldots\Gamma(b_q+nB_q)}\frac{z^n}{n!}$$

(1.4.1)

The Single parameter Mittag-Leffler Function is defined as follows.

$$E_\alpha(z)=\sum_{n=0}^{\infty}\frac{z^n}{\Gamma(1+\alpha n)},\ \text{for}$$

(1.4.2)

$$E_{\alpha,\beta}(z)=\sum_{n=0}^{\infty}\frac{z^n}{\Gamma(\beta+\alpha n)},\ \text{for}$$

(1.4.3)

$$E^{\gamma}_{\alpha,\beta}(z)=\sum_{n=0}^{\infty}\frac{(\gamma)_n z^n}{\Gamma(\beta+\alpha n)}\frac{1}{n!},\ \text{for}$$

(1.4.4)

Where, $(\gamma)_n=\gamma(\gamma+1)(\gamma+2)(\gamma+3)\ldots$

And $(\gamma)_0=1$

Main Results

In this section, the authors have derived the Hartley transform of Fox-Wright and Mittag-Leffler functions in terms of Fox's H – function.

Theorem2.1: The Hartley transform of Fox-Wright function in terms

$$H\{p\psi q(z)\}=\frac{1}{s}H^{1,p}_{1,q}\left[\begin{matrix}(1-a_1,-A_1)(1-a_2,-A_2)(1-a_3,-A_3)\ldots(1-a_p,-A_p)\\(1-b_1,-B_1)(1-b_2,-B_2)(1-b_3,-B_3)\ldots(1-b_q,-B_q)\end{matrix}\,|S\right],$$

Proof: Since

$${}_p\psi_q\left(\begin{matrix}(a_1,A_1), & (a_2,A_2) & \ldots & (a_p,A_p)\\(b_1,B_1) & (b_2,B_2) & \ldots & (b_q,B_p)\end{matrix}\right)=\sum_{n=0}^{\infty}\left(\frac{\Gamma(a_1+nA_1)\,\Gamma(a_2+nA_2)\ldots\Gamma(a_p+nA_p)}{\Gamma(b_1+nB_1)\,\Gamma(b_2+nB_2)\ldots\Gamma(b_q+nB_q)}\frac{z^n}{n!}\right)$$

The Hartley transform of Fox-Wright in terms of Fox's H – function is given by

$$H({}_p\psi_q) = H\left\{ {}_p\psi_q \begin{pmatrix} (a_1, A_1), & (a_2, A_2) & \dots & (a_p, A_p) \\ (b_1, B_1) & (b_2, B_2) & \dots & (b_q, B_p) \end{pmatrix} \right\}$$

Now,

$$= H\left\{ \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \frac{z^n}{n!} \right) \right\}$$

From equation (1.3.1 and 1.3.2) we have,

$$H({}_p\psi_q(z)) = H\left\{ \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \frac{z^n}{n!} \right) \right\}$$

$$= \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \right) H\left(\frac{z^n}{n!} \right)$$

$$H({}_p\psi_q(z)) = \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \right) \int_{-\infty}^{\infty} z^n / n! cas(vz) dz$$

$$= \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \right) \left\{ \frac{1}{n!} \right\} \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} z^n \left\{ cos(vz) + sin(vz) \right\} dz$$

$$= \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \right) \frac{1}{\Gamma(n+1)} \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} z^n \sqrt{2} sin\left(vz + \frac{\pi}{4} \right) dz$$

$$= \sum_{n=0}^{\infty} \left(\frac{\overline{|(a_1 + nA_1)}\ \overline{|(a_2 + nA_2)} \dots \overline{|(a_p + nA_p)}}{\overline{|(b_1 + nB_1)}\ \overline{|(b_2 + nB_2)} \dots \overline{|(b_q + nB_q)}} \right) \left\{ \frac{1}{\Gamma(n+1)} \right\} \times - \left[1 + (-1)^n \right] coscos\left(\frac{n\pi}{2} \right) \Gamma(n+1)$$

Or

$$H\left\{ {}_p\psi_q(z) \right\} = \frac{1}{s} \sum_{n=0}^{\infty} \frac{\Gamma(1-(1-a_1)+nA_1)\Gamma(1-(1-a_2)+nA_2) \dots \Gamma(1-(1-a_p)+nA_p)}{\Gamma(1-(1-b_1)+nB_1)\Gamma(1-(1-b_2)+nB_2) \dots \Gamma(1-(1-b_q)+nB_q)} s^{-n}$$

$$= \frac{1}{s} H^{1,p}_{1,q} \left[\begin{matrix} (1-a_1,-A_1)(1-a_2,-A_2)(1-a_3,-A_3) \dots (1-a_p,-A_p) \\ (1-b_1,-B_1)(1-b_2,-B_2)(1-b_3,-B_3) \dots (1-b_q,-B_q) \end{matrix} | S \right]$$

Application of the Hartley Transform via the Fast Hartley Transform:

The discredited versions of the continuous Fourier and Hartley transform integrals may be put in an amenable form for digital computation. Consider the discrete Hartley transform (DFT) and inverse DFT (IDFT) of a periodic function of period *NT* seconds.

The DHT avoids complex arithmetic

• The DHT requires only half the memory storage for real data arrays vs. complex data arrays

• For a sequence of length *N*, the DHT performs *O*(*N* log2 *N*) real operations vs. the DFT *O*(*N* log2*N*) complex operations

• The DHT performs fewer operations that may lead to fewer truncation and rounding errors from computer finite word length

• The DHT is its own inverse (i.e., it has a self-inverse) for reasons of computational advantage either occurring through waveform symmetry or simply the use of real quantities, the Hartley transform is recommended as a serious alternative to the Fourier transform for frequency-domain analysis. The salient

disadvantage of the Hartley approach is that Fourier amplitude and phase information is not readily interpreted. This is not a difficulty in many applications because this information is typically used as an intermediate stage toward a final goal. Where complex numbers are needed, they can be easily constructed as a final step by (4.3.27) or (4.3.28). Due to the cited advantages above, it is clear that the Hartley transform has much to offer when engineering applications warrant digital filtering of real-valued signals. In particular, the FHT should be used when either the computation time is to be minimized; for example, in real-time signal processing. The minimization of computing time includes many other issues, such as memory allocation, real vs. complex variables, computing platforms, and so forth. However, when one is interested in computing the Hartley transform or the convolution or correlation integral, the Hartley transform is the method of choice. In general, most engineering applications based on the FFT can be reformulated in terms of the all-real FHT in order to realize a computational advantage. This is due primarily to the vast amounts of research within the past decade on FHT algorithm development as evidenced in Reference 11. A voluminous number of applications exist for the Hartley transform,11 some of which are listed below:

• Fast convolution, correlation, interpolation, and extrapolation, finite-impulse response and multidimensional filter design.

Conclusions

In this paper, an overview of the Hartley transform is presented, the relationship between the Hartley transform and the Fourier transform is provided and the Hartley transform properties are analyzed. More importantly, the Whitened Hartley spectrum is defined, its properties for phase spectral estimation are highlighted, its short time analysis is provided and its advantages compared with the Fourier phase spectrum are underlined. The properties of the Whitened Hartley spectrum are also demonstrated via an example involving time-delay measurement. Summarizing, the Whitened Hartley spectrum is proposed as an alternative to the Fourier phase spectrum for applications related to phase spectral processing. Specifically, the Whitened Hartley spectrum, unlike its Fourier counterpart, does not convey extrinsic discontinuities since it is not using the inverse tangent function, whereas the discontinuities of the signal in the phase spectrum which are caused because of intrinsic characteristics of the signal can be compensated. Finally, it is important to mention that the phase spectrum which is developed via the Whitened Hartley spectrum does not only have important advantages compared with the Fourier phase spectrum but it is also very straightforward in terms of its implementation and processing.

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LINKAGES BETWEEN SECTORAL GROWTH AND ECONOMIC GROWTH IN INDIA

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ABSTRACT

This paper examined the relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) in India using time series data from 1951 to 2019. This study uses the ADF unit root test, Johansen co-integration and Vector Error Correction techniques to investigate the long run and short run causality between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) in India. The Johansen co-integration test indicates Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) are co-integrated, and that a long-run equilibrium exists between them. The Vector Error Correction test reveals that there is no causality between Gross Domestic Product (GDP) and Industrial Sector Production (IP). I also found evidence of unidirectional causality running from Gross Domestic Product (GDP) to Agriculture Sector Production (AP) in the long run, the result also reveals that there is unidirectional causality running from Service Sector Production (SP) to Gross Domestic Product (GDP) in the long run. In short run there is bidirectional causality between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP). It means in short run Gross Domestic Product (GDP) leads to Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) and also Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) leads to Gross Domestic Product (GDP).

***Keywords**: Gross Domestic Product, Industrial Sector Production, Agriculture Sector Production, Service Sector Production, Causality, Co-Integration. VECM*

Introduction

The process of economic development in the economy results in different structural changes. As the country advances and the GDP basket expands, a shift in economic activity away from agriculture toward the services and industry sectors. This process, in turn, leads to structural transformations, thereby diminishing the importance of primary activities and the increasing dominance of secondary and tertiary activities. This process brings significant changes in the production process, consumption pattern and many other social indicators. According to the literature on this topic, the services sector does not experience accelerated growth until after a certain level of development has occurred in agriculture and industry. The experiences of economies varied over time, in this regard. For example, in most developed economies, economic development has followed a series of sectors in them. Development of the agriculture, industry and services sector in this order. On the contrary, the experience of some countries such as India shows that after the development of the primary sector, the higher sector developed without a successful transition to an industrial economy.

From the traditional agricultural economy until the 1970s, the Indian economy has turned into a service-oriented economy, especially since the mid-1980s. The economic reforms that began in the mid-1980s and their implementation in the early 1990s saw the service sector's share of gross domestic product increase continuously for the Indian economy. The shift in GDP formation has brought about fundamental changes in production and demand linkages between sectors. Moreover, with the high growth of the economy, there has been tremendous growth in distribution, telecommunications, consumption and financial services, which in turn is driving increasing demand from commodity-producing sectors. This highlights the issue of how the third sector is linked with two commodity producing sectors of the economy.

The investigation of structural relationships between sectors becomes important from a policy perspective. It helps a person understand not only the evolution and evolution of these relationships but also the cross-sectoral adjustments over time. A clear perspective of inter sectoral dynamics can be useful in developing an appropriate and appropriate development strategy. Moreover, the sharp differences in the growth rates of the

various sectors have serious effects on income distribution, inflation and the current account deficit of the economy. A correct understanding of the characteristics and trends of sectoral linkages also assumes importance in designing socially just policies as effective monetary / credit policies. Examining the linkages between sectors is very important for a developing country like India so that the positive growth drivers between sectors can be identified and strengthened to maintain the momentum of economic growth. This would go a long way in tackling various social and economic problems such as poverty, unemployment and inequality. The current study focuses on studying the interlinkages between sectors of the economy.

Review of literature

Rangarajan, C. (1982), in his paper "Agricultural Growth and Industrial Performance in India" found a strong association between agriculture and industrial sectors. He was also found that Agriculture Production increased the Industrial Production.

Bhattacharya, B.B. and Mitra, A. (1989), in their paper entitled "Industry-Agriculture Growth Rates: Widening Disparity: An Explanation". Analysed the relationship between industrial Growth and Agriculture Growth. From the study they found that that many services activities are significantly associated with the agricultural and industrial sectors and this helps in employment generation.

Banga, R. and Goldar, B.N. (2004), in their work "Contribution of Services to Output Growth and Productivity in Indian Manufacturing: Pre and Post Reform" found that contribution of services to output growth increased substantially to 2.07 per cent per annum during the 1990sn The relative contribution of services to output growth was about one per cent in the 1980s and increased significantly to about 25 per cent in the 1990s.

Bathla (2003) carried out a comprehensive econometric analysis of inter-sectoral linkages in the Indian economy for the period 1950-51 to 2000-01. This study does not find any significant relationship between the primary and secondary sectors, while the primary sector was found to have a unidirectional causation with "trade, hotels, restaurants, communication" and "financing-insurance-real estate and business" services. Under the co- integration framework, strong evidence of the existence of long-run equilibrium relationship was found among the primary, secondary and the specialized service sector.

Kaur et al (2009) explored that primary, secondary and tertiary (excluding community, social and personal services) sector display strong long run equilibrium relationship amongst each other. At sub-sectoral level, the existence of long-term equilibrium was found between 'trade, hotels, transport & communication' and 'manufacturing' sectors. Further, the financial sector activity in the 'banking & insurance' sector was found to be co-integrated with the 'manufacturing' and 'primary' sectors.

Debnath and Roy (2012) analysed the trend in sectoral shares in state domestic product and inter-sectoral linkages in northeast India for the period 1981 to 2007 in his paper. They show that there exists bidirectional causality among the sectoral output of north-eastern states, at least in the short run. In the long run, there exists a unidirectional causality running from the agricultural sector and the industrial sector to the services sector. From the above discussion, it has seen that the importance of sectoral linkages is useful to understand the association between different sectors in the economy

Chebbi (2010) examines the link between agriculture growth and other sector growth of the economy (i.e., Manufacturing, transportation, tourism and telecommunication, commerce and service sector); using the J.J. Co- integration and Granger causality in the case of Tunisia. The author concluded the existence of a long run relationship between agricultural growth and other sectors of the economy. he rejected the weak exogeneity for the agricultural sector and suggests possible long run linkages between agriculture and other sectors of the economy.

Data source and methodology

In this study, annual data is used from 1951 to 2019. All the data were collected from HAND BOOK OF INDIA (RBI) 2019-20. Variables

used in this study and the definitions are Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP).

The data analyzed to determine the causality between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP). Before analyzing the causal relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP), data has been transformed in to natural logarithms, and then possible existence of unit roots in the data is examined. The stationarity of each series is investigated by employing Augmented Dickey-Fuller unit root test. The number of lagged differences included is determined by the Schwarz Information Criterion and Akaike Information criteria. Further proceed with the VAR lag order selection criteria to choose the best lag length for the VAR time series model to examine the Granger Causality test for all the series is performed. Johansen co-integration test is also applied to test for co-integration

The basic empirical investigation has two purposes. The first one is to examine the long-run relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) while the second is to examine the short-run dynamic causal relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP). The basic testing procedure requires three steps. The first step is to test whether the variables contain a unit root to confirm the stationarity of each variable. This is done by using the Augmented Dickey–Fuller tests (ADF). In the second step we test for the existence of a long-run co-integrating relationship between the variables. This is done by the use of the Johansen co-integration test. Finally, the last step, if all variables are integrated of same order and co-integrated then short run and long run causality test can be computed using the vector error correction model (VECM) method suggested by Engle and Granger (1987).

Empirical results

Result of Stationarity Test:

One of the most important attributes of a time series variable is its order of integration. Hence, we first perform unit root tests in levels and first differences in order to determine the order of integration of the series. To test the order of integration, we employ the conventional augmented Dickey-Fuller (ADF) test.

Table: 1 Result of Unit Root Test Using Augmented Dickey Fuller Test

Variable	At Level		At First Difference		Conclusion
	ADF	Prob.	ADF	Prob.	
Gross Domestic Product (GDP)	8.0612	1.000	-7.8487	0.0000	I (1)
Industrial Sector Production (IP)	0.3761	0.980	-2.4154	0.0163	I (1)
Agriculture Sector Production (AP)	1.7809	0.980	-7.1785	0.0000	I (1)
Service Sector Production (SSP)	0.9592	0.995	-7.6895	0.0000	I (1)

It is evident from the above table that the calculated ADF statistics for level variables are less than the critical values in all cases, suggesting that the variables are not level stationary. Table 1 also shows that the ADF statistics for all the variables imply first-difference stationary.

Result of Lag Order Selection Criteria for GDP, IP, AP, and SP

For getting optimal lag Length for co integration analysis, we have used five criteria namely, LR test statistic, Final prediction error, Akaike information criterion, Schwarz information criterion and Hannan-Quinn information criterion. All the criteria have suggested a leg length of 1 as an optimal leg length.

Table 2 VAR Lag Order Selection Criteria for GDP, IP, AP, and SP

Lag	LogL	LR	FPE	AIC	SC	HQ
0	100.3285	NA	5.52e-07	-3.058048	-2.921976	-3.004530
1	**506.1699**	**747.2636***	**2.33e-12***	**-15.43397***	**-14.75361***	**-15.16638***
2	514.9077	14.97896	2.96e-12	-15.20342	-13.97877	-14.72176
3	526.0750	17.72592	3.50e-12	-15.05000	-13.28106	-14.35427
4	537.7310	17.02152	4.15e-12	-14.91210	-12.59887	-14.00229
5	550.1141	16.51074	4.89e-12	-14.79727	-11.93976	-13.67340

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic
FPE: Final prediction error
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
AIC: Akaike information criterion

Result of Co-Integration Test Based on Johnson Juselius Method:

Once I have the results of unit roots, the next step is to determine whether there exists co-integration, using the same order of integrated variables. To test for co-integration, the Johansen and Juselius (1990) procedure was used, which leads to two test statistics, trace test and maximum eigenvalue test, for cointegration.

Table: 3 Result of the Co-integration Test based on Johnson Juselius method

Johansen Test for Co-integration (Trace Test)				
Hypothesized No. of CE(s)	**Trace Statistic**	**0.05 Critical Value**	**Prob.**	**Conclusion**
None	58.69012	47.85613	0.0035	One Co integrating Relationship
At most 1	22.16820	29.79707	0.2893	
At most 2	7.391319	15.49471	0.5326	
At most 3	0.332117	3.841466	0.5644	
Johansen Test for Co-integration (Maximum Eigen value Test)				
Hypothesized No. of CE(s)	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.**	**Conclusion**
None	36.52192	27.58434	0.0027	One Co integrating Relationship
At most 1	14.77688	21.13162	0.3048	
At most 2	7.059202	14.26460	0.4822	
At most 3	0.332117	3.841466	0.5644	

Table3 express the results of the co-integration test. There are two test statistics for co-integration, the Trace test and Maximum Eigen value test. The Trace-Statistic value is shown to be greater than the critical values at 5% levels. Therefore, we reject the null hypothesis of no co-integrated equation among the variables. Thus, we conclude that there is at most one co-integrated equation among the variables. The results of Maximum Eigen value test statistics also express same here. Finally, we can say that there is a long run relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP), Service Sector Production (SP)

Result of Granger Causality Test Based on VECM:

Long run Causality Test Based on VECM:

The VECM long run causality result presented in Table 4 revealed the causal relationship among Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP). The result showed that the error correction term for co-integrating equation with Gross Domestic Product (GDP) as a dependent variable is significant but not negative at one percent, implying that there is no long run relationship running from Industrial Sector Production (IP) to Gross Domestic Product (GDP). The coefficient of

error correction term with Industrial Sector Production (IP) as a dependent variable was observed to be insignificant, implying that no existence of long run causality from Gross Domestic Product (GDP) to Industrial Sector Production (IP).

The result exposed that the error correction term for co-integrating equation with Gross Domestic Product (GDP) as a dependent variable is insignificant and not negative at one percent, implying that there is no long run relationship running from Agriculture Sector Production (AP) to Gross Domestic Product (GDP). The coefficient of error correction term with Agriculture Sector Production (AP) as a dependent variable was observed to be significant and negative implying that there is long run causality running from Gross Domestic Product (GDP) to Agriculture Sector Production (AP).

The coefficient of error correction term with Gross Domestic Product (GDP) as a dependent variable observed to be significant and negative implying that there is existence of long run causality running from Service Sector Production (SP) to Gross Domestic Product (GDP). The coefficient of error correction term with Service Sector Production (SP) as a dependent variable was observed to be significant but not negative implying that no existence of long run causality from Gross Domestic Product (GDP) to Service Sector Production (SP).

Table: 4 Long run Causality Test Based on VECM:

Causality	**ECM_{t-1}**	**T-Statistic**	**Prob.**	**Result**
Long run causality from IP to GDP	0.0226	3.7410	0.000	**No Causality**
Long run causality from GDP to IP	-0.0002	-0.2871	0.774	
Long run causality from AP to GDP	-0.0029	-1.8438	0.0723	**Uni Directional Causality**
Long run causality from GDP to AP	-0.1237	-2.4579	0.0182	
Long run causality from SSP to GDP	**-0.0307**	**-4.1424**	**0.000**	**Uni Directional Causality**
Long run causality from GDP to SSP	-0.0076	-0.5897	0.589	

Short run Causality Test Based on VECM/ Block Exogeneity Wald Tests

Multivariate Short run Causality Test Based on VECM/Block Exogeneity Wald Tests present in Table-5 among Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP). The result showed that the short run bi-directional causality running between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP).

Table: 5 Short run Causality Test Based on VECM/ Block Exogeneity Wald Tests

Causality	**Coefficient**	**T-Statistic**	**Result**
Short run causality from IP to GDP	70.36596	0.0000	**Bi directional Causality**
Short run causality from GDP to IP	250.7474	0.0000	
Short run causality from AP to GDP	66.30285	0.0000	**Bi directional Causality**
Short run causality from GDP to AP	36.40178	0.0000	
Short run causality from SSP to GDP	72.21624	0.0000	**Bi directional Causality**
Short run causality from GDP to SSP	84.17394	0.0000	

Conclusion

In this paper, I have examined the relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) in India using time series data from 1951 to 2019. This study uses the ADF unit root test, Johansen co-integration and Vector Error Correction techniques to investigate the long run and short run causality between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture

Sector Production (AP) and Service Sector Production (SP) in India. From the above study, it can be concluded that the Augmendented Dickey Fuller unit root tests show that Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) series become stationary when first difference is considered. The empirical result reveals a long run co-integrating relationship between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) in India.

The result also revealed that there is no causality between Gross Domestic Product (GDP) and Industrial Sector Production (IP). It means Gross Domestic Product (GDP) does not lead to Industrial Sector Production (IP) and also Industrial Sector Production (IP) does not lead to Gross Domestic Product (GDP) in long term.

From the result we conclude that unidirectional causality running from Gross Domestic Product (GDP) to Agriculture Sector Production (AP) in the long run. It means Gross Domestic Product (GDP) leads to Agriculture Sector Production (AP) in the long run. However, Agriculture Sector Production (AP) does not leads to Gross Domestic Product (GDP) in the long run.

We also found evidence of unidirectional causality running from Service Sector Production (SP) to Gross Domestic Product (GDP) in the long run. It means Service Sector Production (SP) lead to Gross Domestic Product (GDP) in the long run. However, Gross Domestic Product GDP does not lead Service Sector Production (SP) in the long run.

In short run there is bidirectional causality between Gross Domestic Product (GDP), Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP). It means in short run Gross Domestic Product (GDP) leads to Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) and also Industrial Sector Production (IP), Agriculture Sector Production (AP) and Service Sector Production (SP) leads to Gross Domestic Product (GDP).

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'LEARNING STRUGGLES' CRISIS OF SCHOOL GOERS DEEPENS, COURTESY PANDEMIC COVID-19

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ABSTRACT

'Learning struggles' are the difficulty a learner faces in grasping academic tasks as well as other related behaviors aimed at by the school system. These are attributed to problems faced by otherwise normal learners and do not amount to specific learning disabilities. The paper analyses the role of supports a school system offers to address the learning struggles of a learner. These factors are in the forms of human support (teacher, peers, assistants & support staff in the school), soft support (pedagogy, model, feedback & reinforcement, evaluation and parental contact) and hard support (Learning spaces- library, laboratory, playgrounds and cafeteria). In the wake of Covid-19 pandemic learners lost all these learning support entities and the normal learning struggles became greater in number and magnitude thus deepened the crisis. Besides this, author also explained the introduction of technological and virtual world anxiety due to introduction of e-learning and online learning system. Finally author suggested some measures to deal with these learning struggles and bringing back the situation to normalcy. This normalcy is necessary to avoid a learning gap among the future learners.

***Keywords**: Learning, learning struggles, Pandemic, Covid-19*

Introduction

Although learning is a natural process that comes by virtue of observations, experience and feedback received on the basis of interaction with the environment-biological, social and non-living. But this can only be said about action oriented learning i.e. relating to task performance in our routine life. Also it is true for learning which can be attained through gestures, expression and self-explanatory symbols other than language. But when it comes to formal learning it starts with theoretical perspectives which involve language, facts, concepts, formulae, equations, and terms and symbols previously unknown to the learner and are abstract in nature. When learner is unable to grasp these entities across various school subjects we say that learner is struggling with learning and identify the entities responsible for it we call as 'learning struggles.' Besides academics the complex behaviors like public speaking, debating, and creative expression, operating with instruments, generic skills, resilience, efficiency and effectiveness are also learnable targets in formal setting and inability to learn these would be named allied learning struggles. Thus in a school other than classroom teaching so many activities are organized namely cultural activities, literary activities, social activities, national identity orientation and so and so on. Both academic and allied learning is attained through a professional planning, guidance, execution in a meticulously engineered environment. All learners are unable to learn as per the school designed program and struggle to learn we identify as "Learning Struggles." Learning struggles here amounts to normal struggles a learner faces rather than 'specific learning disabilities'. In case of academics it is assumed that for a normal child (not a special child) teacher needs to be good at subject matter and pedagogy of the subject. Besides this teacher needs to adapt strategies addressing the individual differences in terms of interest, ability, motivation, achievement motivation, learning style, study habits and the like. But other than academics learning is so complex and needs lot of support in varied forms for which curriculum and schools are designed, teachers and other human support are trained, infra-structure and soft support are put in place. In this background author would be trying to establish that schools system has been established on a very sound philosophy which makes learning smooth and natural as if nobody is working for it and nothing has been deliberately designed. This saves the child from facing learning struggles and has inbuilt capacity to solve the struggles they face in the course of learning. As things become unnatural, I mean when this luxury of support system availability is taken away for some reason, we realize how important role had been being played by the school as a system in

ensuring learning of the learner. In the time of pandemic this has been felt very strongly by the learners, teachers and parents alike.

Factors affected the Learning struggles

There are many factors which help in smooth learning of the learner which even we don't notice. During the period of pandemic institutions were forced to close and suddenly all those learning supporting entities disappeared from the scene. Even under normal conditions learners face learning troubles, but due to readily available support system problems are resolved, at least retard aggravating. During pandemic two things happened namely vanishing of school system and appearance of new system of learning named online learning. Both of these changes affected the learning very strongly, some could adjust quickly enough, but majority could not and crisis of learning struggles deepened. In this paper we are discussing the factors responsible for learning struggles to aggravate and the impact they had, and followed by the possible solution we can offer to resolve these learning struggles. The possible factors unavailable to the learners during pandemic are classified in to three categories-human support, soft support and hard support. Also the impact of new introductions namely technology and virtual platforms on magnitude of learning struggles has been made subject of discussion.

Human support: Teacher, Peers, Assistants & Support Staff in the school

As a phone call or a mail cannot be a substitute of meeting a close friend or a relative, so is true for physical presence of a teacher in a classroom. A movement near the learner, a gesture of acceptance, positive reinforcement by placing a faithful hand on learner's back, an eye contact for feedback is some of dozens of interactions between teacher and learner, so necessary for involvement and progress of the learner and learning. Teacher not only teaches but reaches to the mind and soul without formally announcing it. Teacher keeps watch on the learners for degree of participation or lack of it, in the classroom proceedings. An aggressive or a withdrawal learner becomes a person of concern for the teacher and he tries his best to find ways to normalize the learner for his best possibilities. In a classroom some learners hesitate to participate but at times show spark for a potential performance. This observation can work wonder for the learner under guidance of the teacher. Teacher is at best position to interact with parents for informing about strengths and weaknesses of the learner and suggest the measures to set the course right for the learner. The variety of terms coined by educationists for identifying learners as gifted, creative, talented, backward, learning disabled, retardates, and so and so on, actually present the spectrum of variation in a classroom, that makes teaching a highly specialized task. Performing this complex task needs a close association, observation and evaluation of the child. A teacher is given the task of all round development of the child which necessitate a firm hand holding of the learner that in turn demands intimate contact between the two. In the time of pandemic this intimate contact vanished and most of the learners lost their way to face the learning struggles in every aspect of their development.

Before invention of school system Education was only prerogative of elite class and were usually educated at their places. Mostly it had been one to one affair between teacher and learner. But later it was discovered that learning is more effective in an assembly and hence schools were institutionalized. Learners pass through all stages of learning in a group i.e. observation, imitation, experimentation, manipulation and independent learning. As far as peer learning is concerned it has been found that it improves student attendance (Deslauriers, Schelew, & Wieman, 2011), boosts student engagement (Lucas, 2009), reduces student failure rates (Porter, Bailey-Lee, & Simon, 2013), and immensely improve attitudes towards their studies (Beekes, 2006). Pandemic has taken great toll in this respect; learners lost this precious support to learning and hence paved the way for deepening of learning struggles.

Assistant staff although seems to be unimportant for a learner's development due to low frequency of interaction, actually play invisibly a vital role in smooth functioning of day to day life of the institution which directly or indirectly support the learning of the learner. The school's support staff is essential stakeholders and consistently interacts with

learners across grade levels, subject matter areas, and physical locations (Feuerborn, Tyre, & Beaudoin, 2018). Without librarian books and virtual world would remain unreached, laboratory attendant helps in making learning concrete, assistant teachers are crucial for individual attention, technical assistants makes all it possible and even transport attendants are so important for managing learner's expected roles and the level; of efficiency demanded in these roles. Support staff is hugely important to setting and keeping things in order for conducting learning activities. Support staff is responsible for making school co-curricular program possible to function effectively. They are vital for developing a sense of security among the learners and quality organizational climate. They become even more important when school has one or more disabled learners in classes. The support staff must be included in shared leadership and their voices must be valued (Bako, 2020). It is found that support staff that promote and model fairness, equity, caring, and respect tend to produce higher academic outcomes (Benninga et al., 2006). Their all services are directly or indirectly directed to address learner's learning struggles of the learner. These services were altogether lost at the time of pandemic and learner faced learning struggles in allied dimensions too, besides academics.

Soft support: Pedagogy, Model, Feedback & Reinforcement, Evaluation and Parental contact

Pedagogy as we know is art of teaching and learning has been designed to ensure effective learning outcomes. It involves various skills, devices, methods, techniques, styles, models and the like. But all this has been designed to conduct the classroom proceeding in offline mode. These actually require learners' participation, eye contact, exchange of gestures, teacher-peer and peer-peer interactions and the like. Pedagogy is actually aimed to address the variation among the learners in terms of learning styles, motivation level, attention span, intellectual ability, resilience etc. A teacher needs to address and match to these variations of the learners so that the learner accepts him as 'his teacher'. Pedagogical interaction has been proposed as one of the key parts of any learning experience (Hay, Hodgkinson, Peltier, & Drago, 2004). Classroom environments that actively engage learners have the potential of stimulating the development of self-regulated learning (Young, 2005). Researchers found that students' involvement is most due to pedagogical interaction between students with their peers and with the teachers (Hay et al., 2004). In the times of pandemic this pedagogical support was absent and pedagogy for online learning was not in place thus augmented learning struggles of the learners.

Learners need models to imitate and draw inspiration for learning, acquiring behaviors, manners, psychological wellbeing, adjustment, developing personality traits and the like. In classroom situation it is readily available in the form of teachers, peers and other support staff across various interactions in the school. All these things come naturally without any effort and keep building up inside the learner. All these inputs are so essential to resolve the learning struggles and behavioral problems. The student-student interaction supports and motivates to achieve a higher cognitive level and to find personal meaning for learning (Dempsey, Halton, & Murphy, 2001). A number of authors have suggested that student-student interaction, whether formally structured or spontaneous, can enrich learning outcomes (Johnson & Johnson, 1990; Topping, 1996). Research reveals that a high level of student-student interaction improves the perceived quality of the learning experience (Peltier et al., 2003) and has a positive influence on the learning outcomes (Hay et al., 2004; Topping, 1996; Cardoso et al., 2011). In pandemic situation learners missed this luxury of readily available models. This led to deepening of the learning struggles which at some level already existed even in offline learning system.

Feedback and reinforcement is the backbone of the learning mechanism. Teacher keeps watch on the learning and the associated behaviors of the learner. In view of this he keeps on giving feedback for advancing the learner's behavior in right direction. Similarly in result of a behavior teacher offers positive or negative reinforcement to enhance or suppress it, depending on its desirability in respect of some pre-decided standards. National surveys, both in the UK (Higher Education Funding Council for England 2011) and in Australia (James, Krause, and Jennings 2010) endorsed the fact

that feedback is essential for progress of learning. . Feedback is considered as a vital approach to facilitate learners' development as independent learners in order to monitor, evaluate, and regulate their own learning (Ferguson, 2011). Blend of feedback and reinforcement offers teacher a wonderful tool of behaviour modification that goes a long way in attaining the real purpose of education. In the times of pandemic learners were deprived of this vital tool resulted in deepening of crisis of learning struggles.

Evaluation is another area of great significance for all round development of the learner. All forms of evaluation consist of systematic information gathering and making some kind of judgment on the basis of this information (Scheerens, 1983; De Groot, 1986). Recent review of literature reports that quality evaluation and assessment has been endorsed as one of the most influential factors for enhancement of learning (Reynolds, Sammons, De Fraine, Van Damme, Townsend, Teddlie & Stringfield, 2014).Evaluation is actually used to assess the worth of the child rather than finding weaknesses. Evaluation helps the teacher in finding a day for every child, as every child is special in one sense or other. Even an anecdote noticed by the teacher about a potential of a learner can turn in to a beginning of a wonderful career in music, sports, creative writing or some other forms of specialized ability. The evaluation process is not conducted in vacuum; it needs a social system and invariably testing moments. During the pandemic times in physical absence of teacher and hence absence of proper evaluation the learning struggles aggravated further.

Parental teacher interaction is another vital input for saving the learner from falling in the trap of learning struggles. Parent-teacher communication in the form of parent teacher meet has been found to be extremely valuable in understanding the child in terms of strengths, weaknesses, interests, talents and creative abilities. Epstein (1987, 2011) in his theory of overlapping spheres, states that parent-teacher interactions lead to more frequent parent involvement in their children's academic work and, in turn, better academic outcomes. Parents can also contact teacher on all sorts of communication modes, but for that a physical association is a must. In the pandemic situation this physical contact was snapped and affected very strongly and negatively the first year learners of any stage. In online mode teachers were teaching imaginary learners and learners were imagining their teacher hypothetically possessing certain traits and abilities. In this situation parents became alien to the process of learning and lost the role of a liaison in resolving learning struggles.

Hard support: Learning spaces- Library, Laboratory, Playgrounds and Cafeteria

While passing through the pandemic period we could realize the importance of school buildings and the various components there in. On this occasion I am reminded of a great quote by Sir Winston Churchill made in a speech in the House of Commons on October 28, 1943 about replacing the bombed-out House of Commons chamber by the enemy raids. He said "we shape our buildings; thereafter they shape us". The physical environment is known as the 'third teacher' in a school, which can either, stimulate or hinder the teaching and learning processes (Shmisdiego et al., 2019). Barrett (2018) concluded well-designed classrooms alone influenced 16% of the student learning outcomes. Literature also believed that physical conditions must cater to students' physical, cognitive, socio-emotional, and sensory abilities (Victorian School Building Authority, (2020). These learning spaces are actually intended to resolve learning struggles of the learner. Library is not only about content, but is also about people, events, opportunities, inspirations, sensitivities, building attitudes and building independent point of view about the subject of study and its claims. Library is solution to every possible learning struggle, at least for those who hesitate to talk to people. In the times of pandemic learners were denied of this prime learning space which deepened the learning struggles immensely.

Laboratory in a school is center of activity for study of matter, computer sciences and the like. In fact this is a place where all confusions are resolved and theories are confirmed or rejected on factual basis. Here learner draws distinction between matter and non-matter, living and non-living, dynamic and static, concrete and abstract, forms and categories and so and so on.

Resolving these issues are nothing but resolving his learning struggles those could not be resolved just by being in a theory class or more so in a virtual classroom. The training of experiencing physical world is achieved in the laboratory. Learning struggles of physical world may it relate to content or life situations are best addressed in a laboratory. In pandemic times learning was theoretical only and learners missed this vital learning space very badly, consequently learning struggles deepened down.

Playgrounds are not just to play and pastime, but to solve so many learning struggles, product of routines. Games and sports turn learner resilient, tolerant and patient and capable of teaming up. Earning of these traits helps in addressing the learning struggles of all dimensions of school life. The peers in ground are source of strength, inspiration and discovering friends forever. These peers have capacity to team up for solving any problem and thus achieving a goal. This helps the learner to find unflinching support to take up challenge of school life and hence settling the learning struggles. In the time of pandemic leaners remained devoid of this unconditional support that resulted in unsetting of learning struggles, rather number increased considerably.

In universities cafeteria was made essential due to the fact that people should have some reason to sit together and have exchange of ideas. This exchange of ideas is so important for building argument and counter argument and finally reaching to a conclusion about an issue of concern. School canteen or cafeteria should actually be engineered to be a place of learning among peers. Learners are truly informal in cafeteria, discuss things unplugged and are truly original and at their best in many ways. They admit frankly the learning struggles they face in and out of the class, in academics and other areas of performance. This freedom to admit and submitting to friends for finding a solution to various learning struggles has been grossly missed by learners during the period of pandemic. This has certainly resulted in accumulation of learning struggles in number and magnitude as well.

Addition factors for deepening crisis of learning struggles

Technological anxiety

Technology has been part and parcel of learners after the introduction of mobile phones, but has never been so extensively used for teaching and learning. Initially when pandemic broke it was thought as a temporary measure so embraced by both learners and teachers, but slowly the pain of technology started taking its toll. For poor learners it became a financial burden both at hardware and software ends. UNESCO in its Global Education Monitoring (GEM) report 2020 revealed that an estimated 40 per cent of the poorest countries failed to support learners at risk during the Covid-19 crisis. A survey by Cao et al (2020), which includes 7143 participants of college students, found around 25% of students are suffering from severe anxiety due to e-learning crack-up. Once the essentials are acquired the operational struggles appeared as next trouble, both for teacher and learners. Due to absence of proper training and preparation there was lot of hesitation to interact with teacher and inter-peer interaction became almost impossible. The platforms used for interaction were actually meets (Google meet, Zoom, Microsoft teams etc.) used by corporate houses rather than any app specifically designed for teaching learning situation. Solution to this problem was found in integrating these apps with some sort of learning management system (LMS) like Google classroom, Edmodo and the like. But this further increased anxiety among teachers and learners and the simple learning struggles got further complicated. The technological anxiety was real and learning became secondary that resulted in aggravating learning struggles.

Virtual world anxiety

Once winning over the initial hurdles, the psychological struggles turning in to learning struggles. The screen time, one-way traffic, the bombardment of subject matter without seeking feedback, absence of any help, non-availability of peer model and absence of social contact all makes the virtual learning a mess of unknown solution. Lischer et al (2021) in a university students survey found that 85.8% of the

students reported symptoms of anxiety, although in the majority of cases these symptoms were mild (63.3%). For school students it must be even greater in magnitude and frequency. High Focus centre (2020) in its blog claims that online learning may cause heightened anxiety about keeping up to date with their school work, other teens may experience difficulty concentrating or staying focused while at home, for some adolescents and young adults, being in front of others on video can lead to its own anxieties and some may find it difficult to receive the extra education support they need to succeed. In general, close to 39% of the students feel some sort of anxiety with online courses (Saade et al, 2017). Teacher is not just a conveyer of information, rather is a complete package of learning both in academic and allied areas of development. If we compare virtual classroom with the face to face classroom it would be parallel in comparing an eyed and a blind man. The blind man in absence of a guide or a model develops phenomena called 'blindism' who conducts himself awkwardly in public. Similarly, in absence of teacher and peers an element of 'awkwardness' creeps in the conduct of the learner. Many a time learner is taking note of this problem, but finds helpless to overcome it. This results in a type of anxiety we may call as 'virtual world anxiety' that pushes learner deep in to learning struggles. In the time of pandemic virtual became the reality as new normal which learners could not relate to, thus many lost the track. Virtual world anxiety becomes really significant when we talk about has practical subjects and subjects requiring hands on experience, drill work and performing arts. Thus it seems virtual world anxiety combined with technological anxiety has caused learning struggles to multiply manifolds.

Possible ways out

- Teaming up for identification, sharing and addressing the learners', learning struggles As far as possible blended learning environment i.e. virtual learning integrated with face to face learning should be operational at the earliest
- Systematic operation of remedial work to make up the loss during Pandemic
- Training of teachers and learners to interact in e-learning environment
- Integrating LMS with the meeting apps or introducing some classroom teaching apps
- Identification and preparing strategies for resolving individual learning struggles related to academics and allied dimensions for learner development
- Developing pedagogical skills and methodology for virtual learning
- Individual counseling, teaching, tutorials, graded assignments and participatory evaluation
- Building social relations with learners and parents

Conclusion

Learners struggle in one way or other in academics or behavioral learning essential for progressing in education and making a noticeable life. These inabilities to accomplish the desired goals in the area of performance are termed as 'Learning Struggles'. These struggles are addressed by the teacher and school by variety of methods, techniques and strategies. This is possible only due to presence of a well-designed school system is in place. The school system offer a social system (human support), soft support in terms of pedagogy, model, feedback & reinforcement, evaluation and parental contact and physical support in terms of infra-structure namely library, laboratory, playground and etc. In the times of outbreak of Covid-19 pandemic all these supports disappeared and learners were left in the midstream. Moreover adapting to new format of online learning posed more problems than easing the crisis situation. This led to deepening of crisis of learning struggles. School needs to put all resources on the task to addressed these learning struggles; otherwise we will be having next generation of citizens with severe learning gaps.

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AFFILIATION MARKETING: A CRITICAL REVIEW

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ABSTRACT

Affiliate marketing is a popular, modern sort of performance-based Internet marketing in which a company reimburses affiliates for each client referred by the affiliate's marketing efforts. The purpose of this paper is to evaluate all available studies on affiliate marketing (i.e., web-based affiliate marketing) in order to comprehend the general progress in this field of study. The affiliate marketing and associated terminology search results revealed a total of seventeen studies on the subject. The assessment clearly shows that there has been a paucity of research effort in this area.

***Keywords**: Machine Learning, KNN, Random Forest, Random-Tree, Hybrid approach*

Introduction

Affiliate marketing is an extremely effective and profitable kind of web marketing. According to Prussakov (2007), affiliate programs are a kind of marketing in which partners or affiliates advertise the merchant's items. He goes on to say that this sort of marketing is dependent on results, because remuneration is often paid depending on the number of hits. Gallaugher et al. (2001) expand on this, noting that these schemes often pay a site operator (affiliate) a commission on any items purchased by customers on the partner site (merchant).

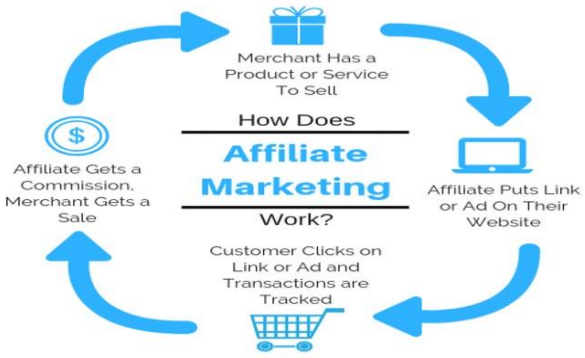

Figure – I (Source: https:in.seekweb.com/Top 10/seekweb)

In figure 1, the basic process of an affiliate program is explained. Merchant has a product to sell, They puts affiliate link or Ad on their website, customer clicks on the link or Ad and transactions are tracked and at the end affiliate got a commission and merchant got a sale. According to Fiore and Collins (2001), an affiliate program benefits both sides. The businesses get increased traffic and sales, while the affiliates get paid for the users they send.

CDNow.com and Amazon.com pioneered affiliate marketing. CD Now's Buy web Network launched the first affiliate marketing program in 1994. Greffen Records came up with the concept to make it easier for fans of its artists to purchase music online. Greffen, on the other hand, had no intention of creating a full internet store for this reason. As a result, they approached CD now to see if they could handle the sales for them. Greffen then placed links on its website that referred people to CD now's web store once CD now consented. It was a win-win situation for both parties (Hoffman & Novak, 2000). This was quickly followed by Amazon's Associates Programs, which now include over 1 million partners (Prussakov, 2007). With these two affiliate programs began the birth of all other affiliate programs that may be found today.

Affiliate programs go by a variety of names, including associate, revenue-sharing, and partnership programs. In this form of business arrangement, the merchant agrees to pay a commission to the affiliate (Prussakov, 2007). One advantage of this type of marketing is that it is very inexpensive for the firm, as commission is only paid if the final customer makes a purchase. According to Prussakov (2007), the merchant will always be in a winning scenario because fraudulent or invalid sales do not count. This demonstrates that affiliate marketing may be beneficial to e-businesses of all sizes.

Literature Review

Gregori et al. (2013) want to know what factors influence customer trust in tourism-related

affiliate websites. The study's primary findings show that there is a distinction between necessary and trust-enhancing variables. It suggests that affiliates demonstrate their expertise and honesty to customers. The findings also imply that affiliates should reduce customer confusion by giving structural guarantees and background information on their websites.

Zia Ul Haq (2012) a survey of 300 Internet users in India was performed for this study to determine their attitudes regarding affiliate programs and the different elements that impact their efficacy. The findings of this poll show that affiliate marketing is viewed positively. This study also discovered that usefulness, intuition, reward, and perceived trust are the best predictors of customer attitudes in affiliate marketing. In conclusion, the consumer's opinion of the utility and management of the affiliate program has a significant impact on the future of affiliate marketing.

Analysis

Keyword Analysis

Table 1 lists some of the most frequently utilised terms in affiliate marketing research. According to the analysis, certain keywords such as online or Internet marketing, affiliate marketing, various terms related to search, advertising, affiliate(s) and affiliate website, e-commerce, Internet, marketing strategy, networks, and trust were discovered to be repeating keywords across various studies. Although not included in the Table, keywords such as collaborative filtering, complexity theory, content delivery, contracts, cookie, Croatia, customer acquisition, customer referrals, fraud, hotels, hyperlinks, market segmentation, merchant, Nash equilibrium, pay-per-performance, pay-per-conversion, pay-per-lead, qualitative research, recommender systems, search behaviour, search engine ranking.

Table – 1

Keyword(s)	Frequency
Marketing / Internet Marketing / Interactive Marketing/ Online Marketing	6
Affiliate Marketing	6
Information Search | Search | Screening | Online Search	4
Advertising | Online Advertising | Targeted Advertising	5
Affiliate | Affiliates | Affiliate Website	4
E-Commerce	3
Internet	2
Marketing Strategy	2
Networks | Online Affiliate Marketing Networks	2
Consumer Trust | Online Trust	2

Table 2 summarizes the techniques utilized in all affiliate marketing research. According to the analysis, the majority of studies used secondary data analysis (e.g., articles retrieved from various sources, published documents, search engines, journals, affiliate network websites, etc.) to conduct research on this topic, followed by some other methodologies such as case study, conceptual paper, different surveys (e.g., web-based survey, questionnaire survey et al.).

Table - 2

Source	Methodology
Bhatnagar and Papapla (2001)	Online Survey
Kwok et al. (2003)	Conceptual
Duffy (2005)	Case Study
Mican (2008)	Case Study

Edelman (2009)	Data received from an advertising network
Edelman and Brandi (2014)	Secondary data: US Affiliate Networks (Websites
Gregori et al. (2013)	Focus Group Interview, Web-based survey
Janssen and van Heck (2007)	Multiple case study of seven advertising web sites
Multiple case study of seven advertising web sites	Primary Source: Interviews, Questionnaire Survey; Secondary Source: Observation of websites, published documents, internet search engines and various journals of affiliate marketing
Prabhu and Satpathy (2015)	Secondary data: Online retailing company websites, matrimonial websites, tours and travel industry, online job sites etc.

Some studies (e.g., Akcura, 2010; Diffy, 2005; Fox and Wareham, 2007; Gregori et al., 2013; Iva, 2008; Ivkovik and Milanov, 2010; Janssen and van Heck, 2007) have highlighted the advantages or benefits provided by the affiliate marketing program to its stakeholders. Some of the key advantages provided by affiliate marketing and its program include revenue generated by affiliates without investments in inventory and infrastructure (Duffy, 2005), to assist firms in increasing their prices and profits (Akcura, 2010), targeted campaigns with low advertising costs (Ivkovik and Milanov, 2010), and a relatively low cost for both affiliates and merchants (Fox and Wareham, 2007; Gregori et al., 2013; Iva, 2008), , with no need for offices, the entire globe is their market (Iva, 2008), with the costs and advantages of affiliate marketing programs being assessed on a regular basis, they are widely recognized (Janssen and van Heck, 2007).

A few studies that investigated affiliate marketing (e.g., Fox and Wareham, 2007; Gregori et al., 2013; Hossan and Ahammad, 2013; Janssen and van Heck, 2007; Mariussen et al., 2010; Papatla and Bhatnagar, 2002) specifically acknowledged their limitations and/or future study. Some studies explicitly mentioned limitations such as lack of external validity and thus generalization (Fox and Wareham, 2007; Gregori et al., 2013), preliminary study (Fox and Wareham, 2007; Hossan and Ahammad, 2013; Mican, 2008), lack of awareness, relatively new phenomenon, and small sample size (Hossan and Ahammad, 2013).

Discussion

This study presents an overview of the literature on the issue of affiliate marketing compiled from studies published over the previous 15 years. According to a study of the literature on affiliate marketing, despite being such an essential idea in internet marketing, relatively little research has been performed on this issue. The examination of keywords reveals several extremely common and evident terminology, such as various types of online and Internet marketing, affiliate marketing, advertising, and other search, or screening methods.

Conclusion and Suggestions

This is, to the best of our knowledge, the first study on a survey of the affiliate marketing literature. This study includes a thorough evaluation of all current studies on affiliate marketing, as well as some of the major findings from the literature, such as keyword analysis, methodology analysis, benefits/disadvantages, limits and future research, and essential success factors analysis. Such assessments allow academics to plan a suitable future course of study in this subject.

This study, like any other research, has some limitations. First, when researching affiliate marketing, we came across a handful of studies that could not be accessible and so were not included in the present analysis. Second, the current study did not perform demographic analyses of the relevant literature, such as author analysis, country analysis, years of publication of existing studies, and so on. This

kind of analysis would offer a more thorough view of the affiliate marketing study.

Future study might include a more complete assessment of the literature that takes into account all of the aforementioned factors. Third, because this is a literature review work, the research findings are based on secondary data obtained from 18 research publications on the subject of affiliate marketing. Future study might augment the evaluation of secondary data with some primary data obtained through interviews with merchants and affiliates to determine if the conclusions from both parts coincide or vary.

The research looked at eighteen publications on affiliate marketing that were found and downloaded from the ISI Web of Knowledge database and the Google Scholar search engine. According to the review of research, no literature study on this issue has yet been conducted. Case studies, conceptual studies, and studies based on secondary data sources are the most common types of study in this field. However, only a small percentage of research relies on primary data sources. Furthermore, little attempt has been made in this field of study toward theoretical advancement.

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DRONE TECHNOLOGY IN CONSTRUCTION INDUSTRY: STATE OF ART

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ABSTRACT

Unmanned aerial vehicles (UAVs), often known as drone technology, are employed in civil engineering for a variety of purposes. Drones as instruments that improve communication between construction participants, improve site safety, use topographic measurements of huge regions, and produce buildings aerial surveying, bridges, roads, and highways utilising principles of aerial photogrammetry, saving project time and costs, and so on. Operators can share the imaging with personnel on site, in headquarters, and with subcontractors, planners can meet virtually to discuss project timing, equipment needs, and challenges presented by UAVs in civil engineering can bring many benefits; creating real-time aerial images from building objects, overviews reveal assets and challenges, as well as the broad lay of the land, operators can share the imaging with personnel on site, in headquarters, and with subcontractors, planners can meet virtually to discuss project timing, equipment needs, and challenges presented by UAV The goal of this article is to provide a broad overview of the usage of unmanned aerial vehicles (UAVs) in civil engineering. The article also discusses the many types of UAVs used in construction, as well as their benefits and drawbacks.

***Keywords**: civil engineering, data capture, unmanned aerial vehicle, drone, aerial mapping*

Introduction

The project management information system includes monitoring as an important component. The goal of monitoring is to figure out how far along the project is and whether there are any roadblocks in the way. The difficulty that continues to be an impediment to construction monitoring is documenting changes in the field and preparing the timetable that has been established. Currently, deviations from anticipated performance can only be reported after a long period of time has elapsed, and human construction activity monitoring is both costly and error-prone.

UAVs have the potential to greatly improve performance and speed. Many surveying applications in civil engineering are turning to unmanned aerial vehicle (UAV) systems as a data collecting platform and measuring instrument [1]. In the field of construction management and monitoring, UAV technology can be used dynamically to produce more practical and cost-effective operations, and this UAV system not only provides an easy and smart way for site supervision and management, but also results in better operations, planning, and effective on-site adjustments [2]. The use of UAVs can give practical value since they are faster in their usage, and the use of UAVs is faster in data gathering because of the cloud point [3]. Drones and unmanned aerial vehicles (UAVs) can be utilised as part of an Automatic Data Collection (ADC) system to deliver real-time data in the transportation and construction industries [4]. In the construction industry, UAVs have been used for a variety of tasks, including monitoring and maintaining pavements and highways, checking and monitoring bridges, inspecting buildings, monitoring damages and cracking, maintaining facades, and mapping historical monuments, as well as 3D modelling for building reconstruction and photogrammetric applications such as volume measurement.

According to earlier research, the use of UAV generates 3D modelling that makes it simple to identify project status [4], the UAV technique produces superior data in performing real-time monitoring. The outcomes of this 3D modelling offer a number of other advantages, including the following: • they can be understood by experts and laypeople, making it easier for certain parties, such as the project owner, to know the progress of the work on the project in real-time if they are integrated with the BIM work method. • they can be understood by experts and laypeople, making it easier for certain parties, such as the project owner, to know the progress of the work on the project in real-time if they are integrated with the BIM work method. In a short amount of time, a UAV may recover data in the form of

aerial photographs with a broad scope and size [6]. In comparison to traditional approaches, the UAV method has reduced overall expenses [6]. When compared to traditional techniques, the production level of employing UAV technology is higher. When compared to traditional techniques, UAVs are 35,41 percent quicker, have a 71.22 percent accuracy, are up to 78 percent more affordable, and have a productivity level of up to 94,48 percent [6].

Objective

1. To study the various applications of Drone Technology in Civil Engineering
2. To identify the future scope of Drone Technology in Civil Engineering

Drone Technology in Construction Industry

New digital technologies appear to increase productivity while also reducing the total duration and cost of building projects. Drones have just recently been introduced to the construction sector, despite their widespread usage in other industries (e.g., agriculture, public safety, military reasons, science and research, security monitoring, mining, and so forth) [7]. Aerial vehicles have been used in the construction industry for a variety of tasks, including inspecting highways, bridges, roads, cell towers, high mast lighting, wind turbines, power transmission lines, building façade and roof, survey and mapping, construction monitoring, wetland/environmental, drainage and erosion, traffic monitoring, and emergency services. [7, 8] are a couple of examples. Operators can share images with on-site workers, internal corporate personnel, and remote subcontractors [9]. With extensive views of remote and otherwise challenging and difficult to reach places, UAVs give essential assistance and cost savings. With the above perspective, UAVs show the best access, and 360° panoramas show a real-time scenario [10]. This comparison may be broadened to incorporate real-time recording, reporting, billing, verification, and planning in addition to construction schedule and costing [11]. UAVs currently provide a high level of automation that allows them to reach previously unreachable regions while gathering a huge quantity of data in a short amount of time. This, however, is not their sole application 12]. Commercial drones are frequently employed in the construction sector [13]. There are a huge variety of drones on the market. Drones can be categorised in a variety of ways, including photography drones, aerial mapping drones, military drones, and surveillance drones, among others. The best classification of drones, on the other hand, may be formed based on aerial platforms. There are four primary categories of drones based on the type of aerial platform used: fixed wing drones, multi rotor drones, single rotor drones, and fixed wing hybrid VTOL drones [14].

Utilizing drone technology in the construction industry

Building Surveys

Almost every building survey requires vision of the structure's roof in order to assess the building's technical condition and any faults or failures. In most situations, climbing to the top is difficult, requiring the use of scaffolding, ladders, or other auxiliary structures, which can pose a risk and be time-consuming and expensive [5]. In these situations, the use of a small drone can save time, money, and decrease health and safety concerns associated with building surveying of the roof structure and accessing complicated or difficult-to-reach sections of the building's top [15].

Topographic Mapping and Land Surveys

Consultation of topographic maps is required when planning large-scale and complex building projects. Construction design mistakes that are unsuitable for the terrain may be shown using topographic maps. Topographic maps are helpful for building projects, although they are frequently expensive and time demanding to produce [10]. Drones are quite useful in these situations. Its capacity to gather huge volumes of data in a short length of time results in considerable cost reductions, as well as project expenses for these operations. Drones ensure project timeliness, budget, and accuracy owing to their capabilities. Furthermore, 3D representations of the surface (DSM-digital surface model) or of the terrain (DTM-digital terrain model) may be constructed from the high-resolution aerial photos captured by drones [13].

Construction Site Inspections

For builders, drone data may be acquired often, allowing for quick integration into projects and exact tracking of site development with no lag time. This helps construction businesses to manage their time and resources more effectively while avoiding possible difficulties and delays [16]. Drone-assisted construction site inspections can be a valuable tool for project teams [10]. A pilot with prior expertise may use the drone to identify any construction or technical issues on the job site, and drones can also be used for inspection reasons to verify that the project goals are met. In the event of rebuilds and plan revisions, the usage of drones can save thousands of euros. Drones can also be safer since they eliminate gaps or locations on the building site that could be harmful when assessing damage [10]. Drones can also be used to fly around a construction site to see how closely it resembles the construction plan or model, drones can aid in the creation of detailed 3D models of new construction projects, drones can help see what things look like on the roof of a skyscraper under construction, and so on [17]. Site inspections may be done more often and cover a broader area with greater efficiency [15]. Drones for building site inspections have four primary advantages: increased safety, less labor-intensive data, and higher quality data [18].

Equipment Tracking and Automating

Every project manager on a building site faces the challenge of tracking and automating equipment. This is generally an issue when there are a lot of different tables and documents to keep track of, which is difficult and time-consuming [10]. During the drone flight, the same project manager may quickly check whether the equipment is where it should be. It is also feasible to rapidly check whether a device that has already done its task is still on-site using a drone, and to avoid costly extension costs using this method [13].

Remote Monitoring and Progress Reports

Drones' visibility from the air, from a high height, and from any place [13] is probably the most significant benefit they can give to clients in the construction sector. A continuous drone flight over a building site can be a rapid way to track a project's development, especially when clients are unable to visit the site personally [6], [14]. Project developers may obtain a clearer picture of project development at daily, weekly, or monthly intervals thanks to several high-resolution aerial pictures and HD-quality films [14]. According to [19] it's recommended to film only those areas of the new construction where the best progress is achieved, unless the client stipulates otherwise.

Integration of laser scanning and aerial photogrammetry

It might be difficult for a surveyor to get access to a suitable laser scanning site, such as a roof structure, from which to scan. The final point cloud may be incomplete in this situation. Drone technology combined with laser scanning may be able to overcome this restriction. [15]. Aerial photogrammetry with a drone was employed, as well as terrestrial laser scans. This structure's measurement was done in two stagesThe whole facade of the building was selected for digital surveying in terrestrial laser scanning (stage 1), and the entire top of the structure was picked for digital surveying in aerial photogrammetry (stage 2).

Thermal Imaging recording

Drones, like laser scanners, can produce airborne thermal pictures from various areas of buildings, which may be used to analyse cold spots in structures. This capability can provide engineers, surveyors, and contractors with critical building information in the event that it is necessary to diagnose and correct construction faults, such as locations where thermal bridges occur and the like [15]. Thermography is a technique for determining the thermal technical characteristics of a building envelope and for detecting concealed flaws. Thermography has the ability to detect these problems with the required accuracy and, if properly analysed, is the first step in designing a successful technical solution and, as a result, checking its implementation. The use of thermography in conjunction with drones enables for the detection of building flaws that are not evident to the human eye [15]. Water penetration, leaks, and places with mould or decay may all be detected via thermal

imaging of a specific region of the structure before they cause severe harm. On the thermal imaging screen, these chilly, wet regions will look as dark blue. Using the technology to check rooftops, locate leaks, and detect heat loss makes the procedure easier, safer, quicker, and more efficient from the inspector's perspective [20]. Security surveillance, personnel safety, health and safety inductions, maintenance inspections, promotional photography, live feed/virtual walk around, site logistics, worker monitoring, and other uses of drones in the construction sector are just a few examples. [13], [15], and [19] are three examples.

Progress tracking

Design flaws are responsible for 38% of building conflicts. As uncertainty grows, inaccuracies and inadequate designs can cause projects to fall behind time and over budget. By recording very precise site data, progress monitoring with drones can help to mitigate these difficulties.

Health and safety

Slips, trips, and falls were the second leading cause of injuries and fatalities in the UK construction sector in 2019, according to the Health and Safety Executive (HSE) annual report. Construction firms and shareholders are naturally concerned about on-the-job injuries and are searching for methods to reduce risk. Drones can swiftly perform surveys in hazardous regions and transport contractors away from high-risk zones where casualties may occur. Drones are operated remotely, which is useful for assessing places where sending people would be too dangerous.

Figure No. 1. Drone Technology in Construction Industry

Aerial photography from a drone is one of the most effective ways to monitor a construction site, a building, civil engineering projects, a piece of art, and so on. A drone survey will quickly and easily give an aerial overview, which will considerably assist project managers in a variety of ways, including:

- study the site before the operations start
- monitor and control the evolution of the activities and proceedings
- present an overview of a site
- check the quality of the work
- follow the deadlines in relation with the work progress
- monitor the compliance of the works with the specifications
- promote their know-how, skills and knowledge for future projects
- bring out and underscore the quality of the work

The future of Drone Technology in Construction

Prior to the emergence of aerial drones, the typical technique of collecting site data was done on foot or with human aerial vehicles. Construction experts have taken advantage of the ability to acquire up-to-date photos as often as they want in real-time by using drones.

Drones in construction give contractors an unrivalled perspective of a site at a fraction of the cost, allowing them to monitor any issues, follow progress, and design better plans on-site. This has mostly been connected to labour deployment, material waste, site inspection, and overall return on investment in building projects (ROI).

Conclusion

In the field of civil engineering, drones are a valuable technical advantage. Their usage in the construction sector will only grow in the future since they can quickly capture high-quality data and substantially reduce the danger to a project team's safety. In general, when it comes to incorporating new progressive technology into production or existing workflows, the construction sector is generally cautious. Unmanned aerial vehicles technology was swiftly embraced as a tool that reduces costs, time, and improves safety and control in the construction sector, which is a fast-growing industry. Because of their numerous advantages, construction businesses are receiving drones at a far quicker rate than ever before. Drones have proven to be an invaluable tool throughout the life cycle of a construction project, whether they are used for topographic terrain mapping, building surveys, land surveys, construction site inspections, remote monitoring, progress reports, thermal imaging recording, or integration with laser scanners. Engineers, contractors, investors, or prospective consumers have more confidence and assurance in working on a construction project as a result of the drone capabilities, which reduce money, time, risk, and labour.

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