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Orignal Article

Manpower Utilization in New Born Management Activities in Organized Swine Farm

Mamta[1], Mukesh Singh[2], Manav Singh[3], Rajneesh Sirohi[4], Deep Narayan Singh[5]

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Abstract

Rearing of pigs in India is predominantly occupied by marginal, small and semi-medium farmers which are mostly following unorganized system of pig production. Intensive pig production has been grown all around the world and also have quite a potential in India as well. Labour in an organized farm is the most critical resources which influences the profitability of it. Information about the manpower utilization for various pig farm operations is essential for the viewpoint of manpower deployment and management. A Time motion study was conducted at Swine Production Farm, IVRI, Izatnagar, Bareilly, Uttar Pradesh to find out the existing manpower utilization in new born management activities for litters belonging to Desi, Landrace, and Crossbred breed dams. Three litters consisting of 7 piglets each were utilized to record the time spent in different management activities in each group of dam. The time spent in cleaning of farrowing pen was significantly higher ($p<0.05$) for Desi dam than the landrace and Crossbred dams. Time spent in attending new borne activities was also significantly higher ($p<0.05$) for Desi dam than the landrace and Crossbred dams.

Keyword: pigs; manpower; new born management; Desi; Landrace; and Crossbred dams.

INTRODUCTION

In India pig rearing and pork industry are in the hands of traditional pig keepers belonging to the lowest socio-economic stratum.[2] Rearing of pigs in India is predominantly occupied by marginal (52.36%), small (20.9%) and semi-medium (15.42%) farmers[1] and mostly they are following unorganized system of pig production as simple backyard pigs, pigs living on garbage belts to family operated farms. Intensive pig production has been grown all around the world and has increased with greater pace in Asian countries in more recent years.[3] Restructuring of farms and agribusinesses is constantly occurring through mergers, consolidations and reorganization.[4] Growth in pig production industry has been accompanied by a shift to confinement farms and farms with multiple sites and by the use of many cost saving technologies.[5] Labour is an important resource in the seven day-a-week piggery business

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in an organized farm. Manpower is the most critical sources which influences the profitability of pig farm. Efficient use of labour is an indicator of productivity and key to profitability. Hired labour account for a large share of production cost for hog production 10%.[7] Labour cost has the distinction of being somewhat more flexible within the operator's management strategy. Types of labour activities included also influences the total amount of labour required i.e, labour demand is different for different systems of practices involved in pig production. Thus a research is needed to examine the labour requirement in these systems of production. For this purpose we first need the basic labour information in the present existing system. Labour has not been optimized as much as animal productivity, feeding and housings. Limited studies has been done in the field of manpower utilization in pigs farms in other (developed) countries where the pig farms are well organized and mechanized so their recommendations cannot be validated in Indian conditions. To get some idea of efficiency, we must have basic information about the minimum time required to finish a task. Present study is an effort to give information about the time required to clean the farrowing pen after farrowing and manage mental activities related to attending new born by a full efficient labour in presence of a supervisor.

MATERIALS AND METHODS

The present study was conducted at Swine Production Farm, IVRI, Izatnagar to find out the manpower requirement in different new born related activities under contractual labourers. The farm is well organized, and maintained animals of Landrace, Desi and Crossbred (50% and 85%) breeds. The study was done with three litters consisting of 7 piglets in each litter belonging to Desi, Landrace, and Crossbred breed dams to record the time spent in different sub activities involved in cleaning of farrowing pen after farrowing and attending new born piglets. Two labours and one technical person as supervisor were engaged in these activities. Stopwatch was used to record the Man sec consumed in removing piglets, removing bedding material, sweeping of the covered and open area, washing of the covered and open area of the pen, and putting the piglets back. For activities related to attending the newborns, time spent in removing piglets, naval cord cutting and its disinfection by swabbing with tincture iodine, Needle Teeth cutting, temporary identification by marking specific number over the body with silver nitrate dye, and finally putting the piglets back was recorded. The data was analyzed by standard statistical methods as per Snedecor and Cochran, (1989).[6] Significance was declared at P≤0.05.

RESULTS AND DISCUSSION

Cleaning of farrowing pen after parturition

The results (Table1 and Fig. 1) shows the time required in different activities in newborn management viz; collecting, removal of bedding material, sweeping of covered area, sweeping of open area, washing of the floor area and putting the piglets back to the dam pen for 7 piglets. Manpower required in this unit operation was found 685±11.88 man-sec/dam, 550.50±12.87 man-sec/dam, and 550.00±8.22 man-sec/dam, for Desi, Landrace and Crossbred dams respectively. This operation required 2 labours at a time for efficient working.

Time required in different activities in cleaning operation of farrowing pen after farrowing except collecting piglets at dam did not differ for the Desi, Landrace, and Crossbred dams. Time required for collecting the piglets was found significantly higher for Desi dam than other two breeds of dams. This was because the Desi breed has more maternal instinct, and it becomes more furious when the newborns were approached by labourers for taking out of the pen.

Attending new borne

Total manpower required in attending new born involving two labours thus calculated was found 279.14±7.15 man-sec/piglet, 251.43±9.12 man-sec/piglet, and 289±6.89 man-sec/piglet for the piglet of Desi, Landrace and Crossbred dams respectively.

Time required in different activities of needle teeth cutting, naval cord cutting and application of tincture iodine, temporary tattooing did not differ for the piglets of Desi, Landrace, and Crossbred dams. Total manpower required in attending new born was found significantly higher for piglets of Desi dam than other two breeds of dams. This was because the time required for collecting the piglets was found significantly higher for Desi dam. Time required in all activities did not differ significantly for Crossbred and Landrace litters.

Table 1: Manpower utilization in *Cleaning of Farrowing* pen after farrowing.

Breed of dam	Time req. in piglet collection (man-Sec)	Time req. in bedding removal (man-Sec)	Time required in SCA (man-Sec)	Time required in SOA (man-Sec)	Time req. in WCA (man-Sec)	Time req. in WOA (man-Sec)	Time req. in putting piglet back to pen(man-Sec)	Man-powerreq. in operation (man-Sec/dam)	Total Manpower req. in operation (man-Sec/ dam)
Total Man-power req. in operation (man-Sec /dam)	181.25± 5.62a	258.00± 14.26a	42.25± 3.47a	65.75± 5.39a	23.50± 0.65a	71.25± 5.59a	43.25± 2.14a	685.25± 11.88a	1370.5± 23.76a
Landrace	61.00± 4.53b	229.50± 6.99b	38.75± 3.97a	56.00± 1.73a	22.25± 0.75a	96.75± 2.78a	46.25± 3.75a	550.50± 12.87b	1101± 25.74b
Crossbred	59.75± 3.25b	233.50± 6.30b	41.00± 2.74a	60.00± 6.54a	22.25± 1.49a	85.75± 3.15a	47.75± 1.75a	550.00± 8.22b	1100± 16.44b
Overall Mean	100.67± 17.35	240.33± 6.40	40.67± 1.84	60.58± 2.87	22.67± 0.57	84.58± 3.79	45.75± 1.51	595.25± 20.06	1190.5± 40.12

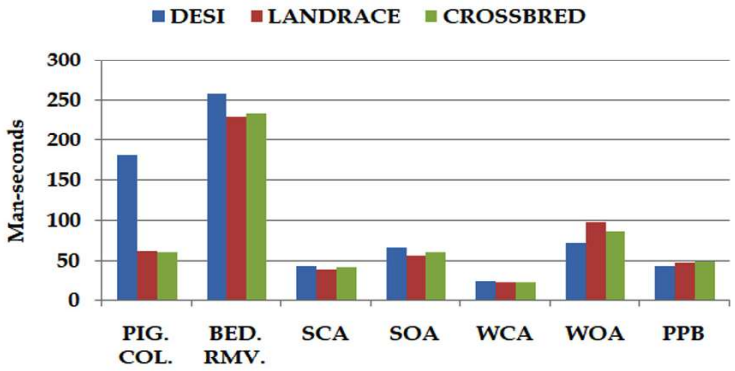

Fig. 1: Overall manpower utilization pattern in cleaning of farrowing pen after farrowing

Table 2: Manpower required in *New Born Management* activities of different breeds per piglet (n= 21)

Dam breed	Time req. in pigletz collection (man-Sec)	Time req. in needle teeth cutting (man-Sec)	Time req. in naval cord cutting (man-Sec)	Time req. in temp. tattooing (man-Sec)	Time req. in putting piglet back (man-Sec)	Manpower req. in NBM activities (man-Sec/ piglet)	Man-sec required per piglet (man-Sec/ piglet)
Desi	25.14± 0.90	29.00± 1.56	31.38± 1.98	44.43± 2.56	9.62± 0.32	139.57± 3.58	279.14± 7.15
Landrace	13.33± 0.60	29.52± 1.69	31.52± 1.54	41.95± 2.69	9.38± 0.37	125.71± 4.56	251.43± 9.12
Cross bred	19.05± 0.69	32.62± 1.64	33.24± 1.39	49.52± 2.52	10.19± 0.51	144.62± 3.45	289.24± 6.89
Overall Mean±SE	19.17± 0.74	30.38± 0.95	32.05± 0.95	45.30± 1.53	9.73± 0.24	136.63± 2.43	273.27± 4.87

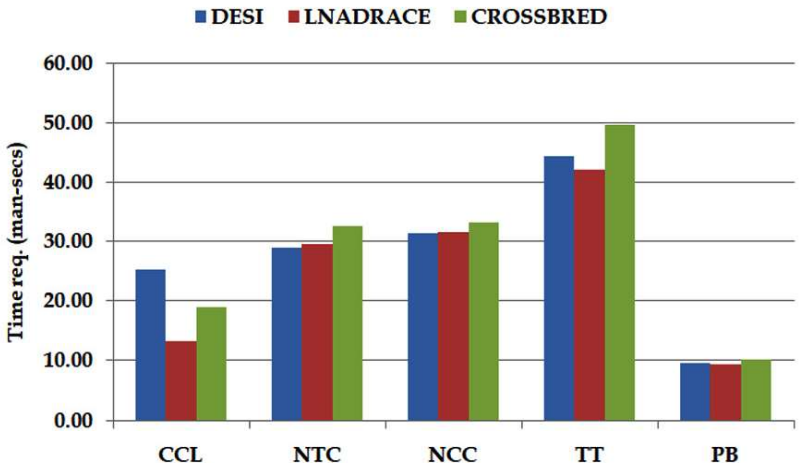

Fig. 2: Comparison of manpower utilization pattern in new born management activities for piglets of different breed dams.

CONCLUSION

This study was an effort to find out the minimum time required to finish the different task of new born management activities in an organized farm. However, the labourer deployed in these activities were considered to be working with their full efficiency and were well skilled in different activities, however to decide the manpower requirement for farm operations the working efficiency and skilfulness of labourers should be considered first.

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Review Article

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Adoption of Improved Dairy Practices by Dairy Farmers

Arpita Sharma Kandpal[1], Priya Khurana[2]

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Abstract

Dairy farming is one of the most important economic activities in Uttarakhand state, and is closely intervened with farming systems. Traditionally, a significant importance is attached to animal husbandry in this region. According to Uttarakhand Dairy Development Board, milk production in state has increased steadily. Milch cow and buffalo are reared at all altitudes and they have high potential to develop dairy farming. Milk production in the state is 1741(000 tonnes) in the year 2017-2018 and per capital availability 447 gms/day. Various measures have been taken by the Government to develop dairy business and livestock farming. Present paper aim is to discuss the status of dairy farming in India.

Keyword: Dairy farming; Status.

INTRODUCTION

"India's place in the sun would come from the partnership between wisdom of its rural people and skills of its professionals" Dr. Verghese Kurien. The Indian Agricultural system is predominantly a mixed crop livestock farming system, with the livestock sector supplementing farm income by providing employment, draught animals and manure. India has vast resources of livestock, which plays an important role in National economy and socio economic development of million of rural households. *Sabapara et al. (2014)* concluded that majority of the dairy farmers were middle to old aged, literate, nuclear type of family having more number of children and have medium level of extension contact. *Ahuja et al. (2016)* revealed that majority of the respondents were middle aged, literate having nuclear family with medium family size, small land holding, some were landless with small and medium herd size, low extension contact, low media exposure and very low social participation. In India the significance of animal husbandry in the Indian economy arises also because of its assistance to deal with the serious problem of unemployment and under employment for weaker section in the country and for providing subsidiary occupation. In an integrated system, crops and livestock interact to create a synergy, with recycling allowing the maximum use of available resources. Crop residues can be used for animal feed, while livestock and livestock by product production and processing can enhance agricultural productivity by intensifying nutrients that improve soil fertility, reducing the use of chemical fertilizers

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and on the other hand, milk, meat, wool, egg from livestock ensures steady source of income to rural households.

DAIRY FARMING IN INDIA

Dairy farming is recognized as an instrument for social and economic development. Dairying is a potential source of gainful employment, creating additional income to rural people, particularly landless farm labourers, marginal and small farmers who are resource deficit. *Kalaivani et al. (2017)* revealed that majority of dairy contract farmers were male, marginal farmers were from nuclear family and belonged to old age and low income group. *Dipu et al. (2019)* revealed that the peri urban small and marginal dairy farmers are not full dependent on dairy farming for income and young people are less interesting in dairy farming as well. The livestock, specifically dairying is highly integrated with crop production. More than 75 percent of the farmers keep 2-3 milch animals for survival of their livelihood. *(Gaikwad, 2021)*

World milk production during 2018-19 was 843.75 million tonnes. India is largest milk producing country having 17 million tonnes milk production in 1951 to 187.7 million tonnes in the year 2019. India accounting for more than 22 percent of the World milk production and per capita availability of milk in India is 394 gms/day. Out of the total milk production in India, about 48 percent milk is either consumed at the producer level or sold to non producers in the rural India and the 52 percent of the milk is marketable surplus available for sale to consumers in urban areas. It is anticipated that India needs around 600 million tonnes of milk per year to fulfill the demand for milk and milk products. This means that India's milk production needs to grow at around 3.2 percent CAGR for the next 40 years according to *(Ramsinbhai 2019)*, FICCI paper on development of Dairy sector in India.

The rapid growth of milk production is mainly because of the increase in the number of animals rather than improved productivity and the low productivity is due to the reason that people do not adopt improved dairy farming practices at the desired level.

Over the decades the country has witnessed significant changes in Animal Husbandry Management in country. The credit of this by and large goes to the network of public and private institution involved in bringing out improved dairy practices. In India dairying is recognized as an instrument for social and economic development but, in spite of several years of efforts, the pace of development is not uniform in different parts of the country *Patil et al. (2009)* stated that majority of the respondents 72.44 percent stated their constraints as low milk production from local breeds, 45.33 percent as shortage of green fodder and 41.33 percent as lack of clean water while 25.33 percent stated lack of preservation facility as their constraint in adoption of improved dairy farming practices. *Dhaka et al. (2017)* revealed that lack of knowledge, poor extension support, poor credit support, lack of proper communication system, high cost of inputs, and lack of conviction were the major constraints perceived by the farmers in adoption of improved dairy farming practices. *Meena et al. (2017)* concluded that non availability of livestock extension officers, veterinary doctors, preference of natural services are the constraints in adoption of improved dairy farming practices. *Rajadurai et al. (2018)* revealed that the major constraints faced by the dairy farmers were high cost of concentrates, low price of crossbred cow milk, shortage of land, repeat breeding for adoption of improved dairy farming practices. *Rajpoot et al. (2018)* stated that low price of milk and milk products, lack of technical knowledge, high cost of construction, no vaccination against contagious diseases and lack of loan facility were major constraints in adopting improved dairy farming practices. *Rathva et al. (2019)* stated that high cost of feed, lack of insemination facility in time, high cost of production of milk were the major constraints perceived by the dairy farmers. *Minhaj et al. (2020)* revealed that lack of finace, inadequate housing, lack of proper knowledge of milk production, high cost of feed supplements, poor conception rate of A.I. and high cost of treatment were the major constraints faced by dairy farmers in adoption of improved dairy farming practices. *Sharma et al. (2020)* revealed that the majority of dairy owners 78 percent were not adopting the scientific feeding parameters due to poor technical knowledge and lack of training, unawareness, poor resources, and non availability of green fodder as not available throughout the year in majority of dairies.

According to *Ministry of Fisheries, Animal Husbandry and Dairying*, Government of India is making efforts for strengthening infrastructure for production of quality milk, procurement, processing and marketing of milk and milk products through various Dairy Development Schemes like: National Programme for Dairy Development (NPDD), National Dairy Plan (Phase-I), Dairy Entrepreneurship Development Scheme (DEDS), Support to Dairy Co-operatives, Dairy Processing

and Infrastructure Development Fund (DIDF) etc.

DAIRY FARMING IN UTTARAKHAND

The Government has provided infrastructural and policy framework from which millions of dairy farmers are benefiting from it. Market and institutional help provided by the Government are some other factors. Dairy farming in the rural area has become a major source of livelihood generation for the people who do not have enough land resources and other means of income generation living in poor conditions by providing employment opportunities. *Satyanarayan et al. (2017)* concluded that family size, family type, annual income, economic motivation, land holding and education had positive effect on adoption of scientific practices. Growing urban and industrial centers like, Dehradun, Haridwar, Rishikesh, Haldwani-Kathgodam, Nainital, Rudrapur, Pantnagar and Kashipur etc. are creating continuous demand of milk andmilk products. Role of *Uttarakhand Co-operative Dairy Federation Limited (UCDFL)* and milk unions of the districts is important in this regard which are working with thousands of milk societies spread throughout the Uttarakhand. Economic status of the milk producers belonging to these milk societies is continuously being improved by the sale of milk.

ADOPTION OF IMPROVED DAIRY PRACTICES

Adoption is a decision to make full use of an innovation as the best course of action available. Adoption is essentially a decision making. The sequences of stages in the process of adoption by farmers are (a) Awareness of the existence of an innovation. (b) Conviction of usefulness. (c) Acceptance in the sense of willingness to try the innovation (d) Complete adoption. Adoption of an innovation is a process composed of learning, deciding, and acting over a period of time. The adoption of specific practices is not the result of a single decision to act but series of actions and thoughts decisions. Improved dairy farming practices are the dairy practices involving better and new technologies of dairying which ultimately ensures good animal health, better milking hygiene, nutrition, environment, high production of milk and socio economic management. *Tailor et al. (2012)* revealed that feeding of green fodder, feeding of colostrums to newly born calves have high adoption whereas practices like Artificial insemination, rearing of crossbred, pregnancy diagnosis and full hand method of milking had low adoption level. *Divekar et al. (2016)* concluded that higher extent of adoption was observed in reproductive management, followed by health care management, while lower extent of adoption was seen in milking and general management practices. *Khode et al. (2017)* concluded that majority of the respondents 38.13 percent had medium level of adoption of improved animal husbandry practices. *Meena et al. (2017)* concluded that 80 percent of the dairy farmers adopted improved reproductive practices, 96.67 percent of the dairy farmers adopted improved dairy management practices, 76.67 percent of the dairy farmers adopted improved health care practices. *Godara et al. (2018)* revealed that majority of the dairy farmers had medium level of adoption regarding breeding, feeding, management and health care practices. *Kadian et al. (2018)* observed that 66.25 percent of respondents had medium level of adoption of breeding practices, 68.34 percent fell under medium level of adoption in feeding practices, 70.83 percent under medium level of health care practices and 51.25 percent fell under medium level adoption of management practices. Different improved dairy farming practices are Feeding practices, Breeding practices, Management practices, Health care practices.[1]

Animal health care Practices: Poor animal health is one of the principal constraints to increasing small scale dairy productivity, as it results in high morbidity and low production. Overcoming this constraint could significantly improve productivity and result in real and direct benefits for producers. It includes Vaccination of all animals as recommended or required by local animal health authorities, regularly checking of animals for signs of disease, attending sick animals quickly and in an appropriate way, use of veterinary medicines as prescribed by veterinarians.[2] **Breeding practices:** Milk producers can improve productivity and returns from dairying through selective breeding and control of reproduction. Reproductive efficiency (e.g., calving intervals, conception rates) can be improved by using genotypes that are suitable to the production environment, and appropriate husbandry practices. Artificial insemination (AI) is used mainly for cattle, and to a lesser but growing extent for other dairy animals such as sheep and goats. In developing countries, AI is routinely used by large scale dairies, which often produce breeding males that are sold to smaller producers for natural mating.[3]

Feeding practices: The quantity and quality of

the feed and water provided largely determines the health and productivity of the dairy animal, and the quality and safety of its milk. Regular grazing, feeding advance pregnant animal with extra concentrate, feeding colostrums to newborn calves, regular feeding of green fodder etc are some suggested feeding practices.[4]

Management practices: Management practices ensures proper care of the animals, proper keeping of animals in ventilated houses, adequate spaces for them, proper cleanliness of the animals and maintaining adequate open space for them. Through these practices good animal health and high milk productivity can be assured. Growing population, changing lifestyle, expanding urbanization and increasing climate changes are developing new challenges in Bovine breeding systems, the challenge is to provide essential nutrients to promote health especially reproductive health, fortunately along with the challenges, the developments in science and technology are also emerging to tackle these challenges.

Further, the number of indigenous breeds with better adaptability, disease resistance and feed efficiency ratio is declining, it is the need of the hour to conserve and improve the productivity of Indian indigenous breeds. For accomplishing this task, adoption of improved dairy practices like focusing on 100 percent artificial insemination coverage along with the application of advanced cutting-edge reproductive technology developments, feeding of good fodder, good management and health care system are needed all these steps promise to give a long term sustainable solution to both livelihood and security of about 70 million farming community of India as well as provide enhancement in milk production. *Gupta et al. (2019)* observed that 56.66 percent of respondents have medium level of adoption about improved dairy management practices followed by 22.5 percent respondents have low level of adoption and 20.83 percent have high level of adoption about improved dairy management practices. *Bidyut et al. (2020)* revealed that 53.85 percent respondents had medium level of adoption of improved dairy farming practices, while 53.08 percent respondents had low adoption level of improved dairy farming practices.

An assessment of adoption of improved dairy farming practices is important for dairy development and to improve the production efficiencies.

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Review Article

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Air Pollutants and its Effects on Animal Health, Production and Reproduction

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Abstract

Air pollution refers to any physical, chemical or biological changes in air quality i.e. contamination of air by harmful gases, dust and smoke which affects plants, animals and humans drastically. Air pollution is one of the major problems which affect the animal's health, production and reproduction parameters throughout the world. Air pollutant may be an anthropogenic, biogenic or geogenic source that is either not part of the natural atmosphere or is present in higher concentrations than in the natural atmosphere and can have harmful effects in the short or long term on the living creatures. Mostly inhalation triggers the health problems in animals as well as in human being also, but occasionally deposition of particulate matters from industrial exhaust on pasture land may also affect health directly or indirectly. Pollutants may enter the animal's body system by inhalation or ingestionmechanism and affects mostly the respiratory and cardiovascular system. Particulate matter (dust) and Bio aerosols are also responsible for reduced growth and increased morbidity and mortality from respiratory disease and abscesses in animals and human being. The rapid industrialization, urbanization, unplanned and excessive exploitation ofnatural resources has been causing pollution problems in cities and towns of developing countries.

Keyword: Aerosol; Anthropogenic; Pollutants; ppm; VOCS.

INTRODUCTION

The earth's atmosphere consists of a mixture of gases. Some gases have a nearly constant concentration, while others are variable in both time and space. The most important gases are nitrogen (78.1%), oxygen (20.9%), argon (0.92%) and water vapour (variable 0.004 to 4%). The concentration of some other atmospheric gases is listed in Table 1 *(Builtjes, 2003)*.

Table 1: Chemical Compositions of Air

Gases	Symbol	Concentration (ppm)
Neon	Ne	18.2
Helium	He	5.2
Krypton	Kr	1.14
Xenon	Xe	0.09
Carbon dioxide	CO	280.0
Methane	CH_4	0.750
Nitrous oxide	N_2O	0.270

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Air pollution occurs when the air contains gases, dust, vapours or odours in harmful quantities, that can be harmto the health or well being of humans, and animals or that can damage plants and living creatures leads alteration in nutritive values of plants *(Singh et al., 2017)*. The substances that cause air pollution are called pollutants. Air pollutant can be defined as any substance emitted into the air from an anthropogenic, biogenic or geogenic source that is either not part of the natural atmosphere or is present in higher concentrations than in the natural atmosphere and can have harmful effects in the short or long term.

General air pollutants of anthropogenic origin present in the atmosphere have similar adverse effects on human and animal health, especially on the respiratory and cardiovascular systems. Air pollution has a significant impact on the health of agricultural workers and affects their job satisfaction *(Boivin et al., 2003)*. The impact of air pollution on human health is well understood and there is need of awareness about this. However, the effects of air pollution on animals, which are not yet recognised as sentient beings, are neglected.

The earliest reports associated with air pollution and livestock can be traced back to the 1930 by *Almquist et al. (1934)* in the United States to establish a link between air quality and animal health. Innes, 1936 established the relationship between the incidence of coughing and dust levels in pigs. Further reports on effect of air pollutants on animals viz. effects of dust on calves *(White, 1940)*, a case of H_2S gas poisoning in a cow *(Coghlin, 1944)* and a report on the death of chickens from silogas *(Peterson et al., 1949)***.**

Air pollutants in general can be classified as primary or secondary type.

PRIMARY POLLUTANTS

Substances emitted directly from sources into the atmosphere. The most important primary pollutants known to cause damage in sufficiently high concentrations are the followings:

- Carbon compounds, such as CO, CO_2, CH_4 and VOCs (volatile organic compounds).
- Nitrogen compounds, such as NO, N_2O and NH_3
- Sulphur compounds, such as H_2S and SO_2
- Halogen compounds, such as chlorides, fluorides and bromides
- Particulate matter (PM or "aerosols"), either in solid or liquid form, which is usually classified into these groups on the basis of the aerodynamic diameter of the particles:

Particle Size (μm)	Specification	Remarks
11-100 μm	Inhalable	Easily enter into the nose and mouth
5-10 μm	Thoracic	Easily penetrate deep into the airways
2.6-4 μm	Respirable	Small enough to pass completely through the airways and enter the bloodstream.
0.2-2.5 μm	Fine	Greatest risk to health.
<0.1 μm	Ultra fine	Penetrate tissue and absorbed directly into the bloodstream

Secondary pollutants

These are not emitted directly from sources, but are formed in the atmosphere from primary pollutants (also called "precursors"). The main secondary pollutants known to cause damage in sufficiently high concentrations are the following:

- NO_2 and HNO_3, formed from NO.
- Ozone (O_3), formed by photochemical reactions of nitrogen oxides and VOCs (volatile organic compounds).
- Sulphuric acid droplets formed from SO_2 and nitric acid droplets formed from NO.
- Sulphate and nitrate aerosols
- Organic aerosols formed from VOCs in gas-to-particle reactions.

Sulphur dioxide (SO_2): This compound is colourless but has a pungent, choking smell. The main source of SO_2 is the burning of fuels containing sulphur (such as oil and coal). Exposure to SO_2 can irritate lung tissues and damage to the lung parenchyma. It also irritates the eyes, nose and throat. As part of acid rain, this rain acidifies lakes and rivers, destroys the life of plants and fish in lakes and rivers, removes mineral nutrients from soils, reduces forest and agricultural yields, and corrodes metals and damages building surfaces.

Nitrogen oxides (NO and NO_2): NO_2 is a reddish brown gas with a pungent odour. The main source of this gas is motor traffic and is involved in the formation of ozone in the troposphere. High concentrations can cloud vision and increase the risk of acute and chronic respiratory diseases. Nitrogen dioxide is a serious air pollutant and can cause pulmonary oedema (excessive accumulation of fluid in the lungs). It can also produce

photochemical smog.

Carbon monoxide (CO) - This colourless, odourless gas is produced by the incomplete combustion of fuels. Therefore, motor vehicles are currently the largest source of CO. Carbon monoxide is the most common fatal poisoning in many countries around the world. Exposure to carbon monoxide can be life threatening, causing poisoning of the central nervous system and heart, serious effects on the baby in pregnant women, headaches and dizziness and problems with oxygen supply to parts of the body.

Volatile Organic Compounds (VOCS) - Volatile Organic Compounds are defined as organic compounds that readily evaporate into the atmosphere. VOCs include a wide range of organic air pollutants, from pure hydrocarbons to partially oxidised hydrocarbons and organic compounds containing chlorine, sulphur or nitrogen. Some aromatic compounds such as benzene, toluene and xylene are potentially carcinogenic and can cause leukaemia. As promoters of ozone formation, VOCs can cause respiratory and other ozone-related problems. They may indirectly contribute to the problem.*(Kesselmeier, et al. 2000)*

COMMON AIR POLLUTANTS AROUND LIVESTOCK AND EFFECTS IN ANIMAL HEALTH

The effects of air pollutants and emissions on animal health have been conducted on various livestock farms. There are various air pollutants which affects the animal health.

Ammonia

Elevated ammonia levels leads to decrease in growth *(Charles and Payne, 1966),* feed consumption *(Lee et al., 2005),* health condition *(Veit et al., 1985),* and immune response *(Wei et al., 2015).* The higher concentration of atmospheric ammonia primarily acts as an irritant to the ocular and respiratory mucosa, affecting the course of infectious diseases by playing as a chronic stressor and reducing the growth of healthy young animals *(Lillie, 1972; Curtis, 1983). Drummond et al., (1980)* observed a 12% reduction in weight gain in young pigs which were exposed to 50 ppm air ammonia, but no respiratory lesions were observed. There is positive correlation between levels of ammonia in the air of the farm and incidences of arthritis, porcine stress syndrome lesions, and abscesses *(Donham, 1991).* There are five main mechanisms protecting the lung from foreign materials invasion which are cellular and humoral immunity, mucociliary transport, macrophage function, cough reflex and nasopharyngeal filtration. Out of these defence mechanisms, mucociliary transport and alveolar macrophage functions are the one which are most affected by ammonia and hydrogen sulphide air concentration *(Lillie and Thompson, 1972).* In poultry, ammonia is considered the most harmful gas in broiler houses *(Carlile, 1984).* An ammonia concentration of 50 ppm in the air over a prolonged period irritates the respiratory tract and predisposes chickens to respiratory infections with the additional risk of secondary infections and the development of ocular kerato-conjunctivitis at an ammonia concentration of 60 ppm in the air *(Hauser, 1988).*

Hydrogen Sulphide

Hydrogen sulphide is a potentially lethal gas produced by anaerobic bacterial decomposition of proteins and other sulphur containing organic matter. Large amounts of suddenly released H_2S during stirring or pumping of stored manure have resulted in animal deaths *(Hoff et al., 2006).* This colourless gas with the distinctive smell of rotten eggs is heavier than air and can accumulate in slurry pits, holding tanks and other low areas in a facility. Hydrogen sulphide is a serious air pollutant, with concentrations generally highest in pig barns incompared to poultry, dairy farms have higher concentrations of hydrogen sulphide.

Particulates or Dust

Fine particulate matter (PM), or simply dust, is a complex mixture of extremely small particles and liquid droplets in the air *(USEPA, 2010).* Fine particulate matter comes from two main sources: animals themselves *(e.g. skin, hair and feathers)* and animal feed *(Shen et al., 2019).* Animal barns are an important source of particulate emissions. Particulate matter concentrations in stables are high and are influenced by the type of housing and feeding, animal species and environmental factors. They are primarily caused by the increasing activity of the animals *(Maghirang et al., 1997).* Dust concentrations are usually higher in poultry houses than in those of other livestock species. Pig barns usually have higher dust concentrations than cattle barns. Dried faeces are heavily contaminated with microbes and microbial by products. Animals and workers in nursery and farrowing pens would be exposed to greater concentrations of faecal dust than in fattening farms where feed dust predominates

(Donham, 2000).

Bioaerosols and Endotoxins

Air quality, as defined by ventilation parameters, influences aerosol dispersion of potential viral and bacterial pathogens that colonise over the epithelium of the respiratory tract. The concentration of endotoxin in the atmosphere of housing facilities is of greater importance for animal health.

Endotoxin is a phospholipid-polysaccharide macromolecule that forms the cell wall of Gramme-negative bacteria. It is released when the integrity of the cell wall is disrupted. A typical range for endotoxin in the atmosphere of a closed building is 150-1000 units. The maximum concentration of exotoxin for pig health has been reported to be about 150 units. Endotoxin is a potent pro-inflammatory substance and is thought to play an important role in respiratory disease in people working in animal farms.

CONCLUSION

The common air pollutants present in atmosphere have similar adverse effects on human and animal health. Scientific studies on the effects of air pollutants on the health and productivity livestock, indicate ammonia and hydrogen sulphide are two important inorganic gases that affect the respiratory system in various ways and many more other health effects including arthritis. Particulate matter (dust) and Bio aerosolsare associated with reduced growth and increased morbidity and mortality from respiratory disease and abscesses. Thus these associated adverse effects needed to be addressed in context of animal health as well as the labourers involved in livestock farming.

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Comprehension on Aromatic and Medicinal Plants in Improving the Functionality of foods of Animal Origin

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Abstract

The numeral of plants that have preservative and aromatic values to food is considerable during the last few decades. The change in consumption pattern of consumers that is "going green" is further augmenting. The advantage of these food additives is that they can be incorporated at any point of time with excellent antimicrobial, antioxidative and preservative action. The functional properties of these plants are exhibited by the presence and quantum of active substances. As animal source foods are having a rich nutritional dense matrix and are very much prone to oxidative deterioration and microbial spoilage, judicial use of certain plants (Medicinal and aromatic plants) and their extracts can be promising aspects of natural additive supplementation for modern consumers. Thus, this conception can benefit the expansion of diversity and functionality of bioactive compounds as natural preservatives in foods of animal origin sector.

Keywords: Medicinal and aromatic plants; Functional food; Animal food; Essential oil.

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INTRODUCTION

Medicinal and Aromatic plants have been used to fortify foods throughout history as preservatives, flavor, and therapeutic agents. The herbs and spices are low cost commodities, they are nowadays appreciated as gold or jewels in many developing and developed countries.[1] The use of plant parts and extracts were used by ancient civilizations and have been used for Centuries in India and China. Today, these plants can be used to increase the acceptability of foodstuffs and improve their health thereby increasing the functionality of the product. Additionally, herbs and spices have been utilized as food additives all over the world,

not only to enhance the organoleptic properties of food[2] but also to increase the shelf life by decreasing or eliminating food-borne pathogens.[3] Several studies have recommended the use of dietary herbs[4] and spices for their beneficial effects on human health through their antimutagenic, anti-inflammatory, antioxidative, and immune-modulatory properties.[5] Nowadays, livestock products are a unique carrier that has been successfully used to deliver phytochemicals and other nutrients for health benefits in our nutrition food system.[6] Furthermore, the addition of herbs and spices or their extracts to different dairy and meat products make these products act a carrier for neutraceuticals.[7]

MEDICINAL AND AROMATIC PLANTS (MAPS)

Medicinal and aromatic plants play an important role in the life of people. In Indian traditions, all the plants on this earth are considered medicinal [Jivak in Astanga Hriday (Sutra[9-10])]. No exact definition of a Medicinal plant is possible however, medicinal plants could be defined in the simplest way as plants that are used in official and various traditional systems of medicines throughout the world. The foundation for the selection of these plants are depending upon the active ingredients that are capable of affecting the physiological processes of living organisms, including human beings. The definition of aromatic plants is even less precise. The plants have an aroma; being fragrant or sweet-smelling, implies the taste of aromatic herbs. These aromatic plants are exclusively used for medicinal purposes in aromatherapy and perfumery.

Spice plants are used as seasoning and flavoring agents having potent antioxidative and antimicrobial properties. These are capable of enhancing the sensory attributes by means of color and overall acceptability of food products. The complexity and overlapping uses of active ingredients found in these plants, make it practically impossible to establish them as medicinal or aromatic plants. Nutmeg, caraway, anise, dill, coriander, thyme, cinnamon, etc. are equally known as medicinal, spice, and essential oil crops. Therefore, these plants are frequently referred to as medicinal plants, disregarding their specific features of the presence of active ingredients. More recently, the term "Medicinal and Aromatic Plants" (MAPs) has been used in a slightly broader sense, distinguishing the fragrant (aromatic, ethereal) ingredientscontaining a group of medicinal plants.

CLASSIFICATION OF MEDICINAL AND AROMATIC PLANTS (MAPS)

The MAP scan be classified in different ways, but the subsequent form of classification is as follows:

Chemical Classification

Based on the presence of active matter in the body of the plants.

1. ***Plants that produce Essential Oil:*** Nutmeg, Anise, caraway, Parsley, Mint, Cinnamon
2. ***Plants containing bitter substances:*** Mugwort, Vermouth, Gentian, Chamomile
3. ***Plants containing glycosides:*** Ouabain, Digitalis, Scilla, Nerium oleander
4. ***Plants containing saponin:*** Mojave yucca, Gypsophila, Saponaria, Hedera Helix, ginseng
5. ***Plants containing alkaloids:*** Lobelia inflate, Datura, Nicotiana, Atpora, Poppy
6. ***Plants containing flavonoids:*** lettuce, Silybum, Verbascum, Kale, Peaches
7. ***Plants Containing Tannins:*** Maples, Hamamelis, Quercus, Willows, Quebracho, Sumac

Classification by Type of Consumption and Use

1. ***Stimulating Plants, Soft Drinks, and Herbal Teas:*** Tea, Coffee, Tobacco, cocoa, cannabis
2. ***Spice Plants:*** Allspice, Basil, Cumin, Black pepper, Mustard, Thyme, fennel, poppy, sesame, anise
3. ***Medicinal Plants:*** Digitalis, Atropa, aloe, tulsi, neem, ginger, mint, cinnamon, Ashwagandha plant, Allium sativum, Vitexnegundo, stinging nettle, Orange flowers, Chamomile flowers
4. ***Perfume Plants:*** Lavender, Rose, Oriental lilies, Daphne, Heliotrope, Angel's trumpet (Brugmansia), Lily of the valley, Korean spicebush, Jimson weed (Datura), Tuberose, Lilac
5. ***Gum and Mucilage Plants:*** Acacia, Astragalus, Plantago, gum ghatti, (Anogeissuslatifolia), neem gum (Azadirachtaindica), gum karaya (Sterculiaurens; Cochlospermumgossypium), Joel or Jingan gum (Lanneacoromandelica), and Mesquite gum (Prosopisjuliflora)
6. ***Resin Plants:*** Sweetgum, Ferula, cedar, fir, juniper, pine, redwood, spruce, Yew, larch
7. ***Tannin Plants:*** Rhus, Oak, gallnuts, lacquer

leaves, cotinus leaves, oaks, blackberries, pomegranates

8. ***Dye Plants:*** Rubia, Bixa, AlkanaTinctorium, woad, madder, Indigo, saffron
9. ***Insecticide Plants:*** Neem, Allium sativum, Artemisia absinthium, Citrulluscolocynthis, Laurusnobilis, Menthapulegium, Myrtuscommunis, Nerium oleander, Ocimumbasilicum, Origanummajorana
10. ***Wax Plants:*** Jojoba, Myrica, palm, soybean, candelilla, rice

ACTIVE INGREDIENTS

MAPs contain complex chemical substances having different physiological (metabolic) activities. These are mentioned as active or biologically active substances (principle), implying their effect on the physiology of living organisms. The active ingredients of plants are frequently classified into four traditionally accepted groups alkaloids, glycosides, essential oils, and other miscellaneous active substances.[8] These categories are mainly based on physiological, practical, and investigative considerations.

- Alkaloids are a group of nitrogen containing substances of basic chemical reaction; they frequently form salts and have strong physiological effects on living organisms. The alkaloids are very variable in their composition.[9]
- Glycosides are compounds of various chemical structures and physiological effects, and divergent metabolic origin. Although generally not regarded as a uniform group of compounds, their common feature is that one or more identical sugar molecules are bound to a non sugar type compound.[10]
- Essential oils term refers to a mixture of various compounds, mainly terpenes and terpene derivatives that evaporate at room temperature without residues. Frequently they have characteristics and a strong odor and taste (aroma). These essential oils are generally extracted (isolated) by the steam distillation process.
- Miscellaneous substances like aromatic acids, bitter substances carbohydrates, mucilaginous substances, plant pigments, rubber, sterols, tannins, and vitamins cannot be classified into the above groups; they are of diverse chemical composition and physiological effectiveness. In contrast to the above classification, the biogenetic system of natural substances is based on the main pathways of universal metabolism and connects special metabolic pathways.

SECONDARY METABOLITES

All plants produce an extensive variety of organic compounds that do not have any functions during their growth and development phase. These extensive varieties of organic compounds are generally referred to as secondary metabolites, secondary products, or natural products of the plant. They are different from the primary metabolites (amino acids, saccharides, etc.) in many characteristics. Primary metabolites are present in all the plants whereas secondary metabolites are found only in certain plants.

Table 1: Three main groups of secondary metabolites

A - Terpenes	B - Phenolic Compounds	C - Nitrogen Compounds
Essential Oils	Phenylpropanoids	Alkaloids
Cardenolides Glycosides	Coumarins	Cyanogenetic glycosides
Saponins	Benzoic Acid Derivatives	Amines
Steroids	Lignin	Glucosinolates
Resins	Anthocyanins	Alkamides
Rubber	Flavonoids	Lecithins
Gibberellins	Tannins	Peptides (and polypeptides)
Cannabinoids	Volatile terpenoids	
Artemisinin	Hydroquinones	
Thapsigargin	Hydroxybenzoates	
	Hydroxycinnamates	

PROCESSING

Medicinal Plants: Appropriate measures of primary processing are dependent on types of material (active compound). These processes should be carried out in conformity with national or regional quality standard norms. Drying Medicinal plants can be dried in several ways such as in the open air under shade, wire screened rooms, by direct sunlight, drying ovens or rooms, solar drier, indirect fire, microwave, infrared device, etc. depending upon material and requirement. Specific processing Some medicinal plants require specific processing such as peeling of roots or rhizomes, boiling in water, steaming, soaking, pickling, distillation, fumigation, roasting, natural fermentation, treatment with lime, and chopping.

Aromatic Plants: Hydro-distillation is done which are three basic types of essential oil hydro-distillation. In all these processes, condensation of the extracted volatiles oil in gaseous form is passed through a condenser which is cooled by running cool water.

Solvent extraction is used where total extractions are needed e.g. oleoresins extraction of ginger, cardamom, pepper, etc. and concentrates and absolutes of jasmine, rose, etc. After extractions, the solvents are removed.

ESSENTIAL OILS

Certain aromatic plants contain odorous, volatile, hydrophobic, and highly concentrated compounds named essential oils (or volatile or ethereal oils). These are obtained from various parts of the plant such as flowers, buds, seeds, leaves, twigs, bark, wood, fruits, and roots.[11] The essential oils are complex mixtures of secondary metabolites consisting of low boiling point phenyl propenes and terpenes. The most significant families for the essential oils are Apiaceae or Umbelliferae, Asteraceae or Compositae, and Lamiaceae or Labiateae. Based on the type and concentration of active principle, essential oils exhibit cytotoxic effects on living cells, although non-genotoxic. The cytotoxic activity of essential oils is mostly due to the presence of phenols, aldehydes, and alcohols. Such cytotoxic activity is of great interest for applications against some human or animal pathogens and parasites, as well as for the preservation of agricultural and marine products. Moreover, essential oils can exhibit hypolipidemic, antioxidant, digestive stimulant, and antioxygenic activities and can also contribute to odor and ammonia control. Aromatic plants and their essential oils are decent sources of natural antimicrobial and antioxidants, such as phenolic compounds, e.g., Anethole, eugenol, thymol, carvacrol, Terpinene, Methoprene etc.[12] The essential oil contains polyphenols in form of glycosides, although the bioactivity is governed byaglycon structures mainly to catechol in aglycons in the composition.[13]

APPLICATION OF HERBS IN DAIRY PRODUCTS

Thoughtful application of numerous herbs in various forms i.e. powder, essential oils, etc. in certain dairy products has been successfully endeavored to have increased functionality. The account of each dairy product incorporated with herbs and spices has been deliberated herein.

Various significant results were obtained by incorporating these MAPs with the various dairy products. *Rajanikant*[14] reported that when *Arjuna* herb was incorporated with ghee (clarified butter fat) it helped in the prevention of Cardio Vascular Diseases. *Deshmukh et al.*[15] stated that the addition of Vidarikand (*Puerariatuberosa*), Shatavari (*Asparagus racemosus*) and Ashwagandha (*Withaniasomnifera*) increase the anti-oxidant property of ghee. Trials of *Panwar et al*.[16] concluded that incorporation of *Withaniasomnifera* imparts Aphrodisiac, Rejuvenative and life prolonging properties to ghee. Ghee is imparted with Immuno-stimulant, anti-hepatotoxic, anti-oxytocic, antioxidant, and anti-diarrheal attributes by adding Asparagus racemosusis.[17] Sage (*Salvia officinalis*) and Rosemary (*Rosmarinusofficinalis*) increases the shelf life and anti-oxidant property of ghee.[18] Some MAPs like Cinnamon and licorice were added to Yogurt and Labneh (concentrated yogurt) to impart an inhibition effect.[19] *Chowdhury et al*.[20] stated that a mixture of Tulsi leaf (*Ocimum sanctum*), Pudina leaf (*Mentha Arvensis*) and coriander leaf (*Coriandrumsativum*) is added to yogurt to increase its β-D-galactosidase activity. A very popular Indian dairy product: Dahi (*Indian yogurt*) and lassi (a fermented drink) was incorporated with Aloe vera to impart immune-protective effects.[21] *Landge et al*.[22] reported that Ashwagandha powder was added to Shrikhand (sweetened and flavored) to increase its shelf life. *Kumar et al*.[23] showed that mint acts as flavor enhancer when added to yoghurt. Ice cream, an industrially important dairy product is made tastier (enhanced physiochemical properties) by adding ginger and basil (*variety Ocimum sanctum, O. Americanum, O. Basilicum and O. Gratissimum*).[24] Buch

et al.[25] reported that turmeric is an effective way of extending the shelf life of panner (directly acidified cheese like product). Paste of turmeric (*Curcuma longa*), coriander (*Coriandrumsativum*), curry leaf (*Murrayakoenigii L*), spinach (*Spinaciaoleracea*) and aonla (*Emblicaofficinalis*) was added in Sandesh (*sweetmeat based on chhana*) to extend its shelf life and impart antioxidative property.[26] Samy[27] reported that cheese was attributed with antibacterial properties by the addition of clove essential oil.

Usage of medicinal plants in meat and meat products

The use of medicinal plants, which have an important antioxidative effect on meat and meat products, is increasing. The most studied medicinal plants for use in meat and meat products are thyme, thyme, rosemary, licorice, green tea, and Nelumbonucifera.[28] For instance, thyme was detected as effective in inhibiting oxidation, keeping the flavor and safety of meat. The sensory acceptability of muscle food is very important.[29-31] The effects of these plants on the quality of meat products vary depending on the usage dose and their original color and flavor.[32] The active edible film[33] with the incorporation of essential oil[34] in the film forming solution for preserving the quality attributes of meat food production is prospering.

Many researches have been done which proves that the functionality of meat and meat products has increased with the addition of various medicinal plants. Oregano, Thyme (5%) addition in Ground beef patties resulted in higher antioxidant activity than Thyme.[35] *Jiang et al.*[36] added Rosemary extract (0%, 0.02%, 0.05%, 0.1%) in precooked pork patties and found imparted anti-oxidative property (Licorice extract was more effective than rosemary extract). Oregano and sage leaves (0.2% w/w each) were added to cooked chicken and presented lower TBARS values than those of the control and BHT samples.[37] Rosemary extracts (250, 500, 750 mg/kg) added in porcine liver patties reduced lipid oxidation with no effect on color stability.[38] Marjoram, rosemary, and sage (0.4%) had antioxidant effects when used at the level of 0.04% of the sample (v/w) to minimize lipid oxidation and improve color with storage at 5°C for 41 and 48 days.[39] Beef patties blended with Myrtle extract (10%), Rosemary extract (10%), Nettle extract (10%) Lemon balm extracts (10%); showed antioxidant effects.[40] Chicken nuggets were incorporated with Anise, caraway, and nutmeg essential oil at refrigeration temperature for 15 days resulted in significant increase in shelf life with acceptable sensory attributes.[41]

CONCLUSION

Medicinal plants are conventionally used in folk medicine as natural healing remedies with potent therapeutic properties. The application of different kinds of medicinal plants as antioxidants has been studied in milk and meat products and these studies show promising results. These medicinal plants inhibited lipid oxidation and degradation of meat pigments thus stabilizing the color and helping to delay the rancid flavors in meat and meat products. These MAPs are found effective in increasing shelf life, increased antioxidative and microbiological property along with distinct essence. Further research is needed to determine their safe limits and toxicological effects in milk and meat products as the extraction or processing conditions may alter their properties.

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Review Article

Behavioral Economics may be the Option for Growth Strategy: Myths and Reality Check on Indian Economy

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Abstract

Developing countries have taken an enormous hit in terms of capital outflows, growing bond spreads, currency depreciations and lost export earnings, including from falling commodity prices and declining tourist revenues. Lacking the monetary, fiscal and administrative capacity to respond to this crisis, the consequences of a combined health pandemic and a global recession will be catastrophic for many developing countries and halt their progress towards the Sustainable Development Goals. In line with the government's stated policy of Aatmanirvar Bharat or self reliance, Indian will integrate its rich economic and spiritual heritage with modern economic ideas for ethical wealth creation through a marriage of the invisible hand of the market with the hand of trust. We must recognise that wealth creation is a collective process and that market outcomes are the product of how these various "wealth creators" interact. We must drop the false dichotomy of governments versus markets and begin to think more clearly about the market outcomes we want. Public investments should be the mission oriented, instead of focused on "facilitating" or "incentivizing" business. Policy should actively shape and create markets, not just fix them when they go wrong. Fiscal and monetary policy will be important, but only if coupled with the creation of opportunities in the economy. Money creation, through quantitative easing, will not fuel the economy if the new money ends up in banks that do not lend. And when businesses do not see opportunities, interest rates stop affecting investment. Until the 1980s, productivity increases were accompanied by wage increases and rising living standards. This link was broken by a drop in labour's negotiating power and companies' increased financial orientation. The farm sector is likely to register positive growth even as the rest of the economy (barring the government sector) contracts. Federal structure will be the key for effective corporate governance and hence should be more involved in innovation policy, pressing for investments in education and training the long run drivers of wages. By generating a virtuous cycle where private investment, wage and employment growth as well as consumption feed into each other. The rise in agricultural activity, coupled with higher allocations to the MGNREGA also appears to have led to a sharp drop in rural unemployment as observed in the CMIE data. However, healthy growth of the farm sector, even if it continues, is unlikely to offset the economic losses suffered by other parts of the economy. It is possible that heightened risk aversion, self imposed restrictions, and localised lockdowns continue to be a drag on activities in urban areas, impinging upon rural economic activity as well. The behavioural economics is playing the crucial role in major economic domain may be drive towards Aatmanirvar Bharat in the near future.

Keywords: Employment; Fiscal Policy; Government Policy; GST, MGNREGA; Infrastructure; PM-KISAN, TBI.

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INTRODUCTION

In an ideal world, people would always make optimal decisions that provide them with the greatest benefit and satisfaction. In economics, rational choice theory states that when humans are presented with various options under the conditions of scarcity, they would choose the option that maximizes their individual satisfaction. This theory assumes that people, given their preferences and constraints, are capable of making rational decisions by effectively weighing the costs and benefits of each option available to them. Successful marketers must have a profound understanding of the consumer's thought process in order to create a successful marketing campaign. By understanding the consumer's decision-making process, marketers are able to develop value of money less 'costly'.

Indian economy has been witnessing a slow down since 2012-13. The Covid pandemic and war economy is and around the neighbour states have caused considerable uncertainty in the economy. In this context it would be a relevant exercise to explore the possibilities to revive and protect the economy from further slow down and create an environment for an Inclusive and Sustainable development. Our attempt is to expose the myths and realities related to recent slowdown of the economy and to suggest some necessary behavioral changes to uplift the economy from further slow down and ensure an inclusive sustainable development.

Slowdown in retrospect

The slowdowns of Indian economy till in the eighties were mostly a result of drought induced agricultural contractions, wars or balance of payments (BOP) pressures. Though the farm sector had a roughly one-third share in India's GDP, three consecutive drought years of 1985, 1986 and 1987 impacted the economy significantly. The early Nineties slowdowns were mainly due to fiscal and external current account deficits. The growth slump of the early-2000s had mainly to do with the after effects of the 1997 Asian financial crisis and the end of a mid-1990s corporate driven mini investment boom. But the recent slowdown of Indian economy is a unique in its own characterization. Even there's no shortage today of food, forex or even savings. For example, public cereal stocks at 94.42 million tonnes as on July 2020, aggregate deposits with commercial banks as of July 31 were Rs 14.17 lakh crore or 11.1 percent higher than a year ago, foreign exchange reserves were, in fact, at a record high ($538.19 billion on August 7, rising by $60.38 billion since end-March 2020, *The Indian Express 17th August, 2020*), but still there is a severe contraction in the economy which is totally different from the previous ones which were "supply side" induced. Households have cut spending as they have suffered income. Even those with jobs are saving more than spending because they aren't sure when the pandemic will be over. Similar pattern has been observed for the businesses. Many have shut or are operating at a fraction of their capacity and pre-lockdown staff strength. The ones still making profits are conserving cash. If at all they are investing, it is to buy out struggling competitors and not to create new capacities. Households are uncertain about jobs and incomes, firms don't know when demand for their products will really return. This demand side uncertainty and the resulting economic contraction is something new to India. The resultant outcome would be that the GDP will decline of 5-10 percent as projected by various agencies for 2020-21. India has never experienced negative economic growth since 1979-80. The fiscal deficit is on an average of 3.7 percent of GDP during 2014-15 to 2018-19 which is much better than the 5.4 percent during the previous five years. In addition, annual consumer food price inflation is too low (on an averaged a mere 1.59 percent between October 2016 and October 2019) as compared to the previous five years, even though it stands out in a situation where food stocks and forex reserves are at record highs. Meanwhile, banks are also facing a problem of plenty.

QUEST FOR REASONING OF SLOW DOWN

India's slowing economy took a toll on much needed savings too, with the savings rate touching a 15 years low, and household savings also is already hobbled by low investment falling. This has weakened India's macro-economic position which and rising external borrowing to fund capital needs. Household savings also declined as consumers spent more in purchasing durables and travelling. India's households contribute to about 60 percent of the country's savings. But India's gross savings fell to 30.1 percent of the gross domestic product in fiscal 2019 from 34.6 percent in fiscal 2012, and 36 percent in 2007-08, data from the Central Statistical Organisation shows. The previous low was 29 percent in 2003-2004. As a percent of GDP, household savings fell from 23 percent in 2012, to 18 percent last year. A falling savings rate could lead to Indian companies ending up borrowing more from overseas markets, weakening India's external position as it would raise the nation's external debt.

In order to raise investments at a time when savings are falling, the current account balance will have to fall or the current account deficit will have to widen, needing more foreign inflows for funding. But the paradox is that in reality check shows that the Bank deposits are up 11.1 percent, the corresponding credit growth has been just Rs 5.37 lakh crore or 5.5 percent. With very little credit demand, the bulk of their incremental deposits are being invested in government securities, which have increased year-on-year. In a deposit centric financial structure, the stability of the system depends on the accretion of deposits. We have already seen fixed deposit rates come down significantly. In economy, the overall investment ratio (share of gross fixed capital formation in GDP) rose to 31.4 percent in fiscal 2018 from 31.1 percent in fiscal 2017 and 30.3 percent in fiscal 2016. That remains below the 34 percent plus achieved in fiscals 2012 and 2013. Public investments when geared up towards infrastructure creation it is expected to incentivise or "crowd in" private investments. The role of Centre in capital spending is low and declining from 45.5 percent in fiscal 2010; it came down to 28.2 percent in fiscal 2018, suggestive of the restricted fiscal space.

But it is equally a fact that between 2007-08 and 2019-20, the Centre's outstanding debt-GDP ratio has come down from 56.9 to 49.25 percent. So has general government debt, which includes the liabilities of states, from 74.6 to 69.8 percent. Economists such as Olivier Blanchard have shown that public debts are sustainable provided governments can borrow at rates below nominal GDP growth (that is unadjusted for inflation). But only with nominal GDP growth falling to 7.2 percent in 2019-20, and most likely zero this fiscal, has the Blanchard debt sustainability formula come under threat.

In contrast, it is the states and internal and extra budgetary resources (IEBR) of PSUs that are largely funding public investments. The share of the government's investment in GDP raised from 3.5 percent in fiscal 2012 to 4.2 percent in 2017. Since 2015, share of the states' capital expenditure (capex) has got a major upward push when the 14th Finance Commission recommendations were implemented, and states not only started getting a bigger share of the divisible pool of taxes, but also more untied funds. The share of states has raised from 32.6 percent in fiscal 2010 to 43.4 percent in fiscal 2018.

The kind of policy support that can revive any economy quickly in times of an unprecedented shock like we have seen is no doubt the fiscal policy support. It is well known that discretionary fiscal policy support which is defined as targeted support to households and businesses may help in the growth process where the credit rating agencies appear to be less worried about the worsening of fiscal and debt positions in the short-term in fact it is the reverse. It may be possible that even in the normal times, if Government allowed to run about 10 percent deficits, implies that the government's ability to apply countercyclical policy but due to pandemic it is severely curtailed. In the short term, the economy has to pay a price. Other way to look that it appear to be more concerned about the fact that India may not have the administrative and fiscal capacity to implement large fiscal support, and that would be a headwind to growth. What would reassure markets and avoid further credit rating downgrades is not lower fiscal spending in the short-run as many perceive, but most importantly a strategy to revive growth, combined with a credible fiscal plan for the medium term.

A series of probable questions come to the fore. What are the effect of demonetisation and Goods and Services Tax (GST) on incomes and expenditures, especially in the informal sector? Is the growth data based on national accounts statistics properly capturing the decline in the informal economy, which, at least in the pre-demonetisation and GST period, employed the majority of the country's workforce and even supplied goods and services for the formal sector? Most of the analyst was unable to show any facts and Fig.s on the impact of demonetisation but making some sweeping statements without any facts.

As income from GST accounts plays a significant share of state revenue, this needs support to. But the pandemic has widened the gap, with GST revenues declining 41% in the April-June quarter. While the 14% growth rate in tax revenue has been compounded over the base year 2015-16, collections have remained around the same level for two years. Collections through the compensation cess will not be enough to offset the shortfall in states' revenues as measured against their protected revenue growth.

But as per the GST (Compensation to States) Act, 2017, states are guaranteed compensation for revenue loss on account of implementation of GST for a transition period of five years (2017-2022). The compensation is calculated based on the difference between the current states' GST revenue and the protected revenue after estimating an annualised 14 percent growth rate from the base year of 2015-16. While the rationale for assuring states a fixed

growth rate of 14 percent for their GST collections can be debated linking it to nominal GDP growth. The challenge is therefore how to compensate states for the greater than expected shortfall.

It is true that the economy is facing the most unprecedented shock in post-war history but present crisis is truly different than the 1930's depression economy. There was no fear and scare factor among people but the present crisis rising uncertainty and risk towards sharp deterioration in economic activity.

Another reason is due to the unprecedented slowdown were as exacerbated with the already inefficient *Discoms*, making matters worse for power developers. Distribution Companies (DISCOMs) have been a significant strain on the Indian power system. It is necessary to mentioned here that *Capex* at the state level which is defined as the sum of capital outlay, and loans and advances. Since 75 percent of *Discom* debt was taken up by the state governments in fiscals 2016 and 2017 under the *Ujwal Discom Assurance Yojana*, it is prudent to remove this part from the state *Capex* to get more meaningful states spending position for their investment capacity. Most of the state's *Capex* accounted more than half for Discoms are the companies that are responsible for the distribution the electricity to the consumers. Almost 80 percent of the company's output goes to power plants, and the biggest dues were from state owned power firms in West Bengal, Tamil Nadu and Uttar Pradesh. Their poor financial performance has been weighing down the entire sector with their inability to pay power generators on time, manage their losses, and iron out other inefficiencies.

Causes of slowdown may be due to the loan which was provided by the financial institutions on steel, power and infrastructure sector should not commensurate the expected returns to pay out the debs amounts to the sector but also piled up the non performing assets (NPA) in the financial system. On the other hand non banking financial companies (NBFCs) who mainly lend to the real estate sector are also suffering cash crunch. At the end of June 2019, the unsold house/flats in 8 major cities were almost 10 lakh, valued at 8 lakh crore. It is reported that most of the banks were under stress, some of whose credit to NBFCs amounted to 10-14 percent in their ledger books. Fund starvation of NBFCs that had emerged as a key source of lending for small business and consumer durable purchased virtually collapsed. Banks as well as mutual fund virtually stopped lending to NBFCs.

POLICY SUPPORT TO REVIVE OF INDIAN ECONOMY

The debate surrounding the slowdown is whether it is a cyclical down turn or a structural correction. Diagnosing the problem is the key for devising policy responses. Cyclical slowdowns can be dealt with using temporary fiscal and monetary stimulations. Structural problems, on the other hand, require long run policy responses. The Economic Survey rightly mentioned that from the insights of behavioural economics, States can make the right choices without depriving people their choices, as people tend to stick with the default options among a set of choices. The technique can help in scenarios such as persuading the well-off to give up subsidies; making people sign up for savings or health insurance schemes and making farmers buy fertilizers on time.

The impact of flagship government initiatives such as Swachh Bharat Mission, Jan Dhan Yojana and the Beti Bachao Beti Padhao provides testimony to the potential of behavioural change in India, an ambitious agenda for behavioural change on issues such as gender equality, a "healthy and beautiful" India, savings, tax compliance and credit quality. People do tend to make choices based on motives and incentives. If there are right kinds of incentives, people will behave accordingly. One of the factors that drive tax evasion is individuals' perception of the benefits and services they get from the government and how taxpayer funds are utilized in the economy. The Economic Survey encouraged tax compliance, top 10 taxpayers within a district could be accorded due recognition. This may take the form of expedited boarding privileges at airports, fast-lane privileges on roads and toll booths, special "diplomatic" type lanes at immigration counters, etc. Also, the highest taxpayers over a decade could be recognized by naming important buildings, monuments, roads, trains and universities in their name. The idea is to set up "clubs" that exude not only social status, but also honour.

After a deep contraction in the April-June quarter, we expect the economy to rebound mechanically. Going forward, we expect a step down to a more normal, and lower sequential growth pace. Different parts of the economy are likely to recover from the hit at different speeds. Industrial activity could possibly normalise, especially in manufacturing where controlling the virus might be easier. In contrast, industries in which it is harder travel or entertainment for example will still be in a gradual normalisation

process, and probably won't rebound completely until a vaccine is available. Our quarterly estimates imply that real GDP would contract by 4.4 percent in FY21; this would be the deepest recession India has witnessed since 1980. It is important to note, however, that what we are witnessing is just the normalisation of activity from extremely low levels; this may not be evidence of marked improvements in domestic macro-economic fundamentals.

We have to accept that our credit policy doesn't work in raising the financial inclusion of neither the rural workers nor to migrants, self employed, and MSMEs and that may be key point before proceeding to reset the economy growth process through lending. We have also to mention that no foresee the migrant crisis as there was no database about migrant workers. That how we can move that a modern state is a welfare state where data based are so week. Not to create temptations to disguise spending as lending and to avoid unreasonable requests like interest waivers, endless moratorium extensions, blanket one-time restructurings, fudging accounting, reducing capital adequacy, 24-month IBC suspension, etc. It's also breeding an academic blame game that insists the problem pertains to personalities, not structure.

The lessons we have learn from our earlier lending policy, that to give loans is easier than getting them back and that the reason that the banks would have run out of capital and government banks need more than capital. Raising credit availability and lowering its price needs competition driven innovation. Capital should be chasing Indian banking given its high net interest margins, high market cap to book value ratios, and massive addressable market.

Relying on anecdotal evidence or looking at how prices and wages have moved in the recent period, but these cannot substitute for NSO surveys on monthly per capital expenditures that are also the basis for measurement of poverty ratios. Nor we are able to make a difference on low food inflation on spending by households and possibly ignoring them in a low income, jobs and investment growth scenario.

How consumption expenditure is going down in absolute terms according to the NSS estimates and is growing at more than 5 percent according to the NAS? It is well known that that these two types of estimates of consumption expenditure do not match and that is the case in other countries as well. In the 1970s, consumer expenditure according to NSS estimates was around 90 percent but in 2017-18 it was only 32.3 percent according to NAS, where consumption expenditure growth is positive and helping in the GDP growth rate and while on the other where it is actually falling.

It is well known that growth in economy mainly depends on the growth in demand, both for investment as well as consumer goods. Overall if the demand is falling, then the installed capacity will not be fully utilized and it will stop for the scope of new investment, no scope will take place for employment and the economy will get caught in a vicious cycle. In order to boost the aggregate demand it is necessary to harness the opportunities of the informal sector. Expansionary fiscal policy will be impacted more effectively than what would appear from the informal sector. Indeed, the expansionary effect will be larger than what can be guessed from the formal sector expansion. The reason is that a big segment of the population is located in the informal sector; they are poorer and tend to spend a much higher fraction of their income on consumption.

According to National Account Statistics (NAS), around 60 percent of the GDP spent on consumer expenditure whereas 30 percent goes for gross fixed capital formation (or investment). If average consumer expenditure is down and government expenditure has grown around 10 percent, then where is the GDP growth coming from? Accordingly, growth in investment and government spending contribute 1.3 percent to the overall GDP growth rate, and so to get an overall 5 percent growth rate, consumer expenditure should be growing at higher than 5 percent.

It is time to give more emphasis on domestic demand for continuing India's growth process. It is necessary to rethink that instead of boosting households' savings (for retirement income, children's education, healthcare, and housing) through a web of financial repression, regulatory distortions, and public spending choices. It needs redesigning India's infrastructure to look more inward and less outward, increasing public provisioning of healthcare and education, reforming insurance regulations to reduce out of pocket expenses, and eliminating financial repression to raise returns on retirement savings. Merely tinkering with macroeconomic policies will not be enough. India needs to face that it can no longer depend on global trade to be the only growth driver. Instead, it needs to search and find new sources of growth and that starts with recognising and accepting reality.

Will Increased spending on schemes like MGNREGA, education and rural infrastructure is

the need of the hour. As per the estimates provided by the Centre for Monitoring the Indian Economy that the micro enterprises (MSME) were losing 1.5 million jobs due to cash crunch which were mainly generated from the unorganized sources. Small and medium scale micro units face another kind adjustment of uncertainty due to newly introduced GST framework for goods and service tax regime. Fundamentally, we need reform to our labour markets, attract people to cities where we ensure healthy living conditions, and create economic opportunities in rural India.

WAY FORWARD TO ARREST THE SLOWDOWN

In short run, to address the economy slow down one needs to push social and urban affordable housing and basic infrastructure. House building activity provides employment in numbers and its transmission effect to small towns and villages is both quick and effective in shoring consumption demand. If this will go up, there will be an increase in the demand for steel and cement and this will kike off a virtuous cycle of increased demand.

A significant share of India's workforce is trapped in low paid informal work. Data from the Periodic Labour Force Survey (2018-19) tells us that less than 10 percent of the workforce is engaged in regular formal jobs, earning an amount (approximately Rs 26,000 per month) that is above a decent minimum wage. Another 14 percent are engaged in regular informal jobs and report average monthly earnings (Rs 9,500), which is roughly equivalent to or slightly below a minimum wage. The self employed (own-account workers and unpaid family workers) and casual workers account for 50 percent and 24 percent of the workforce respectively and report average earnings that are considerably below a decent minimum amount (Rs 8,400 per month for self-employed and Rs 209 per day for casual labour). Casual workers, who are unlikely to receive work on every day of the month, are at the bottom of the employment structure. How do we increase earnings of those at the bottom of the pyramid? One way is by devising strategies that enhance productivity growth in the informal economy. In fact, structural change that allows for productivity increase in the informal sector increases the incomes of low-wage workers. Another way of achieving this is by raising the minimum wages of the worst off workers.

It is important that minimum wages are paid in public workfare programmes too, in particular MGNREGA works, which involve the employment of unskilled labour. At present, MGNREGA wages are not covered under the Minimum Wages Act. However, it is important to note that less than 4 percent of casual workers are employed in public works programmes. If wages of such a small proportion are to serve as a credible wage floor for others, the contours of public workfare programmes need to be modified. In particular, such works will need to be made widely available all year round. The level at which the decent minimum wage should be set assumes importance in a framework where it is being leveraged to boost consumption and demand of those at the bottom.

In India, the minimum wage is supposed to be shaped by the objective of prevention of exploitation and to ensure bare sustenance of life. However, to enhance the incomes and, therefore, consumption of low wage earners, we need to go beyond the objective of simply overcoming poverty and instead aspire to provide them a decent wage which enables them to maintain a reasonable level of consumption expenditure. For this purpose, the minimum wage can be linked to the consumption expenditure of the relatively better-off group of workers, that is, the regular formal workers in some manner, say the median consumption of the bottom 25 percent. This would create not just a dynamic linkage with the consumption of the better-off workers, but will also allow for the updating of the minimum wage every year as and when the Periodic Labour Force Survey data is released.

The Indian employment challenge today cannot be seen independently of the problem of inadequate income. One half of the economy works on wage labour and policy interventions in the domain of wages can be used to construct a minimum income floor. This approach of increasing wages of casual workers in public programmes and linking them to the consumption of regular formal workers to provide a minimum income guarantee is different from the exercise of providing unconditional cash transfers to those at the bottom of the distribution. Such an intervention will not only enable income enhancement of those in low-paid work but also add fuel to demand and growth, this time from those at the bottom of the distribution.

Vocal for Local gaining momentum, there's a huge increase in local apps, local kirana stores, local artisans and brands. The government has done well to take care of the poor and rural markets. The MGNREGA has created 153.16 crore person days of employment during April-July2020. Not only is this way higher than the 107.24 person days for the

corresponding four months of last fiscal, but also significant compared to the 267.96 crore and 265.35 crore person days generated in the whole of 2018-19 and 2019-20, respectively.

In short, MGNREGA has provide work in rural areas during the peak summer months when the rabi crop would already have been harvested and kharif plantings almost is going to be over. MGNREGA is intended primarily as an employment scheme for unskilled rural manual workers. This time round, though, it was supposed to also cater to migrant labourers returning to their villages. While there are reports of even engineers and graduates enrolling for work., Also MGNREGA guarantees only 100 days of work to all adult members of a rural household at wage rates ranging from as low as Rs 190 in Chhattisgarh to Rs 309 in Haryana. Clearly, it cannot substitute for what the returning migrant labourers were earning as drivers, electricians, plumbers, masons and carpenters or even as less-skilled security guards and loaders in factories. It translates into temporary relief at best. The way forward is to generate demand for products, and create jobs by improving infrastructure.

The Centre has already initiated some action on affordable housing. The challenge is scaling it up; co-opting states and municipalities and having them use state resources for social housing. Infrastructural development in the PPP framework gives positive impacts too. The banking sector, which is not lending for a variety of reasons, can be pushed to give loans to this sector, if necessary with higher collateral insistence.

Focus should be on ethics and building trust when developing solutions to ensure that benefits of technology are available for everyone. National Statistical office (NSO) reported that in December 2019, about 12.67 lakh new jobs were created against 14.59 lakh in the previous month as per the pay roll data of the Employees' State Insurance Corporation (ESIC).

Infrastructure investment should be stepped up, particularly in those sub-sectors which can create jobs. Roads, water shed development, logistics chains such as warehouses, cold storage, grading and sorting facilities will not only give successors to agriculture and rural sector but also mitigate rural stress. Earlier attempts through PPP faced lot of conditions like for better terms for them, at the same time, the government was slow with approvals and projects had stalled. Revitalization of PPPs with appropriate and enforceable risk allocation will be helpful. It will help to increase the government sector to manage these partnerships, and give these new regulators independence, funding, expertise and power.

India has a comparative advantage in abundant supply of labour. The country will have to switch to large scale labour intensive industries and should specialise in their production and exports. Textiles, apparels, leather, handlooms and handicrafts should be focused to jumpstart the exports. This will bring down the trade deficit too. These sectors should be given cluster support, technology support and tax breaks for five years. A regulatory apartheid traditionally existed between banks and non-banks. But progress in payments, MSME lending, and consumer credit suggest that non-banks are important for financial inclusion. They need more regulatory space and supervision.

In reality check, huge amount of investment on infrastructure were spent for better facilities but in reality the facilities are still very poor as compared to some other Asian countries. Though the electricity costs are about the same in India and China, power outrages are much higher in India. Moreover, the transportation takes much more time in India. According to Google Maps, it takes about 12.5 hours to travel 1213km distance between Beijing to Shanghai. A Delhi to Mumbai trips of 1414 km, via national high way takes about 22 hours. An average speed in the China is about 100 km per hour, while in India; they are about 60 km per hour. Railways in India have saturated while Indian ports have constantly been out performed by many Asian countries. The 2016 World Bank's Global Performance Index ranked India 35th among 160 countries. Singapore was ranked fifth, China 25th and Malaysia 32nd. The average ship turned around time in Singapore was less than a day; where as in India it was 2.04 days (Google Map, 2019).

There is a clear contradiction in the attempt to attract foreign investors to Make in India before completing the reforms of labour and land acquisition laws. For example, India has not leveraged its position as the second largest horticulture producer. Smaller countries such as Thailand and Egypt fare better than India in horticulture exports. India is the world's second largest farm producer, but still doesn't rank among top 10 exporters and Indian exports amount to a meager 2.2% share of the global agricultural trade, which is pegged around $1.6 trillion.

Economic Survey, which makes a strong case for free trade and shows that India has clearly benefited from FTAs. After progressively opening up from 1991 to 2016, we appear to have decisively

reversed course. In order to protect products made by MSMEs, which are of "good quality", import tariffs have been increased. This may seem logical, but it is not. Who will decide if the quality is good? How will such products be selected? Who will judge adherence to rules of origin?

India should relax its restrictive goods trade policy, which makes it harder for firms to import to export. For example, India imposes high tariffs on imports of yarn and fiber which, in turn, increases the cost of producing clothing.

WAYS TOWARDS SUSTAINABLE GOAL

Sustainable development in agricultural economy could be revitalized with the scheme like Sufal Bangla Scheme which was initiated in West Bengal 2014. The best and proven illustration of such market linkage is the famous AMUL model in dairy development. This has been replicated across length and breadth of the country with varied success, which has demonstrated that access to market through credible rural institutions, owned and managed by the producers, add value to the produces which are eventually passed on to the primary producers. In the North Eastern Hilly region of India, a similar initiative has been initiated through Integrated Technology Enabled Agri Management System (iTEAMS) 1917 to enable and facilitate access to remunerative and sustainable markets for farmers' produce. It is a marketing portal that links the farmers to markets through the implementation and operation of logistics and extension facilitation services.

What is needed at this juncture is capturing social inclusion by means of investment of effort and resources to the promotion, capacity building and improvement of governance. Empirical evidences suggest that to convert agriculture into business mode needs to be switched from traditional to modern technologies for high value crops.

Change in partnership of business is a must and needed of the hour, even though there were various difficulties that were crept in i.e., human assets, fund, show casing, administration and organization. It is not a charity, but a business in every sense. For this we need to recognize that agriculture as an enterprise by converging agri business to agro business in the form of monetization of farmers' produce and to provide demand led, evidence based policy advices for the promotion of a sustainable economic growth. Social business would be conducted and operated with pleasure as it holds a purpose, self satisfaction, and self-sacrifice.

Farmers need to be kept abreast of the global trends and demands such as varieties to grow or quality and the safety standards to be maintained. India also needs to take care of the concerns of various stakeholders. The most crucial information for our farmers, who cultivate under fractured landholdings and are often not updated on the global demand on the global trends in demand supply positions. This creates information asymmetry for our farmers. Small farmers must also be helped with investing in post-harvest processing; cold chain or branding requires capital as they themselves cannot take care of the same. So, investment in value chain will have to be made in such a manner that there is value creation at every levels of hierarchy.

The government's agenda of setting up 10,000 FPOs a 'Public Private Farmer Group Partnership' model could be the way ahead for pushing agriculture exports from India. Further, the government can establish crop-specific councils and extensively fund them for carrying out market research, building strong brands and setting up common infrastructure. Since NABARD is also responsible for the creation of 10,000 more FPOs, it can create a package that will help these outfits realise better prices.

While about 80 percent of Indian farmers are small and marginal farmers with small landholdings, it is not possible to double their income through agriculture production alone. For them recently announced Agriculture Infrastructure Fund (AIF) will be helpful to build post-harvest storage and processing facilities, largely anchored at the Farmer Producer Organisations (FPOs). There is no doubt that more and better storage facilities can help farmers avoid distress selling immediately after the harvest, when prices are generally at their lowest. But small farmers cannot hold stocks for long as they have urgent cash needs to meet family expenditures. Therefore, the value of the storage facilities at the FPO level could give an advance to farmers; say 75-80 percent of the value of their produce at the current market price. For that FPOs will need large working capital to give advances to farmers against their produce as collateral. Unless NABARD ensures that FPOs get their working capital at interest rates of 4 to 7 percent like farmers get for crop loans the mere creation of storage facilities will not be enough to benefit farmers. Currently, most FPOs get a large chunk of their loans for working capital from microfinance institutions at rates ranging from 18-22 percent per

annum. At such rates, stocking is not economically viable unless the off-season prices are substantially higher than the prices at harvest time.

To help agriculture marketing and better price discovery, the E-NAM online platform was also created. However, due to operational hitches such ambitious programmes have not delivered the desired result. Small farmers continue to get unremunerative prices for their products with intermediaries taking a large share of the final price of the product. The direct cash benefit transfer provided to farmers is also too low to make any substantial difference to their income.

Farmers in India today face immense risk due to climatic aberrations as well as volatile prices. Even when production levels are satisfactory, farmers' income remains a cause of concern. The Pradhan Mantri Fasal Bima Yojana was introduced to give relief to the farmers for crop loss due to climatic aberrations. While the scheme has the stated objective of incorporating 50% of the cultivated area under it, the actual Fig. continues to hover around 20 percent. There is also a substantial delay in disbursement of claims which makes it unattractive to farmers. Notably, though the crop insurance scheme provides relief to farmers, it usually covers only the cost of cultivation and not the potential value of the output. In other words, it is mandatory to the farmers who took loan are insured by the bank and it is only the bank loan that is protected by the crop insurance scheme. However, the farmers also need support to maintain them during the interim period, in the face of crop loss. Hence it is time to consider an insurance cover for the value of crops to provide better support for farmers during crop loss.

Recognising the liabilities through extra borrowing, and paying them in full for social sector schemes like MGNREGA beneficiaries and state governments would have pumped liquidity into the economy. A report by McKinsey Global Institute suggests that if women participated in the Indian economy at the level men do, annual GDP could be increased by 60 percent above its projected GDP by 2025. The same analysis also suggested that India's potential GDP gains through achieving gender parity were larger than gains in any of the other regions they studied (Rohini Pande and Charity Troyer Moore, IE Feb14th, 2020).

The other immediate challenge in the economy pertains to Non Bank Financial Companies (NBFCs) and is directly connected with the real estate sector. Rampant unfinished and unsold inventory is choking the wider economy, and NBFC woes are affecting consumption more generally. Some action has been taken, but it is too little and too tentative to keep the wider economy from dragging down.

To pump the money in the economy needs to rests on doubling the budgeted revenue from disinvestment. Half of this is to come from "strategic sales". Listing LIC could also raise a big part of it. Another source to close the fiscal deficit is through the payout from telecom and non-telecom companies which is likely to lead to windfall gains for the government. Despite the global contraction in Foreign Direct investment (FDI) inflows, FDI in India have improved which accounted 2.37 percent of GDP in 2018-19.

The strong absorbent capacity of the Indian economy shows the strength of basic fundamentals of the economy and its capacity to bounce back. One, Domestic labour market reform can lead to substantial economies of scale and increased. Global value chains (GVC) participation, especially in the labour intensive sectors. Second, improved infrastructure like roads and ports and liberalised transport services can help reduce logistics costs which are three times higher in India than in China and two times higher than in Bangladesh.

Further, the impact on consumption would vary widely depending on the relative gains across income brackets. On the other hand, spending on rural infrastructure and employment (MGNREGA, PM-KISAN, and PMGSY) can help alleviate some of the pain in rural areas.

PM-KISAN is aimed at boosting rural consumption and helping poor farmers recover from distress through direct transferring of Rs 6000 every year directly to 12 crore farmers holding cultivable land up to 2ha.A direct transfer scheme like PM-KISAN is a game changer and can have significant effects if it can deliver timely.

Taking the primary objective of fostering timely usage of technology (mainly agricultural inputs) in combination with complimentary inputs like extension services, IFRI-ICAR studies highlighted the impact based on Uttar Pradesh which is the home for 24 million farmers. The study reveals that 30 percent farmers received the income benefit within three months of the scheme's implementation where Banking infrastructure created through Pradhan Mantri Jan Dhan Yojana (PMJDY) played a key role in the fund disbursal.

Empirical study reveals that those who received the first installment, 52 percent was spent on agriculture, 26 percent on consumption, 7 percent on education and health, and the remaining

15 percent on other incidental expenses (such as during festivals and on social functions like marriage). On the other hand the recipients of the second installment, 39 percent were spent on consumption, followed by agriculture (23 percent) and education and medical (19 percent) (*Deepak Varshney et.al 2020*).

From the study it can be implied that farmers receiving PM-KISAN benefit in the agricultural peak season are more likely to spend it on agriculture and those getting it in the off-season are more likely to spend it on consumption. This clearly suggests that the timing of benefits has implications on spending patterns. Possibly it will complement MGNREGA but currently percolation of benefits is very slow and varying across the states. Even though its financing is 100 percent from the central pool, but whereas it's effect is more in UP and most of the northern states but in the eastern part of the county it's impact is insignificant may be due to state governments' indifference. The case study of UP revels that by investing more in agricultural advisory services, the government can encourage farmers to invest some or all part of the income support in productive assets for achieving the multiplier effect of PM-KISAN.

The government has taken several initiatives, including cut in corporation tax and announcement of packages for reviving sectors like the real estate, automobiles and exports. Ironically, all these are essentially supply side measures, which would make no impact on a demand constrained economy. Putting purchasing power in the pockets of those having high marginal propensity to consume should have received the topmost priority. This can easily be done through increased spending on schemes like MGNREGA, and by investing in education, health services and rural infrastructure. Such spending can immediately spur demand, which in turn would create inducement for potential investors. Direct expenditure on a scheme like MGNREGA induces 1.8 times increase in indirect income and twice the direct expenditure in pension or basic income type scheme.

- Direct cash transfer (subsidies on fertilizer and irrigation should be transformed as cash transfer).
- All product should be marketed through e-NAM (needs to strengthen APMC act, enforced all states, producers company act).
- Strengthen the price mechanism through market integration and one price.
- Reduce the risk in marketing front through better support Credit should be canalized.

The government is effectively using MGNREGA, but a social security measure is not an alternative to productive activity contributing to the GDP. It can also be argued that too much dependence on social security can be counterproductive, if unemployment is structural and not frictional. Hence, there is a need for creating employment opportunities.

To shore up growth, needs to address from trading in commodities to basic manufacturing. That's the transition Bangladesh, Vietnam, and Cambodia are making. Subsequent transitions for more advanced manufacturing and sophisticated services needs to happen which would lead to smaller growth increments. In India we did not fully exploit the benefits of the first transition. We never spent enough time fully engaged in basic manufacturing which had the greatest potential for growth and job creation, but we jumped into the second stage of advanced goods and services, which brought growth but fewer jobs. In reality though we produces the sophisticated products, but the truth is that we are unable to produce job which has been done by Vietnams and Bangladesh in their growth process as well as in job creation. In fact for India, 90 percent of the remedy lies with the domestic reform agenda. Just 10 percent is an international co-operation agenda though trade negotiations can help spur domestic reform and secure access to foreign markets.

Since scale of economy plays a crucial role for productivity growth which in turn, is essential for India to expand its share in world exports. For that India needs its position to clear itself as a cheaper sourcing of goods and parts. For that it requires macro and industrial policy reform which help by removing existing impediments and India could become a valued partner in global supply chains compared to other Asiatic countries.

Domestic labour market reform is essential for substantial economies of scale and increased GVC participation, especially in the labour intensive sectors. Second, improved infrastructure like roads and ports and liberalised transport services can help reduce logistics costs which are three times higher in India than in China and two times higher than in Bangladesh. A day's delay reduces trade by more than 1 percent.

India should relax its restrictive goods trade policy, which makes it harder for firms to import to export. For example, India imposes high tariffs on imports of yarn and fiber which, in turn, increases

the cost of producing clothing.

Therefore production means focusing on cities and towns in poorer regions, leading to the principle of devolution. Fiscal power must be transferred to the state and local level if we are to get policies form-fit for specific markets and conditions.

Finally, reform of higher education is necessary for the Indian services sector to thrive in a world where technology is both disrupting old models and creating new opportunities for trade.

It is recommended that a targeted basic income (TBI) from the central government to poor (mostly rural) households in order to boost consumption spending which is the main driver of India's economic growth. In other words, the TBI received by eligible households must be significantly larger than the various subsidies it would replace. However, there is hardly any fiscal space left to undertake a consumption boosting TBI on a long-term basis (Banerjee, 2019). Though the fiscal space is quite tight for an expansion, given the size of the existing deficit and the limited scope for raising more tax revenues or borrowings but some of the income generated in the informal sector will boost demand in the formal sector through consumer demand for mass-consumption items. As the crude oil price has dropped from around $60/ bbl to around $30 and is likely to stay at this level given the breakdown in agreement among oil producing countries and the massive collapse in global demand. If the government simply taxed the oil windfall by raising excise duties, as it did during the 2014-15 oil price collapse, it could potentially raise almost 1 percent of GDP or a staggering Rs 2.25 trillion. If 50 million households have to be provided assistance, it comes to about Rs 14,000 per month for three months or about Rs 24,000 a month to half of the 63 million SMEs. In the medium term, once the engine of the economy starts moving, the income expansion and deficit numbers will look better. We need to explore full benefits of this transition for which all state Governments must implement the Central sponsored scheme like PM-KISAAN which would complement MGNREGA by enhancing productivity growth in the economy. Immediately it requires limiting the immediate economic fallout through some forms of targeted income support, especially for those in the more vulnerable segments of the informal economy, and provision of food. For instance U.P government has announced direct cash transfer for daily wage labourers in the construction sector, and self employed cart owners, small shop owners and rickshaw pullers, in addition to one month's stock of food grains for vulnerable sections. Similarly Delhi and Kerala Government also announced packages which include the health package also.

Transition for boosting economy requires from commodity trading to basic manufacturing followed by advance manufacturing and sophisticated services which will eventually need to happen but typically lead to smaller growth increments. India was unable to exploit full potential benefits of the second stage of transition but jumped into third stage of advanced goods and services which brought growth but fewer jobs. Greatest potential of growth and job creation lies on basic manufacturing sector .which needs to be revamping for which needs to reform the labour laws. In fact, 90 percent of the remedy lies with the domestic reform agenda. Just 10 percent is an international co-operation agenda though trade negotiations can help spur domestic reform and secure access to foreign markets. Now it is the time for a structural overhaul to purge the remnants of the command economy, and usher in an incentive driven, innovation structured and market determined competitive economy.

JEL Classification Codes:

H10, H30, J38, J68, O23, A35.

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4. Facts and Fig.s are mainly quoted from day to day News Paper like Indian Express, financial Express.

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Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

References

List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540–7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347–55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone-iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3–9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792–801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. pp 7–27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979–2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7–18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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