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## I.T.S JOURNAL of IT & MANAGEMENT

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## CONTENTS

# EDITORIAL

Rapidly changing canvas of globalization, liberalized economy and technological revolution has made the business management more relevant in improving work life balance. For a world of the future both technology and management must go hand in hand, creating a constructive synergy for all of us. We, at I.T.S; are proud to publish the Vol. 19 No: 02, Edition of SYNERGY- I.T.S Journal of I.T & Management. This research journal is endeavoured to promote and disseminate the knowledge to the large numbers of academicians, researchers, students and practitioners across the world in the complex multi-disciplinary management field.

Dr. Smriti Sharma and Dr. H Sharma research paper focuses on biomedical waste (BMW) management in India has become a great challenge which has increased by many folds with spread of the pandemic. Shantanu Raj, Aditya Ranjan Samal and Bidhu Bhusan Mishra carries out a study to identify the homogenous subgroup of people associated with the buying of convenience food based on various parameters. Dr. Mukta Makhija's research paper present's an overview of existing IOT technology in health care industry. Dr. Puja Garg's paper focuses on various initiatives being taken globally by women towards environment sustainability to conserve the natural resources and develop alternate sources of energy. Dr. Abhishek Sharma, Dr. Ajay Sharma paper highlights the role NAAC in quality assurance in higher education. Shikha Agrawal's study focuses on the importance of a symbiotic relationship between leadership and teamwork

As it is evident that the contributed papers delve into multiple aspects of management in different spheres of business and intellectual pursuits offering new perspectives and strategies to engage the reader and spur innovative thinking.

At Synergy, it has always been our endeavour to provide a framework for the furtherance of research into different aspects of Management and Information Technology. It is hoped that the present issue shall continue the tradition of path breaking research ideas from such diligent minds.

**Editor - Synergy**

# Biomedical Waste Management Challenges and Management During Pandemic: A Qualitative Case Study

**Smriti Sharma** [1]

**H Sharma**[2]

## Abstract

With a population of 1.40 billion, biomedical waste (BMW) management in India has always been a great challenge, which has increased many folds with spread of the pandemic. BMW, which contains hazardous and infectious material, is produced enormously on a day-to-day basis. Due to this, it is important that the personnel involved in the management and disposal of BMW have adequate and up to date information/ awareness. Especially employees and workers involved in any healthcare unit engaged in collection, carriage and final disposal are at very high risk because BMW disposal is critical and challenging at the same time. Healthcare waste contains potentially harmful microorganisms, which can infect hospital professionals, patients, health workers, and general public. Exposure to hazardous healthcare waste can result in disease or injury. The Government had been laid down “BMW (Management and Handling) Rules, in 1998”, “BMW (Management and Handling Rules 2011)” “BMW Management Rules, 2016 and BMW (Amendment) Rules, 2018”. Several studies have highlighted that the knowledge about BMW management and its disposal among the health care personnel is limited and the practice is not satisfactory in India. The results of the present study are in accordance with the recent literature and shed light on the urgent as well as strict need for the implementation of BMW management regulations.

**Keywords:** BMW management rules, 2016, BMWM (Amendment) Rules, 2018, BMW disposal practices

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2. PhD, Professor and CoE JNU, Delhi

## Introduction

Health-care wastes generated from health care establishments; hospitals, research institutions, pharmaceutical production plants, pharmacies, animal houses, autopsy centers, and other scattered health-care activities such as health camps are referred to as health-care or biomedical waste (BMW). These include a broad range of materials from used syringes, needles, blood samples, medical devices, and radioactive fluids and/or substances. Handling, separation, storage, transportation, and final disposition are crucial for safe management of BMW. Implementation of appropriate BMW disposal is a growing challenge given the amount of BMW being produced in the last years. As per the Government of India gazette, BMW is any waste generated during the diagnosis, or treatment or research activities involving humans or animals. According to the WHO report of 2018 'the risk of hepatitis B, hepatitis C, and HIV infection is as high as 31%, 2%, and 0.4% respectively when infected with a used needle'. Furthermore, as per the 2018 report of Health Impacts of Health Care Waste, antibiotic resistant strains of Escherichia coli (E. coli) could survive in an activated sludge plant even though it is known that transfer of this bacteria is very limited under regular wastewater disposal and treatment. From the total BMW generated by health-care activities, 75 – 85% is general healthcare waste or non-hazardous. The remaining 15 – 25% of BMW is regarded as hazardous, which if not treated and disposed of properly, can lead to highly contagious diseases such as hepatitis B, hepatitis C and HIV-AIDS posing a threat to current and future generations. Focus of the present article is to understand the difficulties in managing and disposing the BMW specially after the pandemic at the Uttar Pradesh University of Medical Sciences (UPUMS), Saifai, Etawah, Uttar Pradesh (U.P). All medical equipment must be cleaned/disinfected as per the standard operating protocol of the UPUMS guidelines (Table 1).

**Table 1: Guidelines as per SOP, UPUMS for regular disinfection and cleaning of medical devices, and equipment.**

| Medical Device / Equipment | Preferred Cleaner/ Disinfectant | Procedure/Protocol |
|---|---|---|
| Stethoscope | Alcohol-based disinfectant | General wiping and cleaning |
| Thermometer | Alcohol-based disinfectant or water-based detergent | Cleaned individually between use and stored in individual boxes to avoid cross-contamination |
| Blood Pressure cuffs/covers | Water-based detergent | Wiping of cuffs with disinfectant and washing covers with the detergent |
| Instrument trolley | Alcohol-based disinfectant | Wiping completely after every use and individual trolleys for each patient |

Source: SOP, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, UP.

## Potential hazards due to BMW

Healthcare waste or BMW poses a serious threat to the environment due to its infectious composition and hazardous nature. The hazardous nature of BMW is due to one or many of the following reasons: it contains toxic chemicals and/or infectious agents, is radioactive, is genotoxic or it contains sharps. Pathogenic microbes can enter the human body via various routes for example through nasal passage, through a cut or abrasion in the skin, through puncture with an infected needle etc. Exposure to health care waste-related infections are respiratory infections (caused by Mycobacterium tuberculosis, Streptococcus pneumoniae), skin infections (by Streptococci species), gastrointestinal infections (by species of Salmonella, Vibrio cholera), septic infections (by Staphylococcus spp.), genital infections (by herpes virus), and viral hepatitis A, B, and C transmitted through body fluids, blood and inhalation. Therefore, it is crucial that personnel's handling the BMW is well trained, supervised, and monitored regularly for taking precautions.

**Government guidelines on BMW disposal**

BMW guidelines (Management and Handling) 1998 was published vide notification number S.O. 630 (E) dated July 20, 1998, by the Government of India in the Ministry of Environment and Forests, which provided a regulatory framework for the management of BMWs generated in the country. According to these guidelines, the BMW should be collected by the "occupier" which in this case is the institution generating the BMW (as per the rules laid down) and operated by the "authorized person" which in this case refers to the receiving, storing, transporting, and disposal of the BMW according to the prescribed standards. Guidelines also stated that the occupier requisite with said standards was only available for services addressing more than 1000 patients in a month. In addition, every occupier and operator is required to submit an annual report to the Central Pollution Control Board (CPCB), and any mishap or accident in any of the facilities or institutions should be reported to the authorities. Different categories of BMW and color-coding of waste categories were also defined.

Later in 2011, Management and Handling Rules stated that the previously mentioned rules apply to every occupier irrespective of the number of patients served. In addition, duties of the operator were clarified and the issue of waste material separation was sorted. In 2016, the Government of India expanded BMW management and disposal rules detailing concerning the responsibilities. The Ministry of Environment, Forest and Climate Change, Government of India, published in the Gazette of India, Extraordinary, Part II, Section 3, Sub section (i) Government of India via notification of the rules namely the Bio Medical Waste Management Rules, 2016, enlisting the duties of occupier, operator, authorities and a detailed description about the proper treatment and disposal of BMW. As per these latest regulations, the authorities responsible for implementation of rules were referred to as state pollution control boards. It also details the authorization procedure for operators and

occupiers, responsibilities of the advisory committee, and monitoring the implementation of the rules in health care centers. This ensures that the staff at occupier and operators end are well trained, all records are maintained, BMW is collected from the occupier in time, and all details of the treatment, reports, etc. are available on the operator's website.

The segregation, collection, treatment, and disposal options of BMW are summarized in Table 2. These are color-coded (red, yellow, white and blue) indicating different colors for different BMW categories. Other than indicating what kind of waste is separated in specific bags, color coding also provides visual indication of the potential risk posed by the waste when containers are transported to a treatment facility.

**Table 2: Guidelines as per SOP, UPUMS for disposal of BMW & color coding**

| Color | Type of waste and description |
|---|---|
| Yellow | Biohazard waste. Remains of the human or animal body, waste from experimental facilities, veterinary clinics or animal houses. Items contaminated with body fluids (like human blood, urine etc.). Expired medicines or pharmaceutical byproducts, cyto toxic drugs. Chemicals used in biological preparations, clinical chemicals like aspirated body secretions, laboratories cleaning solutions, disinfections etc. |
| Red | Recyclable contaminated waste generated from ur ine bags, syringes, needles, gloves etc. |
| White/Translucent | Used sharp waste including syringe -needles, scalpels, cutter etc. that can cause cuts. |
| Blue | Broken or discarded glassware like medicine ampules except for those used for cytotoxic substances, metallic body implants. |

Source: SOP, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, UP.

The guidelines also address various government-related duties which need to be carried out at the level of union ministry, state and central government, state pollution control boards, and the local authorities. For instance, Ministry of Environment Forest and Climate Change, Government of India, is responsible to make policies, and setting up monitoring committees, whereas Central or State Ministry of Health and Family Welfare is liable to monitor appropriate licensing of health centers, and that proper authorization is obtained for the management of BMW. CPCB is accountable for the guidelines on BMW management and the state pollution control board committees are to take actions against the health care facilities in case rules are violated. The State or Union government has also to ensure that state- and district-level authorities function properly and also that adequate funds and resources are allocated for the BMW management in various health centers. BMW management (Amendment) Rules, 2018, were published with minor amendments, adding, and substituting certain areas of the 2016 rules and also publishing the formats for report submission, as per BMW management (Amendment) Rules, 2018.

**Observation from different studies on BMW management and disposal**

We present the review of literature on the BMW disposal (BMWD) activities being carried out in India for about last 15 yeas and a general review of the situation shows that the practices and knowledge on BMW disposal among the personnel involved in the work were not up to expectations. There has been literature evidence from different parts of India, mostly showing that the knowledge on BMWD among the health care personnel is low and the practice of the same is not satisfactory; this further gets substantiated with the detailed study conducted in 2019 by S. Ramesh K, N. Venkta A, A Venkatesan, M. Natrajan. Various publications show that the knowledge among the doctors, nurses, and other health care workers was low, and the appropriate practices to be followed as laid down in the rules were not followed majority of the times. The International Clinical Epidemiology Network Program Evaluation Network study conducted in 25 districts

spread over twenty states of India including urban and rural areas showed that around 82% of primary, 60% of secondary, and 54% of tertiary care health facilities had no credible BMWM system in place, as per INCLEN Program Evaluation Network (IPEN) Study Group, New Delhi, India. Bio medical waste management: Situational analysis and predictors of performances in 25 districts across 20 Indian states. 'A multivariate analysis done in the study shows that charts at the point of waste generation, availability of designated person, appropriate containers and bags, availability of functional needle destroyers, availability of personal protective gears, segregation of waste at the point of generation, and log book maintenance were independently (odds ratio between 1.2 and 1.55; $P \leq 0.03$) associated with better BMWM system in the health care facilities' as per the study in 2019, 'Bio-medical waste disposal in India: from paper to practice, what has been effected' by S. Ramesh K, N. Venkta A, A Venkatesan, M. Natrajan show that the practices on bio-waste disposal are not up to the mark by literature evidence. Gupta S, Boojh R. 'Biomedical waste management practices at Balrampur Hospital', Lucknow, India, study showed that more often different kind of wastes (infectious and non-infectious) were mixed inside the healthcare facility which were later discarded along with the general municipal waste in the city. Generally, there are no separate containers available to segregate different kind of medical waste, and furthermore the hospital is entirely dependent on Lucknow Municipal Corporation for BMW disposal. The employees from the Municipal Corporation collect the BMW every 2 to 3 days. The waste generated from medical laboratories do not undergo proper segregation or disinfection, are mixed with local municipal waste, and finally end up in the Gomti river. All plastic items are deposited either inside the hospital grounds or outside the premises for further collection and transportation. This kind of open dumping of BMW is then easily accessible to rag pickers who are exposed to serious health hazards from used needles, scalpels, and other contaminated medical plastics.

**Desirable**

Based on the literature review and knowledge gained so far about the BMW disposal being

done in India, it is necessary that BMW disposal rules are implemented completely, so that harmful health effects of improper waste disposal can be avoided. Some critical points need our attention:

(a) Procedures laid out in the guidelines need to be undertaken urgently and this is only feasible when the personnel involved in BMW disposal is trained and updated regularly. Educative information including pictures or images need to be distributed and it should be ensured that it reaches the required people. Physicians could be informed through their respective national associations such as the Indian Medical Association, Indian Association of Pediatricians etc. Ensuring that the "Operators" are also updated on the rules is important. The knowledge of the staff (at operators site) should be assessed at periodic intervals.

(b) Training the personnel working on the BMWD is of utmost necessity to improvise the BMW disposal practices drastically, as per INCLEN Program Evaluation Network (IPEN) Study Group, New Delhi, India. Certification of hospitals, and other health agencies collecting and disposing the waste, and ensuring that only certified staff is given the responsibility.

(c) Making sure that charts on BMW disposal are in place at the point of waste generation, designated persons, appropriate containers, bags and other materials are made available for proper waste segregation at the point of generation, and to ensure log book maintenance, all of which would improve the practices of BMW disposal.

(d) In order to avoid failures, it is better to encourage multiple players in the "operators" side, so as to induce a competition, thereby improving the service of the operations.

(e) Strict enforcement of the laws by the authorities concerned is crucial; also monitoring the health care facilities, supervising the activities of the operator according to the rules laid down in the 2016 guidelines is of prime concern. The central and state governments should start research actions along with district level

committees for stronger implementation of policies, followed by the hospital administration to train their staff and pollution control boards to conduct regular monitoring.

**Standard Operating Protocol (SOP), UPUMS, Saifai, Etawah, UP**

The UPUMS, Saifai, Etawah, UP has issued guidelines based on current knowledge on Covd-19, existing practices and principles brought out by: WHO (World Health Organisation), MOH & FW (Ministry of Home and Family Welfare), National Health Mission, Central Pollution Control Board (Ministry of Environment, Forest & Climate Change), CMR (Indian Council of Medical Research) and other concerned agencies; which are widely circulated and available on the university website. As per SOP covering major aspects i.e. Sanitation Protocol; Environmental cleaning and Disinfection Environmental decontamination; General Principles:

Around 2 kg/bed/day BMW was generated prior to spread of pandemic, which has at least doubled and risk factor has increased several folds. Adequate training and knowledge amongst the health care personnel regarding BMW management guidelines and rules will help in proper disposal of the BMW. It begins from an initial stage of waste generation, on-site segregation, and storage, disinfection, and transfer to the final disposal site. Hence, healthcare professionals and all those people involved have to be fully trained and cautious about the associated risk factors. Different studies conducted in different parts of India show that there are gaps in the knowledge, lacunae, and inconsistency in the practices, which are matters of concern.

**Objectives**

Ascertain knowledge of different policies and practices among professionals involved in BMW management as well as to assess the gaps in knowledge, practices and challenges faced during COVID-19 among different personnel involved in final disposal of BMW in UPUMS

## Methodology

The research is based on the data available on different official websites providing first-hand information on BMW management, disposal and COVID-19. Exploratory research design was utilized for this research with the help of primary data collected through questionnaire and perused by trained management and science research scholars with the authors.

## Study design, population, sample size, mode of selection

The study will be based on qualitative and carried on cross-sectional involving personnel working in the different levels involved in BMW and final disposal. The mode of selection was on random basis, questionnaire was prepared and administered to 2,00 (100 males and 100 females) participants, with an allowable error of ten percent at ninety five percent confidence interval, and accounting for the finite a minimum sample size of 100 was collected. The responses received from respondents through questioner have been tabulated in different forms and summarized in tables and graphs. During the period of study personnel involved in direct disposal of BMW at the lowest level were 68% male and 32% female. To create homogeneity in the collected data, population was further divided in three sub-categories i.e. age below 30 years, 31 to 40 years, 41 to 50 years, 51 to 60 years.

## Sampling strategy, materials and statistical methods

Different strata based on their designation as doctors, postgraduates, staff nurses, laboratory technicians, house-keeping staff and personnel directly involved in disposal of BMW management were included in the population. The tools used for the study were pre-tested, semi-structured closed ended questionnaire which encompassed 35 questions, which were further sub-divided in to 7 sub groups having five questions each. Results were

evaluated across three domains for all the cadres. Data analysis was carried using MS-Excel and R version 3.4.3. Percentages were calculated and tabulated for better understanding. Chi-square test was performed to test on association of different cadres related to the rule, regulations, knowledge, attitude and practices towards bio-medical waste management and disposal. The null hypothesis was tested on two attributes independently. Three hypotheses were tested: cadre and knowledge; cadre and attitudes; cadre and practices –each to be independent.

**Questionnaire**

1. Participant's knowledge on risk, hazards in handling BMW management and disposal.

2. Awareness-color cods, its implications, biomedical hazard symbol, waste categories.

3. Hazards, management and disposal of COVID-19 patients' BMW.

4. BMWM and disposal of pandemic patients, care needed to concerned work force.

5. Training on handling of bio-medical waste, its management and disposal.

6. Immunizing for hepatitis B, COVID-19 & sharps' disinfection.

7. Periodic counseling, checking on awareness and testing of COVID-19.

Data collected through questionnaire regarding 'awareness regarding rule & regulations'; 'knowledge of different practices'; 'personnel employed age-wise in disposal' and 'regarding increase in load' have been analyzed and are tabulated in following table:

**Table 3: Level of awareness about regulations & rules on BMW management & disposal**

| # | Cadre | Yes (%) | No (%) | Not Sure (%) | Others (%) |
|---|---|---|---|---|---|
| 1 | Doctors | 84 | 13 | 1 | 2 |
| 2 | Postgraduates | 76 | 12 | 9 | 3 |
| 3 | Nursing | 74 | 11 | 8 | 7 |
| 4 | Technicians | 71 | 10 | 13 | 6 |
| 5 | Housekeeping | 64 | 20 | 11 | 5 |
| 6 | Disposal personnel's | 59 | 28 | 11 | 2 |

**Figure 1: Level of awareness about regulations & rules on BMW management & disposal**

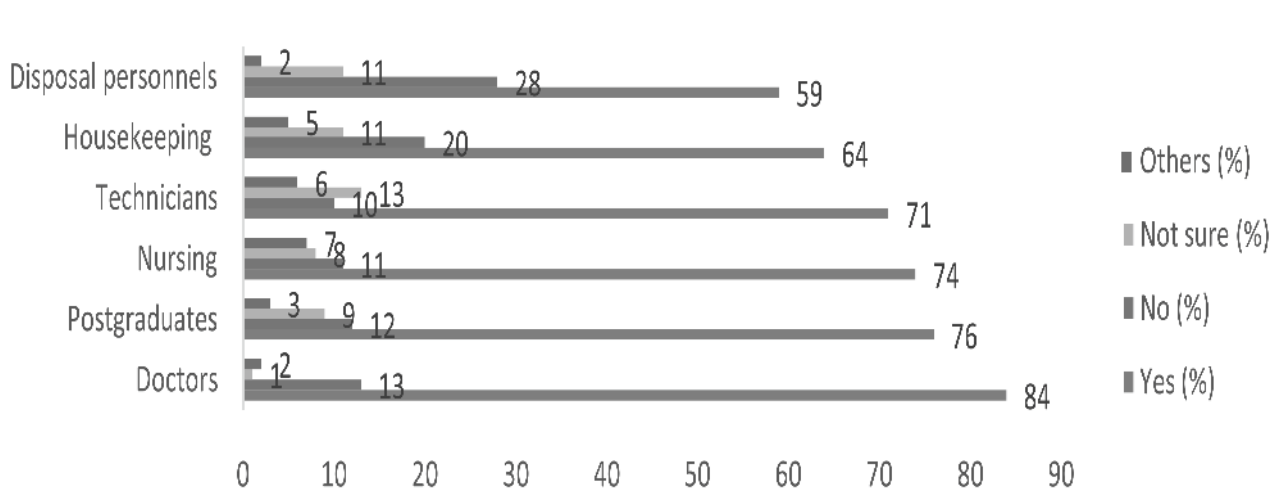


**Table 4: Participant's awareness on practices regarding BMW and disposal system**

| # | Cadre | Yes (%) | No (%) | Not sure (%) | Others (%) |
|---|---|---|---|---|---|
| 1 | Doctors | 76 | 14 | 3 | 7 |
| 2 | Postgraduates | 59 | 19 | 12 | 10 |
| 3 | Nursing | 64 | 18 | 9 | 9 |
| 4 | Technicians | 61 | 16 | 13 | 10 |
| 5 | Housekeeping | 65 | 15 | 11 | 9 |
| 6 | Disposal personnels | 79 | 8 | 11 | 2 |

**Figure 2: Participant's awareness on practices regarding BMW and disposal system**

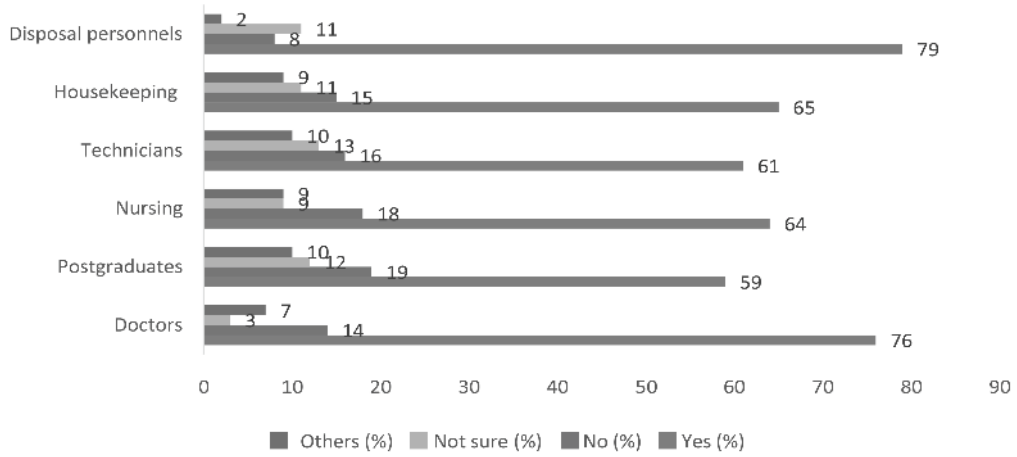



**Table 5: Respondents involved in BMW disposal age-wise during the study period**

| # | Nomenclature | % age |
|---|---|---|
| 1 | Respondents directly involved in BMW disposal age below 30 years | 44 |
| 2 | Respondents directly involved in BMW disposal age group 31-40 years | 33 |
| 3 | Respondents directly involved in BMW disposal age group 41-50 years | 17 |
| 4 | Respondents directly involved in BMW disposal age group 51-60 years | 6 |
| 5 | Total respondents directly involved in BMW disposal | 100 |

**Figure 3: Respondents involved in BMW disposal age-wise during the study period**

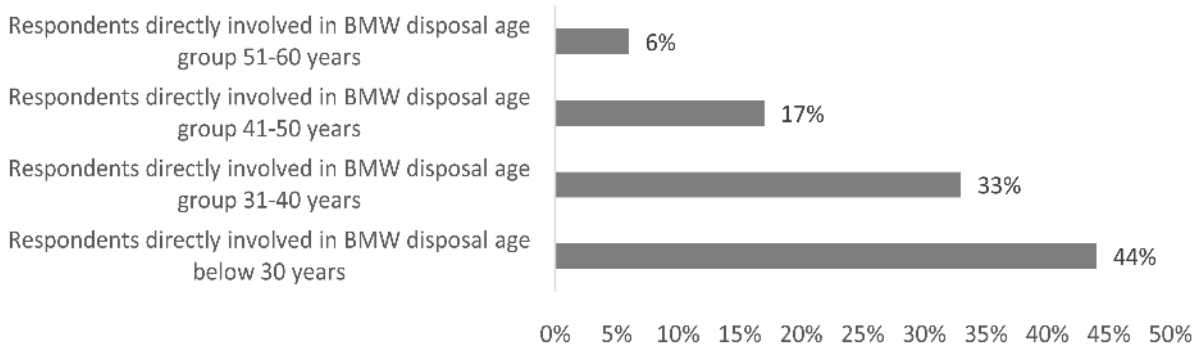



**Table 6: Percentage of excessive load on BMW disposal respondents during COVID-19**

| # | Nomenclature | % age | Increase in % age load |
|---|---|---|---|
| 1 | Respondents directly involved in BMW disposal male | 68 | 76 |
| 2 | Respondents directly involved in BMW disposal female | 32 | 55 |
| 3 | Total respondents directly involved in BMW disposal | 100 | 131-100 (31%) |

**Figure 4: Percentage of excessive load on BMW disposal respondents during COVID-19**

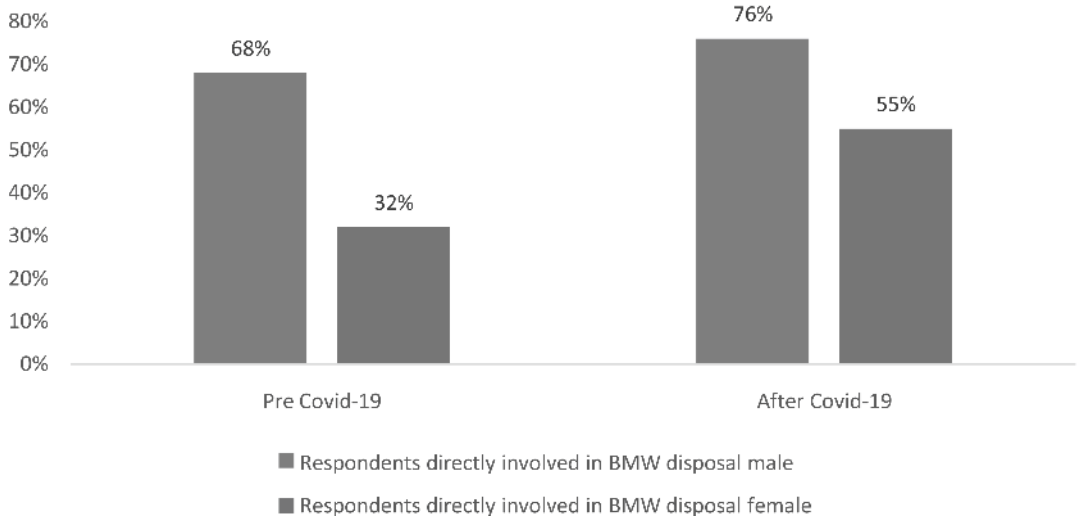


**Table 7: Detail of responses identified by respondents directly involved in disposal**

| # | Factor | Male | % age | Female | % age | Total % age | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| 1 | Participant's knowledge on risk, hazards in handling BMW management and disposal | 46 | 92.00 | 45 | 90.00 | 91.00 | 1.184 | >0.05 |
| 2 | Awareness-colour cods, its implications, biomedical hazard symbol, waste categories | 47 | 94.00 | 48 | 96.00 | 95.00 | 1.924 | >0.05 |
| 3 | Hazards, management and disposal of COVID-19 patients BMW | 47 | 94.00 | 44 | 88.00 | 91.00 | 2.848 | <0.01 |
| 4 | BMWM and disposal of pandemic patients, care needed to concerned work force | 46 | 92.00 | 47 | 94.00 | 93.00 | 1.394 | >0.05 |
| 5 | Training on handling of bio-medical waste, its management and disposal | 45 | 90.00 | 45 | 90.00 | 90.00 | 1.322 | >0.05 |
| 6 | Immunizing for Hepatitis B, COVID-19 and sharps' disinfection | 44 | 88.00 | 47.00 | 94.00 | 91.00 | 3.084 | <0.01 |
| 7 | Periodic counseling, checking on awareness and testing of COVID-19 | 45 | 90.00 | 46 | 92.00 | 91.00 | 1.924 | >0.05 |

## Data analysis

Data collected is tabulated in table No. 6 above and its analysis shows that highest factor is considered with total 95.00% (male 94% and female 96%) is 'Awareness-colour cods, its implications, biomedical hazard symbol, waste categories' which shows that work force is well aware about colour coding etc. and followed by 'BMWM and disposal of pandemic patients, care needed to concerned work force' which is graded by respondents at second place with total 93% (male 92% and female 94%). Four factors namely 'Participant's

knowledge on risk, hazards in handling BMW management and disposal'; 'Hazards, management and disposal of COVID-19 patients BMW'; Immunizing for Hepatitis B, COVID-19 and sharps disinfection' 'Periodic counselling, checking on awareness and testing of COVID-19' have been awarded 91% (men 92% and female 90%; men 94% and female 88%; men 88% and female 94%; men 90% and female 92% respectively). 'Training on handling of bio-medical waste, its management and disposal' was awarded least with overall rating 90% (men and female both with 90%) which proves beyond doubt that personnel dealing with BMW management and disposal needs more training/refresher training. It has been statistically examined and observed that in majority of factors there is no significant difference in practices of male and female ($p>0.05$). It is on point three 'Hazards, management and disposal of COVID-19 patients' BMW' and point six 'Immunizing for Hepatitis B, COVID-19 and sharps' disinfection' that there is a significant difference in male and female practices ($p<0.01$).

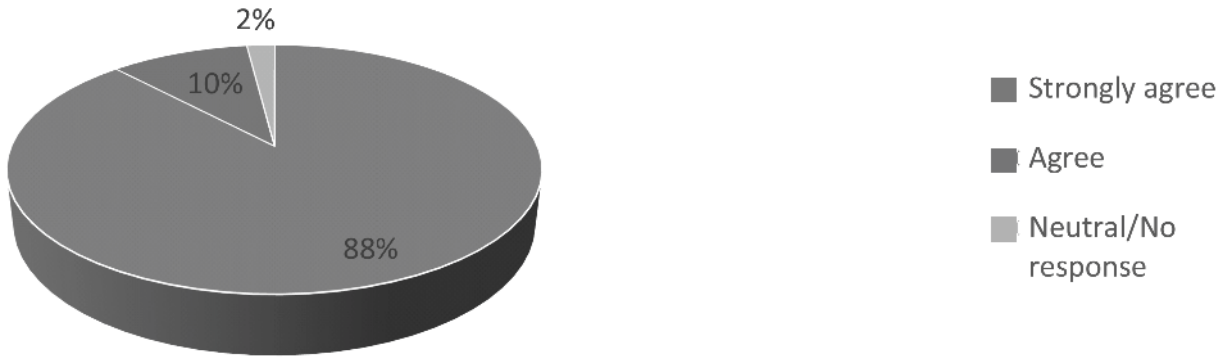
## Discussion

The awareness about rules, regulations regarding the BMW management and disposal is quite good among the doctors followed by postgraduates, nurses, technicians, housekeeping and disposal personnel but know-how about practices on disposal regarding BMW is much higher among the involved personnel. These results are identical to the results from previous similar studies conducted on relevant field. It is good to report that the cross-sectional study shows more than sixty percent personnel aware about rules, regulations and practices on BMW management and disposal. It revealed that low awareness regarding BMW management of and disposal with housekeeping staff was low because of low educational level, high turnover and rotations. Training and regular refresher programs on BMW management and disposal is needed to enhance efficacy and protection at all levels.

**Table 8: Showing Satisfaction level of respondents on overall performance of UPUMS**

| # | Nomenclature | Number | Percentage |
|---|---|---|---|
| 1 | Strongly agree | 88 | 88.0% |
| 2 | Agree | 10 | 11.0% |
| 3 | Neutral/No response | 2 | 2.0% |

**Figure 5: Showing Satisfaction level of respondents on overall performance of UPUMS**




## Overall performance

In the response to the overall performance of UPUMS the satisfaction level of respondents has been very high with 88 percent strongly agree, 10 percent agree and only two percent response has been neutral/non-responsive. It shows that the services provided during past one year during COVID-19 in UPUMS are excellent, efficient and taking care of different types of patients to their highest level of satisfaction with dealing with BMW satisfactorily. Though greater number of the study respondents displayed favourable biomedical waste management practices. It was noted that the staff were following the preventive measures of immunisation of Hepatitis B, and routine health check-ups were conducted for the personnel. Refreshing training regarding BMW management and disposal was desired by most of personnel.

## Conclusions

The study showed awareness about rules, regulations and practices towards BWM management and disposal was satisfactory among the respondents. Awareness about rules and regulations among doctors is found to be the best and as far as practices on disposal is found higher among personnel involved in direct disposal. For more better result regular training and refresher courses are need. Overall satisfaction level regarding performance is very good in UPUMS.

## Summary, recommendations and further studies

The study was an attempt to check the awareness among the personnel dealing BMW management and disposal at UPUMS, Saifai, Etawah, UP. Government of India rules on BMW management and disposal are well documented, however, lacunas are found in its implementations. Sincere efforts are needed at all levels to make the dealing personnel well aware of the rules and its strict implementation. Training and refresher capsules are need to empower the dealing professionals of BMW management and disposal. Following rules, regulations and correct practices would avoid injuries and hampering the health of masses as a whole. Strategies to display charts, handouts, stickers etc. can help in bettering the practices of the personnel dealing in BMW management and disposal. Checklists and inspections on regular basis can fix accountability of the supporting staff. To avoid cross infection all medical personnel of an organization be included in interventions of BMW management and disposal strategies. We all understand with COVID-19 and Omicron in place the BMW management and disposal is going to be a challenging task in upcoming years. The situation would not get better in a short span of time, and it seems virus is going to stay with us & we have to live with it, hence, more comprehensive studies on BMW management and disposal are needed to spread awareness among personnel.

## Conflict of interest and limitations

No conflict of interest has been observed. As complete population are employees, hence, their responses may be restricted psychologically in consciences, however, the researcher has kept all details undisclosed and no name has been revealed during the questionnaire.


## Acknowledgements

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# A Cluster Analysis of Convenience Food Buyer: Cross Sectional Study in Bhubaneswar

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## Abstract

Cluster analysis is highly popular and widely used tools for identifying data based market segment. The purpose of this study is to identify the homogenous subgroup of people associated with the buying of convenience food based on parameter health consciousness, natural content, extrinsic & intrinsic factor and product familiarity. The study was done through online with 375 respondents. The sampling techniques employed for the study was purposive in nature. K means cluster method was performed through SPSS to identify the specific segment of convenience food purchase through. The result revealed that 3 clusters are formed and intrinsic factor, product familiarity and natural content are the important factor which discriminate the cluster. The discrete profile is of outmost importance for marketers to frame up strategies for each cluster.

**Keywords:** Convenience food, health consciousness, natural content, extrinsic & intrinsic factor, product familiarity, clusters analysis.

## Introduction

Convenience food consumption has taken prominent space in the hectic lifestyle of the people. Convenience food is defined as food which saves time and effort in food preparation. It also alleviates physical as well as mental effort while preparing foods from

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scratch (Buckley, Cowan, & Mc Carthy, 2007). Many studies espoused convenience food as food which requires a very small degree of food preparation. For example De Boer (2004) categorized convenience food into ready meals, take away meals and readymade meals. The convenience foods include ready to eat food (e.g. instant noodles), ready to cook (eg. cooking masala) and ready to serve (packaged beverage and juice). Major chunk of convenience food brand contains high amount of salt, sugar and fat, which is detrimental to health (Wilson & Wittert, 2011). In developing countries, the convenience food has briskly captured the food market with average growth rate of (15-20%) than the average rate of world which is hovering around to (5-7%) over the past 10 years (Svein Ottar Olsen, Ho Huy Tuu, 2017). Taste is considered to be the one of most important intrinsic factor which influences food buying behavior. Especially teenagers often crave for convenience food (Fitzgerald et al., 2010). The table (1.0) below demonstrates the different classification of convenience food categories.

**Table 1.0: Degree of readiness categories- description**

| Sr. No. | Readiness Category | Description |
|---|---|---|
| 1 | Eat as is | Products requiring no further processing to achieve a servable form. Consumed as purchased |
| 2 | Ready to Use | Products requiring no further processing to achieve a servable form but typically used in combination with other food rather than served alone |
| 3 | Cut slice, shell | Foods which are eaten raw but have to be trimmed, cut, sliced or shelled rst. Includes ready-to-eat and ready-to-use items that require cutting, peeling or slicing. |
| 4 | Thaw | Foods which have been frozen from the 'eat-as-is' form and only require thawing prior to consumption. Also includes items frozen from 'ready-to-use' form |
| 5 | Hydrate | Foods which require addition of a liquid, most frequently water, prior to consumption. Includes several items where one ingredient such as sugar is also added |
| 6 | Ready to heat | Products which need only heating to obtain servable form. Usually includes fully cooked foods which are not consumed cold. |

| Sr. No. | Readiness Category | Description |
|---|---|---|
| 7 | Thaw then heat | Foods that have been frozen in 'ready-to-heat' form and only require thawing prior to heating. Includes fully cooked foods which are not consumed cold. |
| 8 | Hydrate then heat | Foods which require addition of a liquid, most frequently water, prior to heating. Also includes foods hydrated with heated water. |
| 9 | Ready to Cook | Foods which have been processed to a readiness state allowing direct cooking to achieve a servable form. Also includes commercially frozen breaded products and nuts which must be roasted or boiled |
| 10 | Thaw then cook | Foods which have been frozen in 'ready-to- cook' form and only require thawing prior to cooking |
| 11 | Hydrate then cook | Foods which require the addition of a liquid, most frequently water, prior to cooking. |
| 12 | Cut, peel, shape, then cook | Items which must be pared, peeled, shelled, trimmed, cut, scaled, shaped or skinned before cooking. Also includes foods which must be thawed before cutting, scaling or shaping before cooking. |
| 13 | Add other ingredient then cook | Foods which require the addition of other ingredients as well as manipulation prior to cooking. Also includes frozen items which must be thawed prior to the addition of other ingredients and subsequent cooking. |
| 14 | Eviscerate, prepare for cooking, then cook | Items which must be eviscerated prior to preparation for cooking. Includes frozen live-weight meat, fish and poultry which first must be thawed, then prepared for cooking. |

*Sources: Consumer nutrition division, USDA (1977-78)*

Since there are numerous factors which influenced food buying behavior, but very few studies have explored the impact of health consciousness, natural content, food safety, extrinsic & intrinsic factor and purchase intention on the buying behavior of convenience food. The present study applied cluster analysis and aims to identify the specific profile linked to the buying behavior of convenience food.

**Health Consciousness**

Health Consciousness is very broader construct which defines the extent of person's inclination to undertake healthy mode action. Generally people purchased organic

convenience food because of two reasons firstly for health and secondly for environment (Oude Ophius, 1989). Health consciousness referred to consumer understanding of health status and how much does consumer accentuate on health requirements. Health conscious persons are well aware about the state of well being and are fostered to improve and or maintain their health and quality of life, as well as preventing ill health by engaging healthy behaviors and being self conscious regarding health. There are four dimensions of health consciousness i.e. the greater concern to health, caring about health, scouting for health information and valuing health condition (Gould et al., 1998; Gould and Plank, 1990; Newsom et al., 2005). Health conscious consumers are very agile hence they try to retain their good health and quality of life to keep disease at bay (Newsom, Mc Farland et al., 2005).

**Natural Content**

Natural content means the food without any artificial coloring or any food additives during the processing thus maintaining the original essence of raw material and manufacturing without excessive processing condition. The organic consumer tend to stress on the labeling of the organic product such as pesticide free, hormone free, no chemicals, no pollutant, no antibiotics, no GMO, such food are deemed to be natural (Essoussi and Zahaf, 2009). Consumer prefers to pay higher prices for the natural food brand which compelled manufactures to place labels on their products that state they contained natural content (Heeres et al., 2013). Some studies categorically stated that 70 % of consumers pay special attention to the label that which indicates that it has natural content without adding artificial ingredients and artificial colour (Wireless News, 2013). Credence attributes mean that the consumer cannot evaluate the product attributes even after consumption i.e. food safety, country of origin, producing condition and natural content (Terjusen et al., 2001, Moser et al., 2011).

**Food Safety**

Food is very important for physical well being and major source of nutrient hence its safety

is paramount importance for the consumer. Each packaged food must be safe, aesthetically pleasing, good tasting and has consistent brand image. Consumers have high concern about food safety are based on anxiousness not only about health but also about agriculture, ecology and food culture. The study define food safety is inverse of food risk i.e. the probability of not suffering some hazard from consuming a specific food. These hazards can sneak into the food system through any means like microbial contaminants, environmental contaminant, over use of pesticides, veterinary drug, growth promoters, packaging component and many more (Henson and Trail, 1993).

**Extrinsic & Intrinsic factor**

The marketing cues in food industry are categorized into two forms i.e. extrinsic and intrinsic factor and it assist the consumer to infer the quality factor of the product and help them to choose right product (Steenkamp et al,. 1999). The extrinsic factors are defined as surrounding factors that impacted food selection like environment and family. The food extrinsic cues include price, brand image, packaging and food label, advertisement, offers and promotion (Szybillo and Jacoby, 1974). The Intrinsic factors includes taste, texture, color and knowledge (Blisset and Fogel, 2013). There was strong correlation between preference and food sensory factor like taste, flavour, appearance and texture etc.

**Product Familiarity**

It refers to people's prior experience and information with products and services. Actually it is people's representations that are obtained through learning, experience, media and word of mouth deeply embedded in people's memory. According to some researcher exposure to a familiar is a simple comprehension process in which relevant meaning associated to the product from memory are automatically activated. Familiarity help the people to recall and recognize the product attribute and is very vital for marketers because most of the purchases are often made after consumers' exposure and attention to products (Peter, P & Olson, 2010). Familiarity also regarded as higher standard than awareness, it is a measure of knowledge and complete understanding about the customers and their expectation for the product.

## Methods and Data

The data collection method adopted for the study was the survey method. The research instruments consist of structured questionnaire. The questionnaire was divided into five parts which constitute health consciousness, natural content, food safety, extrinsic & intrinsic factor and product familiarity. The questionnaires were measured through five point likert scale. The study includes primary data and it was gathered through Google forms. The sampling technique employed for the study was purposive in nature. The reliability of scale was tested through pilot study and the value of Cronbach's alpha was .736. The result is admissible because it is above the threshold value of .700. The questionnaire was sent to 485 respondents and out of 480 respondents I received the data of 405 respondents. The 30 respondent was ousted from the study due to data cleaning process. The final sample size included for the study dropped to 375 which was complete and adequate for the study.

## Sample qualification

The table (5.1) exhibits the socio-demographic characteristics of the sample group in Bhubaneswar, including gender, educational level, marital status, occupation, income level, household size, purchase frequency, monthly expenditure on packaged food and their preferred outlet to buy packaged food. The sample contained (62%) male and (38%) female. Most of the respondents are unmarried (62.1%) and belonged to the nuclear family (63.2%). The graduates constitute (27.4%) and others (72.5%). Most of the sample having 3- 5 members of their house are (54.9%) and (22%) of the respondents belong the family, which has more than 5 member. Most of the sample falls up to 30 years of age bracket accounting for (38.6%) followed by age bracket 30-40 years accounting for (36.8%) and more than 40 years constitute only (24.5%). Most of the respondents belong to 5 lakh income bracket (63.2%) and (29.0%) belonged 5-10 lakh income bracket. Only (7.7%) of the sample came under more than 10 lakh income bracket. Most of the respondent occupations are services (53.1%) followed by homemakers (2.9%), businesspersons

(4.8%), student (36%) and others (3.2%). The (70%) of the respondent buy packaged food item from organized and unorganized outlet but (23.5%) buy from organized outlet. Most of the respondents buy packaged food weekly (33.6%), monthly (17.3%) and daily (17.6%) and few buy packaged-food items more than twice in a month (5.6%). The (54.1%) of the respondent splurge up to Rs 2000 followed by (28.3%) spend Rs 2000- 4000 and (17.6%) splurge more than Rs 4000 on packaged food item on monthly.

**Table 1.1: Socio-demographic of respondent profiles of Bhubaneswar**

| Socio-demographic data | Type | Frequency | Valid Percentage |
|---|---|---|---|
| Gender | Male | 233 | 62.1 |
| | Female | 142 | 37.9 |
| Marital status | Married | 142 | 37.9 |
| | Unmarried | 233 | 62.1 |
| Types of Family | Joint | 138 | 36.8 |
| | Nuclear | 237 | 63.2 |
| Household members | Up to 3 | 86 | 22.9 |
| | 3-5 members | 206 | 54.9 |
| | More than 5 | 83 | 22.1 |
| Age | Up to 30 years | 145 | 38.6 |
| | 30 – 40 years | 138 | 36.8 |
| | More than 40 years | 92 | 24.5 |
| Income | Up to 5 lakhs | 237 | 63.2 |
| | 5 to 10 lakhs | 109 | 29 |
| | More than 10 lakhs | 29 | 7.7 |
| Education | Graduate | 103 | 27.4 |
| | Others | 272 | 72.6 |
| Occupation | Services | 199 | 53.1 |
| | Homemakers | 11 | 2.9 |
| | Businesspersons | 18 | 4.8 |
| | Students | 135 | 36 |
| | others | 12 | 3.2 |
| Purchase frequency | daily | 66 | 17.6 |
| | weekly | 126 | 33.6 |
| | Twice in a week | 62 | 16.5 |
| | Thrice in a week | 35 | 9.3 |
| | monthly | 65 | 17.3 |
| | More than twice a month | 21 | 5.6 |
| Preferred Outlet | Organized | 88 | 23.5 |
| | Unorganized | 26 | 6.9 |
| | Both | 261 | 69.6 |
| Monthly expenditure on convenience food | Up to Rs 2000 | 203 | 54.1 |
| | Rs 2000- 4000 | 106 | 28.3 |
| | More than Rs 4000 | 66 | 17.6 |

*Source: Primary data-researcher's work*

**Cluster analysis:**

To identify the subgroup of convenience food buyers and how their food buying behaviour influenced by health consciousness, natural content, food safety, extrinsic & intrinsic factor and product familiarity. The k means cluster analysis techniques was adopted for the study. The k means clustering serve as refinement of the cluster (Punj and Steward, 1983). The agglomeration & dendogram revealed three cluster solutions. The 3 cluster solutions with each cluster size are exhibited in the table (1.2). It is very evident from the below table that cluster 1 consist of 149 respondent, cluster 2 consist of 104 respondent and cluster 3 has 122 respondent.

**Table 1.2: Cluster size**

| Gender | Cluster 1 | Cluster 2 | Cluster 3 |
|---|---|---|---|
| Male | 95 | 61 | 77 |
| Female | 54 | 43 | 45 |
| Total | 149 | 104 | 122 |

The table (1.3) depicted below revealed the cluster centroid. It is obvious that the large difference exists between cluster cluster 1 and cluster 3 and less amount of difference is observed between cluster 1 and 2 and also between cluster 3 and 2. This level of difference can be easily figure out in the below diagram (1.0). The final cluster solutions are characterized on the basis of six construct taken for the study. These construct are health consciousness, natural content, food safety, extrinsic & intrinsic factor and product familiarity shown in the below diagram

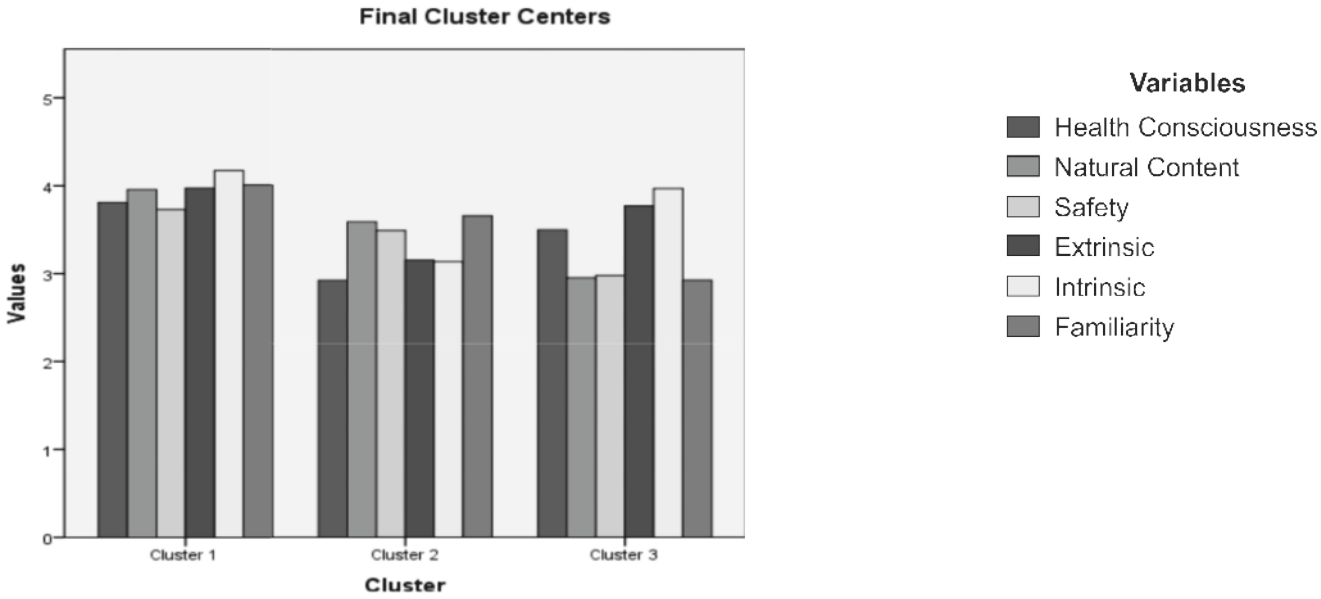
**Table 1.3: Cluster Centroid**

| Cluster | 1 | 2 | 3 |
|---|---|---|---|
| 1 | | 3.114 | 5.139 |
| 2 | 3.114 | | 3.636 |
| 3 | 5.139 | 3.636 | |

**Cluster Qualification:**

The cluster 1 is characterized by “food connoisseur & health & safety consciousness” segment. This segment includes that person who takes profound interest in knowing about the characteristics of convenience food. These segments of people scrupulously observe the food labelling part, country of origin and whether the food product is devoid of artificial flavor and ingredient. They judiciously select that food product which imparts health to their families and they are not price conscious people. The cluster 2 is characterized by “casual convenience food buyers”. Such segment gives more emphasis on the familiar brand of food product that suits their palate. They rarely switch to the new food brand unless the flavor & taste of new food product is congruous to old food brand and they are price conscious people. Eventually, respondent of cluster 3 demonstrate a greater association to the meaning “hedonistic food seeker”. These segments of people are often attracted by the promotion strategy used by the companies. They don't care about the quality of food product but for them buying convenience food is fun and excitement. They seek new taste, flavor, texture and heavy discount in food products. The cluster 3 includes youngster who has been recently graduated from the institution. After analyzing the final cluster solution we found that cluster one has highest number of women compared to cluster 2 & 3.

**Fig 1: Final cluster centre**



The table 1.4 exhibits the Anova description. The most important variable in discriminating the cluster: “intrinsic factor”, “product familiarity” and “natural content”. The consumers while splurging on convenience food keenly observe on the three above mentioned parameter

**Table 1.4: Anova**

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| | Cluster | | Error | | | |
| | Mean Square | df | Mean Square | df | F | Sig. |
| HEALTH CONSCIOUSNESS | 22.805 | 2 | .323 | 372 | 70.712 | .000 |
| NATURAL CONTENT | 33.606 | 2 | .387 | 372 | 86.929 | .000 |
| FOOD SAFETY | 19.176 | 2 | .303 | 372 | 63.204 | .000 |
| EXTRINSIC FACTOR | 20.796 | 2 | .332 | 372 | 62.565 | .000 |
| INTRINSIC FACTOR | 34.678 | 2 | .226 | 372 | 153.306 | .000 |
| PRODUCT FAMILARITY | 40.053 | 2 | .429 | 372 | 93.395 | .000 |

**Discussion and conclusion:**

Now day's people are getting health consciousness and prefer processed foods that are low in fat, sugar and salt. To lead a healthy lifestyle people should undertake a healthy food choice selection such as natural food consumption devoid of preservatives and food additives (Gilg et al., 2000; Magnusson et al., 2003; Tregear et al., 1994; Wandel & Bugge, 1997). The people prefer food product without any artificial colouring or food additives. The people also prefer such food products, which are organic in nature i.e. pesticides free, hormones free, no chemical, no antibiotics and no genetically modified processed food. Many studies predicates that consumers relate natural food products to health & environmental protection (Dickson, Spillman et al., 2011; Rozin et al., 2012; Descola,

2013; Essoussi & Zahaf, 2009). They meticulously observe food labelling, ingredients and certification agency that certified processed food and also fear about the food poisoning while consuming new brands of processed food. People believe that branded food companies maintain stringent quality control eventually enhanced trust in minds of people and therefore people are willing to pay premium price to branded food products (Grunert, 2005; Krystallis and Chryssohoidis, 2005). The consumer not only carefully checks the expiry date and shelf life of the product before purchase but also needs information about the production methods like HACCP and procurement. The word of mouth, packaging, price, advertisement and promotion plays major role in buying convenience food and it came under the purview of extrinsic factor. The sensory appeal i.e. taste, flavour, variety & texture are significantly important to food consumer (Magnusson et al., 2001; Torjusen et al., 2001). The people prefer convenience food because it saves time and energy and this supports the previous study of (Gofton, 1995). The product familiarity is the prior experience and accumulated information concerning with the buying of convenience food. These prior experience and information about the food product form the basis for the consumer to evaluate the convenience food (Park & Kim, 2003).

The article lends a practical contribution, pointing out the important aspect related to how these learning can be beneficial to different stakeholder. The result of study can aid marketers to frame up the food marketing strategies to target different profile of people who purchase convenience food product. Manufacturers should given special attention to people who are more than 40 years of age because they are health conscious & safety driven. They are high end margin consumer and can drive profit for the food companies. They gather knowledge about the food product and purchase after.

**Limitation and further research**

The study entailed purposive sampling hence they should not be generalized. Majority of sample unit belonged to people up to 30 years. The further study can be the impact of above mentioned cluster on the purchase intention and attitude towards the buying

behaviour of convenience food. The model framework will be based on theory of planning behaviour or theory of consumption of value for empirical testing.

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# AI in Internet of Medical Things

**Dr. Mukta Makhija** [1]

## Abstract

The internet of things (IOT) is a network of wireless, interconnected and network digital devices that can gather send and store data without the need for human or computer interaction. The internet of things has a lot of promise for expediting and improving health care delivery by proactively predicting health issues and diagnosing, treating and monitoring patients both in and out of the hospital. Understanding how established and emerging IOT technologies may help health system deliver safe and effective treatment is becoming increasingly critical.

The purpose of this paper is to present an overview of existing IOT technology in health care, as well as to describe how IOT devices are improving health services delivery and how IOT technology can alter and disrupt global healthcare in next decade. The promise of IOT – based health care is explored further to theorize how IOT can increase access to preventative public health service and help us migrate from our existing secondary and tertiary healthcare systems to a more proactive, continuous, and integrated approach. The intersection the internet of medical things (IOMT) for patient monitoring and chronic care management and the use of artificial intelligence (AI) is becoming more promising than ever, as the adoption of telemedicine continues to grow dramatically. Connected devices generate huge volumes of data based on real time measurements of patient vitals, which is delivered to cloud-based applications that are monitored by medical specialists in virtual contact centers. The policy is applied per-patient, and healthcare providers receive

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warnings and messages when a patient's heart rate, oxygen level, glucose level, blood pressure, or other measurement reaches a set threshold. Depending on the sort of telemedicine and tele-health platforms in use, this data is tracked and acted upon by specialists who monitor many patients for many different practices, and in other circumstances, this data is sent directly to the provider. AI in healthcare, as well as other crucial technologies is essential for resolving the issue and producing future prosperity.

## Introduction

Modern lifestyle and the polluted environment are the main causes of different types of diseases. Some diseases are curable through primary medication but some are more severe and require proper medication. In clinical treatment, different categories of medicines such as allopathic, homeopathy, herbal, art therapy, homemade medicine, etc. are applied to cure the diseases. The prediction of an appropriate medicine as per the symptoms of the disease is a challenging task for the clinicians. In this context, intelligent systems could be very helpful to predict the right medicine to the right people. Artificial Intelligence (AI) is a kind of intelligent system that applies different techniques to work with a huge amount of data for real-time analysis and better prediction to attain the required outcome. Also in the medicine industry, the process of discovering new medicines needs several clinical trials and requires approval by the concerned authority to deploy in the market. AI can improve decision-making and assist in the search for better medicines. Machine Learning is another revolution from AI that learns from the pre existing data sets and improves its accuracy in decision-making.

## Categorizing Medical IOT Applications

**1. Diagnostics:** Devices that track bodily metrics that may signal medical diseases such as diabetes and a trial fibrillation are becoming more common. Continuous monitoring of vital physiological factors such as blood chemistry, blood pressure, brain activity, and pain levels is possible. This can aid in the detection of early indicators of illness start or activity, resulting in better responses.

**2. Recuperation:** Patients' postoperative recovery time accounts for a large portion of the operation cost, and reducing it is a critical component of cost reduction. For a total knee replacement, for example, hospitalization in the United States takes roughly two days compared to four to five days in the United Kingdom's National Health Service (NHS).

**3. Chronic Care:** With blood pressure, glucose levels, sweat, and even tear analysis; sensors that detect body parameters are becoming increasingly sophisticated. When compared to standardized examinations, the benefit is not just in terms of logistics, but also in terms of data collection frequency. In chronic degenerative conditions like rheumatoid arthritis, mobility sensors can aid improves stride and form. The monitoring and response of patients to treatment compliance is another category of IoMT device application.

**4. Prophylactics:** Devices that actively engage patients with guided exercise can help reduce injury and the related expenditures of medical treatment. Examples of how devices can aid in prevention include joint range of motion in the orthopaedic area and posture alignment to prevent cervical spondylosis. Upright is an example of a device. Wearable's, for example, may help the elderly avoid catastrophic falls by monitoring their activities and detecting anything unexpected that could lead to a loss of balance and a fall.

## Discussion and Results

Heart disease diagnosis shows that there are different artificial algorithms, frameworks, and methodologies. Table 1 presents the distribution of the studies which apply AI methodology for heart disease diagnosis.

Table 2 presents a comparison summary of the predictive methods used for IoMT applications. Based on Table 2, it is possible to identify that most of the studies analyzed .Robotic surgery is playing an essential role in the development of medicine, but professionals are required too. Table 3 presents a summary of the analyzed studies on robot surgery

**Table 1 AI methodology for heart disease diagnosis**

| AI method | Description | Function |
|---|---|---|
| Support Vector Machine | Creation of classification and regression analysis | Develop a hyper plane. Use in pattern analysis puzzles and nonlinear regression |
| Naive Bayes | Probabilistic classifiers | Creation of classification, sentiment analysis, spam filtering, and news classification |
| Cluster analysis and efficient differentially private data clustering scheme | Classify a sample of subjects (or objects) based on a set of measured variables in different groups | Interaction using the K-means algorithm by comparing the NICV |
| Convolution neural Network | Class of DNNs, most commonly applied to Analyze visual imagery. Known as shift invariant or space invariant artificial neural networks (SIANN) | Classify patients with ventricular dysfunction |
| Deep learning | DNN learning and a prediction model | Enable machines to process data with a nonlinear approach |
| Recurrent fuzzy neural Network | Neural Classifier | Using DPSS to help pretention healthcare services and data security |
| Grasshopper Optimization | Gravity force on it GI and the wind advection AI | MLP NN for tackling optimization with flexible and adaptive searching methodology |
| Relief F and RS | Approach as an integrated feature selection system for heart disease diagnosis | To data analysis and data mining that has been applied successfully to many real-life problems in medicine, pharmacology |
| Multilayer perceptron | SLPs and ANNs technology together | Provide various continuous functions |

The personalized healthcare applications analyzed in this review are summarized in Table 4. These applications address several health complications, such as vital biophysical parameters supervision, diabetes, and medical decision-making support methods.

## Table 2 Summary of predictive methods assisted by IoMT

| Application | IA methods | Results |
|---|---|---|
| Predict respiratory the clinic visits | Back propagation NN | The proposed model fits the nonlinear relationship between the respiratory outpatient visits |
| Deep learning model for predicting chemical composition | CNN | Developed CNN, like stacked auto-encoders, deep belief networks, and RNN |
| ML with IoT data for risk prediction | K-nearest neighbors, NB, SVM, LR, support vector regression, classification trees, regression trees, and random forests | The model is a set of hypotheses about dialysis biomarkers proved in a probabilistic format |
| Fuzzy neural classifier for data prediction and diagnosis | LR and NN | Fuzzy rule-based neural classifier for diagnosing the disease and the severity |
| Privacy-Aware Disease Prediction Support System | K-nearest neighbor and case-based reasoning | The combinatorial advantage of Fuzzy set theory |
| Cancer detection and stage classification on CT images | Deep FCNN and CNN | Potential for the proposed technique in helping radiologists in improving nodule detection accuracy with efficiency |

## Table 3 Summary of AI methods used in robot surgery

| Robot surgery | Description | Advantages |
|---|---|---|
| TORS | Transoral Robotic Surgery | Fewer blood losses, faster postoperative recovery, and fewer adhesions |
| MIS | Management Information Systems | Improve consistency, safety and accuracy, advances in imaging and human-robot interaction |
| STAR | Smart Tissue Autonomous Robot | Nascent clinical viability of a self-governing soft-tissue surgical robot |
| AESOP | Automatic Endoscopic System for Optimal Positioning | Robotic endoscope and surgical robotic systems |

**Table 4 Personalized healthcare applications summary**

| Application | Sensors | Results |
|---|---|---|
| Real-time monitoring of vital statistics of patients | Body oxygen, temperature level, and pulse rate/heart rate | Live date access using thingspeak.com cloud platform |
| DNN and state-of-the-art survival method | Pulse rate/heart rate | Provide individual treatment recommendations |
| Personalized diabetes diagnosis | Temperature, electrocardiography, and blood oxygen | Real-time system to analysis diabetes suffering |

The results presented state that using a methodology improves the main medicine areas such as heart disease, predicting methods, surgery, and personalized treatment. AI gives a chance to realize patients' privies conditions and get a result in a short time. Its methodology can see the deeper reason for illnesses and predict a patient's health in the future.

## CONCLUSION

The synergistic expansion of machine learning (ML) and artificial intelligence is increasing the usefulness of medical IoT. Data analytics and machine learning (ML) help speed up the treatment process by processing enormous amounts of continually streaming data from sensor-assisted medical devices. Preventive treatment, using streaming data, can drastically minimize hospitalization and the expense of acute care. This would boost productivity while also improving patient happiness and results. However, some data security concerns in transit and at rest must be carefully assessed. Furthermore, the possibility of false positive readings might put patients and the healthcare system under undue stress. The three key features of IoMT that must constantly be prioritized are accuracy, repeatability, and reliability.

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# Women as Environmental Warriors: The Need of the Hour

**Dr. Puja Garg** [1]

Environment sustainability is the need of the hour. It is essential to conserve the natural resources and develop alternate sources of energy. This paper focuses on various initiatives being taken globally with women playing the pivotal role. It also includes Indian women doing their bit in this regard in both rural and urban areas. Their stories are a source of inspiration for other women. It also suggests ways of contributing towards ensuring sustainability of nature in all its glory.

**Key Words:** Sustainability, UNEP, SDGs, conservation, waste management

## Introduction

Environment sustainability aims at conserving the natural resources and developing alternate sources of energy along with reducing pollution levels and safeguarding the environment. Sustainability can be ensured through replanting forests, preserving the wetlands and preventing resource harvesting in natural areas. The Sustainable Goals set by the United General Assembly in 2015 for the year 2030 also focused on environment sustainability and include improvement in global resource efficiency in terms of consumption and production and aim to decouple economic growth from environmental degradation. The objective is also to make cities and human dwellings safe, resilient, inclusive and sustainable. One of the primary focus is also to protect, restore and promote sustainable use of land, maintain forests, reduce desertification and prevent further land degradation and loss to biodiversity.

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Women have moved beyond the traditional role of being a home maker and care giver. They are creating their mark in every field. This is not just confined to urban women; the rural women are also equally motivated to improve their socio-economic condition and support their families in every possible way. They have clearly understood their importance. They have also understood the importance of safeguarding their environment. They always strive to give the best to their children whether it is in terms of education or health. Ensuring good health is only possible by keeping the environment safe and natural. The future generations can only be secured by preserving the natural resources.

Nobody can understand the needs and concerns of women more than the women themselves. Environmental and women's organizations, networks and alliances are playing an important role in identifying and addressing gender equality perspectives in environmental protection and sustainable development.

**Literature Review**

To ensure that the future generations can meet their economic and environmental needs, technology can be used to steer agriculture on a sustainable path. The sustainable agriculture policy should support research and development in such technologies and give incentives to promote its use. It should also ensure that conservation involves sustainable allocation of environment assets and to legalize the markets where products grown through such practices are produced (Aldy, 1998)

(Reed, 2007) This paper says that along with reducing the damage caused by excessive resource use one should also learn participation with the environment by using the health of the ecological systems as a basis for design. The design process begins by attempting to understand how the systems of life work in each unique place. The role of designers and stakeholders is to create a whole system of mutually beneficial relationships. By doing so, the potential for green design moves beyond sustaining the environment to one that can regenerate its health – as well as our own.

(Alesina, 2013)This paper seeks to better understand the historical origins of current differences in norms and beliefs about the appropriate role of women in society. They concluded that societies that used plough agriculture have less participation of women at workplace, politics and entrepreneurial activities.

(Ray, 2007) This paper concludes that women play a pivotal role in provision, management and safeguarding of water. It is considered as one of the four internationally accepted principles of water management.

(Garcia-Ramon, 1995)This study analyzed the changing role of women in the new economic activity of farm tourism in two distinct areas of Spain: Catalonia and Galicia. Farm tourism is a valuable alternative for women which both allows the combination of domestic responsibilities with tourism work and represents an income source that supports continued small-scale farming and conservation of the countryside environment. Women's perceptions of the built and natural environments are changing in response to these activities.

(Schahn,1990)This paper studied the interplay of environmentally relevant knowledge, attitudes, and behaviour as well as gender differences in environmental concern and the role of "background variables" for the prediction of (self-reported) behaviour. Women were more environmentally concerned in those topical areas that refer to household behaviour, whereas men knew more about environmental problems.

(Hoyt, 2010)This paper presented the impact of female role models on women's leadership aspirations and self-perceptions. It concluded that women leaders that are one of their own are better role model for other women.

**Objectives:**

a) To highlight how women and women groups are working towards ensuring environment sustainability at the global level.

b) To present Indian cases that can be role models for other women in various sectors.

c) To suggest measures through which women can contribute in making the environment more sustainable in daily life.

**Role women are playing to make the environment more sustainable at the global level**

Since the 1990s this issue has gained prominence and internationally organisations are working towards documenting the role of women and men separately in environmental issues and natural resource management. The United Nations Environment Programme (UNEP) organized Women as the Voice for the Environment (WAVE), the first Global Women's Assembly on Environment along with civil society groups and the Network of Women Ministers on Environment from 11th to 13th October, 2004. The objective was to put the issues of women at the centre of global environment efforts and they also prepared a manifesto on women and environment.

In 2002, a network of women environment ministers was formed. This included 22 female environment ministers and 28 women leaders of NGOs working in this field. It was accepted by this network that women make most worlds poor and should be given a chance to contribute in policy making. The women can bring new perspectives and ideas and help in strategy making for environment protection. Some of its objectives were:

- To develop recommendations for providing practical solutions to environmental problems confronting nations and the world;
- Building partnership among appropriate civil society, non-governmental and intergovernmental agencies;
- Exchanging best practice experiences to implement more effective policies; and
- Creating a critical mass of leadership to influence international and national policy

The Role of Women in environmental organizing and campaigning achieved a big milestone when Wangari Maathai, founder of the Green Belt Movement was awarded the Nobel Peace Prize in 2004. Wangarĩ Maathai was awarded the Nobel Peace Prize for her "contribution to sustainable development, democracy and peace". She had founded the “Mazingira Green Party” of Kenya in 2003 and its members followed the rules set by the Green Belt Movement. The Green Belt Movement (GBM) focused on community development, capacity building along with environment conservation.

Many United Nations Economic Commission for Europe (UNECE) member States have collaborated with civil society organizations to work towards integrating gender equality objectives with those of environmental protection and sustainable development. This focus on raising awareness among variables such as gender equality, environment protection and its sustainability has led to greater decision making role of women in sustainable development. More example of women organizations working at the regional and global level are Women in Europe for a Common Future (WECF) and the Women and Environment Organization (WEDO), Women's Environmental Network (genanet) and Women for Climate Justice. A platform is provided by UNECE for policy dialogue where these groups discuss their concerns and prepare a road map for working towards making the environment right for future generations.

In Beijing Regional Review Meeting that was held on 2-3 November 2009, women' non-governmental organizations had actively participated to discuss the various challenges for women's empowerment and gender equality.

On September 2010, the first Forum for Women Entrepreneurs in South-East Europe was co-organized by UNECE with the Regional Cooperation Council and the Government of Turkey in South-East Europe. It was attended by fifty-nine women entrepreneurs, policymakers, and representatives from Chambers of Commerce and regional

organizations in Istanbul to discuss the nature of support that women entrepreneurs need in South-East Europe. The support ranged from increased access to training and finance to role models and networking opportunities. The Forum provided an opportunity for dialogue and discussion among various women entrepreneurs, women's business associations, policymakers, civil society and international organizations in South-East Europe. It also helped in sharing of information and networking.

In September 2011, a policy seminar was held on Women's Entrepreneurship Development in Central Asia. It was organized by UNECE and United Nations Development Programme (UNDP) in Geneva. The main issue discussed by various women groups, NGOs and policy makers were the challenges faced by women entrepreneurs in rural areas.

In Nepal, a community water supply and sanitation programme involves a women-led sanitation team with responsibility for 23 tap-stands in 160 households.

In the Mantsonyane district of Lesotho, the village water committee elects a 'water minder' who is given the tools to maintain the water system and latrines. Up to 90 per cent of the water minders are women.

In Trinidad and Tobago, most of the community water projects have been started and run by women.

**Examples of Indian Role Models in ensuring Environment sustainability**

They have set up benchmarks for every woman whether she is from a rural area or urban area, whether she is illiterate or literate or whether she is rich or poor. All of us can use them as role models. They can truly inspire other women to become aware and contribute. The examples have been presented in form of contribution in different sectors:

**Agriculture Sector**

**Ms. Ruchi Jain** of Taru Naturals has developed a network that connects farmer communities with clean technology and renewable energy. She has worked with the Ministry of New and Renewable Energy, European Academies Sciences Council and as a Campaigner with 350.org and Indian Youth Climate Network. Her firm mobilizes farmer communities to adopt sustainable methods of agriculture such as solar power pumps, solar dryers, etc.

**Ms. Neha Upadhyaya** is the founder of Guna based in New Delhi that trains rural women farmers in Ladakh and Sikkim to develop eco model villages through a focus on organic farming and the use of solar energy in post-harvest management using solar dryers, solar pumps, etc.

**Ms. Nidhi Pant** is co-founder of S4S Technologies, a Mumbai-based start-up, which manufactures solar dehydrators used by farmers for food preservation, Nidhi heads its marketing and sales. S4S also links farmers to markets to sell these dehydrated food products.

**Nature Environment and Wildlife Society (NEWS),** a non-governmental organization supported by Livelihood Funds, which helps rural communities in developing countries to restore natural ecosystems, have initiated a project in the Sundarbans that aims to restore and regenerate land mass through planting mangroves. To incentivize locals to participate and to make the project sustainable focus is on livelihood creation and carbon credit accretion. Started in 2010, close to 300 women form the core group of this group setting example for communities across regions. Besides planting mangroves, the initiative also encourages women to become economically secure through income generating activities that include organic agriculture, rain water harvesting, culture fishing and artificial honey cultivation. Because of tireless efforts of these women of planting

mangroves on new mudflats, new islands such as Lakhimpur are being formed. This has helped in preventing land erosion at the time of cyclones. The women are using smart phone apps to monitor the growth of mangroves and to analyze how much carbon dioxide the patch of mangroves can remove from the atmosphere.

**Waste Management**

**Ms. ManviDhawan** is the promoter of a start-up Agnij-Adjustable Thermoelectric Power Generator that has developed a product called Agnij — a thermo-electric belt that can be placed around any heated vessel or chullahs to use waste heat.

Don't waste, instead re-decorate!' **Ms. Meenakshi Sharma** of Delhi set up 'Use Me', a brand that utilizes each bit of waste and turns them into creative products. From daily utility products like carrying bags to home décor items and fashion accessories, she saves around 200 kilos of waste every month from being discarded and adding to the ever-growing garbage pile. Presently she is working with 20 other women and together is helping India go waste-free, one item at a time. Waste is collected from factories, boutiques, homes and then it is transformed into beautiful products.

**Ms. Sahar Mansoor,** a resident of Bengaluru, has founded Bare Necessities, a zero-waste company. Through Bare Necessities, efforts are made to capture the essence of India. a cradle-to-cradle approach is taken for every product, which is powered by natural, bare Indian ingredients; having no harmful impacts on health or the environment. All products are handcrafted by women of Karnataka.

**Ms. Shailaja Rangarajan** started Rimagined in 2016 to help in reducing waste output and instead using it to produce usable products such as furniture, jewellery clothes and home décor. She also provides employment to underprivileged women in her production process and helps them in earning a living. The waste is sifted and sorted from the heaps and then

converted into utility items. For making a tetra pack, there is a complete round of washing, cleaning and drying which is a prerequisite to their main work. For fabric waste, the various types of fabric, in terms of material, length of the fabric waste, quality and condition are separated. After finishing this step the design are chosen based on material available. In a short span of 2 years they have prevented tonnes of waste from getting piled up in landfills.

**Health Care Sector**

**Ms. Mousumi Medhi** started a venture, Honey Comb Inventions that aims at enhancing the duration of power back up supply of health care facilities.

**Education Sector**

**Ms. Amishi Parasrampuria** of Upcycler's Lab is the founder of a start-up that makes sustainability-based learning tools for children belonging to the age group 5 and up. They aim to create awareness and educate children on the need for sustainability.

**Power Sector**

**Ms. Kavita Aggarwal** of Blu Prints which is an R&D-driven, embedded systems technology company specializing in Retail-Tech and Fin-Tech Devices, has designed a system for electricity billing.

**Promoting healthy living**

Geeli Mitti farms, a part of the Geeli Mitti Foundation, founded by **Shagun** believes in sustainability, creating spaces and structures that abide by the most natural form of living. The houses are made from mud, cow dung and lime. They also use trash, in all its form, to make useful things out of it. Every structure is based on a specific technique one of which is the earth bag technique. This technique is highly useful in earthquake prone areas. They also promote the spiritual energy that is felt by living in such houses.

**Minimizing the use of Plastics**

**Ms. Vidyun** has introduced the concept of Toy Banks in India. Her aim is to debunk the gender stereotypes and create Gender Neutral Educative Toy Libraries. She also wants to promote the conservation of environment through recycling of toys there by reducing the carbon footprints. She along with her team conduct regular workshops with kids to make them understand the importance of responsible consumption and how it is going to help the environment in future.

**Contribution of Bollywood Personalities**

Bollywood actors are also doing their bit in ensuring environment sustainability. They are creating awareness and crusading actively to preserve environment and natural resources.

**Ms. Nandita Das** is a noted personality in the field of Water conservation. She has been passionately promoting the right use of water. She is working to make people aware about sustainable alternatives. In collaboration with Centre for Science and Environment she has produced short films about rainwater harvesting. She actively promotes the adoption of rainwater harvesting to preserve water and use it without wastage.

**Dia Mirza** has been working for wildlife protection and habitat preservation. She also advocates a plastic-free environment and is passionate about clean energy. She was appointed as the UN Environment's Goodwill Ambassador for India as recognition of her commendable work. She is also working to spread awareness about clean air, clean seas, wildlife protection, sustainable development and climate change. She is one of the seventeen global public figures that have been appointed by UN Secretary-General Antonio Guterres as the new advocate to drive action and solidify global political will for the ambitious Sustainable Development Goals (SDGs).

**Raveena Tondon** is part of the Earth Brigade Foundation's effort to help avert the water crisis in wildlife sanctuaries. She firmly believes that there is a dire need to conserve as a lot of species have already become extinct. The destruction of forests has dis balanced the whole ecological cycle. It is the responsibility of every human to save earth. Then only the survival of human can be ensured.

**Suggestions to make environment sustainable in daily life:**

- Reducing food wastage- wasted food if ends in a landfill can create greenhouse gases.
- Ban Plastic in Homes- plastic being non-biodegradable takes thousands of years to get destroyed.
- Walk or cycle and use public transport- this is going to reduce carbon emissions in the atmosphere
- Save electricity- use of natural light and ventilation should be encouraged. This is going to keep us healthy as well as save energy.
- Use Air Conditioners at moderate temperature- This is going to reduce climate change.
- Use indigenous products- if we use products that travel far, creates more pollution.
- Educate and train kids to look after their surroundings.
- Reducing the use of paper- will reduce deforestation.
- Promote the use of re-cycled products- less resources will be used to make fresh products.
- Donate books and use e- books – lessen the use of paper and save forests.

**Conclusion**

It is the responsibility of every human being to safeguard environment and keep it preserved for future generations. Environment can only be sustained when every

individual participates in this cause. Women being the back bone of every family can motivate other members to save energy and natural resources by using them wisely and rightly. Lot of efforts are being done in this field but more required. The government should make stringent laws against any type of misuse of natural resources.

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# The Role of NAAC for Quality Assurance in Higher Education

**Dr. Abhishek Sharma** [1]

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## Abstract

The Main focus of the study is the role NAAC in quality assurance in higher education. With respect to quality, it is the buzz word in today's world of education. It has become an important ideology of education. There are some genuine apprehensions among academics and social critics on the negative impact of adoption of managerial and market approaches of quality process to education. Quality makes education more relevant of its social transformative and individual development role. Quality in higher education has become the prime agenda of countries worldwide. In the changing context marked by expansion of higher education and globalization of economic activities, education has become a national concern with an international dimension. To cope up with this changing context, countries have been pressurized to ensure and assure quality of higher education at a nationally comparable and internationally acceptable standard. Consequently many countries initiated national quality assurance mechanisms and many more are in the process of evolving a suitable strategy. It is the quality of higher education that decides the quality of human resources in a country. Higher education as we see today is a complex system facilitating teaching, extension and international cooperation and understanding. NAAC is a body established by the University Grants Commission of India to assess and accredit institutions of higher education in the country.

**Keywords:** Higher Education Institution; NAAC; IQAC; UGC, Quality Assurance

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## Introduction

Education plays a vital role in the development of any nation. Therefore, the higher education is to be the best on both quantity and quality. There has been a great increase in the number of Universities and Colleges in India. To check and assess the quality of these institutions, an autonomous and independent organization called The National Assessment and Accreditation Council (NAAC) was established by the University Grants Commission (UGC) of India in 1994. Its Job is to assess and accredit the institutions of higher education in India. It came into existence as a result of the recommendations by the National policy on Education (1986) and the Programme of Action (POA-1992) that had stressed on enhancing and improving the quality of higher education in the country. In spite of the built-in regulatory mechanisms that aim to ensure satisfactory levels of quality in the functioning of Higher Educational Institutions (HEIs), there had been no specific modalities to assess and ensure the quality of education imparted by them. To address this issue, the NAAC has been instilling a momentum of quality consciousness amongst Higher Educational Institutions, through a process of assessing their strengths and weaknesses and motivating them for continuous quality improvement. The NAAC after considering the Institutional Assessment and Accreditation application of the intent institution declares the Institutional Eligibility for Quality Assessment (IEQA) status for the institution.

## Higher Education

In a society full of diversity, ideologies and opinions, higher education means different things to different people. According to Ronald Barnett there are four predominant concepts of higher education:

i) Higher education as the production of qualified human resources.

ii) Higher education as training for a research career.

iii) Higher education as the efficient management of teaching provision.

iv) Higher education as a matter of extending life chances.

## Quality In Higher Education

Approaches to quality in higher education in most countries have started with an assumption that, for various reasons, the quality of higher education needs monitoring. At root, governments around the world are looking for higher education to be more responsive, including:

i) Making higher education more relevant to social and economic needs;

ii) Widening access to higher education

iii) Expanding numbers, usually in the face of decreasing unit cost

iv) Ensuring comparability of provision and procedures, within and between institutions, including international comparisons.

Quality has been used as a tool to ensure some compliance with these concerns. Thus approaches to quality are predominantly about establishing quality monitoring procedures.

## NAAC and Higher Education

The performance of the colleges affiliated with universities, autonomous colleges and universities is assessed after every five years. The programme of assessing an institution is based on international practices and experiences which the academicians, intellectuals and officials connected with the NAAC receive. It inspects the infrastructure, facilities and also assesses the performance and academic excellence of the teachers of an institution. It gives grades on the basis of performance and prospects of an institution.

## NAAC – VISION AND MISSION

### VISION

To make quality defining element of higher education in India through a combination of self and external quality evaluation, promotion and sustenance initiatives.

## MISSION

1. To arrange for periodic assessment and accreditation of institutions of higher education or units thereof, or specific academic programmes or projects;
2. To stimulate the academic environment for promotion of quality of teaching-learning and research in higher education institutions;
3. To encourage self-evaluation, accountability, autonomy and innovations in higher education;
4. To undertake quality-related research studies, consultancy and training programmes, and
5. To collaborate with other stakeholders of higher education for quality evaluation, promotion and sustenance.

Guided by its vision and striving to achieve its mission, the NAAC primarily assesses the quality of institutions of higher education that volunteer for the process, through an internationally accepted methodology.

### Functions of NAAC

NAAC has been entrusted with the following functions, which are expected to reflect the above mentioned vision, mandate and core value framework.

### Primary Functions

1. To assess and accredit higher education institutions which include the following:
2. Assessing and Accrediting Institutions/ Departments/ Programmes
3. Evolving appropriate instruments of accreditation and fine tuning them whenever necessary.
4. Identifying, enlisting and creating a pool of dependable assessors.

5. Providing appropriate training to assessors.
6. Preparing in-house pre-visit documents for the perusal of assessors.
7. Co-coordinating the 'on-site' visit to its effective completion.

**Complementary Functions**

1. To organize promotional activities related to quality in higher education, and Assessment & Accreditation, which include the following:
2. Develop pre and post accreditation strategies
3. Disseminate the NAAC processes and quality enhancement mechanisms through relevant publications
4. Organize Seminars/Workshops/ Conferences to share and discuss education quality-related issues.
5. Provide guidance to institutions for preparing their Self-study Reports (SSRs)
6. Partner with stakeholders for promoting A/A
7. Promote the establishment of Quality Assurance units
8. Internal Quality Assurance Cells (IQAC)
9. State level Quality Assurance Co-ordination Committee (SLQACC)
10. State Quality Assurance Cell (SQAC)

Establish collaborations with other National and International professional Agencies of A/A

**Value Framework of NAAC**

The changes in the education system as a result of the impact of technology, private participation, and globalization and the consequent shift in values have been taken into consideration by the NAAC while formulating the following core values for its accreditation framework.

### I) Contributing to National Development

The HEIs have a significant role in human resource development to cater to the needs of the economy, society and the country as a whole, thereby contributing to the development of the Nation. It is therefore appropriate that the Assessment and Accreditation process of the NAAC looks into the ways HEIs have been responding to and contributing towards National Development.

### ii) Fostering Global Competencies Among Students

With liberalization and globalization of economic activities, the demand for internationally acceptable standards in higher education has grown. Therefore, the accreditation process of the NAAC needs to examine the role of HEIs in preparing the students to achieve core competencies (innovative and creative) to face the global requirements successfully.

### (iii) Inculcating Value System Among Students

The HEIs have to shoulder the responsibility of inculcating the desirable value systems (values commensurate with social, cultural, spiritual, moral etc.) amongst the students. The NAAC assessment therefore examines how these essential and desirable values are being inculcated in the students by the HEIs.

### (iv) Promoting Use of Technology:

To keep pace with the developments in other spheres of human endeavour, the HEIs have to enrich the learning experiences of their wards by providing them with the state-of-the-art educational technologies.

### (v) Quest For Excellence:

Excellence in all that the institutions do will contribute to the overall development of the system of higher education of the country as a whole. This 'Quest for Excellence' could start with the preparation of the SAR of an institution. Another step in this direction could be the identification of the institution's strengths and weaknesses in various spheres/criteria.

The five core values as outlined above form the foundation for assessment of institutions that volunteer for accreditation by the NAAC.

**Accreditation Criteria and Processes for Accreditation**

Since the accreditation framework of the NAAC is expected to assess the institution's contributions towards the five core values mentioned above, the NAAC has integrated these into the seven criteria identified for Assessment and Accreditation, which are:

1. Curricular Aspects
2. Teaching-Learning and Evaluation
3. Research, Consultancy and Extension
4. Infrastructure and Learning Resources
5. Student Support and Progression
6. Governance and Leadership
7. Innovative Practices

At NAAC, a five-stage process of external quality monitoring/assessment is undertaken covering:

(I) On-line submission of a Letter of Intent (LoI)

(ii) Submission of Institutional Eligibility for Quality Assessment (IQEA) required in the case of certain HEIs coming forward for assessment and accreditation for the first time and feedback to the applicant institution regarding specific improvements needed for reaching the threshold level of quality for applying for the comprehensive Assessment and Accreditation by NAAC

(iii) Preparation and submission of Self-Study Report (SSR)/ Self-Appraisal Report (SAR)/ Re-accreditation Report (RAR), as the case may be, by the HEIs

(iv) On-site visit by Peer Teams for validation of the SSR/SAR/RAR and reporting the assessment outcome to the NAAC and

(v) The final decision by the Executive Committee of the NAAC.

**Benefits of Accreditation**

Helps the institution to know its strengths, weaknesses, opportunities and challenges through an informed review

1. Categorizes internal areas of planning and resource allocation
2. Enhances collegiality on the campus
3. Outcome of the process provides the funding agencies with objective and systematic database for performance based funding
4. Initiates institution into innovative and modern methods of pedagogy
5. Gives the institution a new sense of direction and identity
6. Provides the society with reliable information on the quality of education offered by the institution
7. Gives employers access to information on standards in recruitment
8. Promotes intra-institutional and inter - institutional interactions.

**Impact of NAAC**

1. Created better understanding of Quality Assurance among the HEIs
2. Generated keen interest and concerns about Quality Assurance among the stakeholders
3. Helped in creation of institutional database of the accredited institutions
4. Encouraged the institutions to get more funds from the funding agencies

5. Facilitated regulatory agencies to make use of accreditation for funding

6. Triggered Quality Assurance activities in many of the HEIs

7. Activated a 'Quality Culture' among the various constituents of the institution

**Future of Accreditation System**

The criteria currently adopted by the two systems- All India Council for Technical Education (AICTE) and NAAC for assessment are just the physical and measureable parameters like space, faculty strength, publication etc., There are suggestions that the accreditation should also asses the “process parameters” too. In addition the quality assessment should include the system of several other factors like management, administration, transparency, ethics, and so on. Above all, the assessment should also consider the “outcome parameters” such as the performance of the products of the programme or institutions. But this is not possible by the visit or inspection which last for a few days.

**Conculsion**

There is a growing concern that quality monitoring has to be about improving what is delivered to stakeholders, even where this requires some substantial reconsideration of the higher education. Accountability still remains a priority in many systems and there is a concern that credibility through accountability has to be established first and then improvement will follow. Real enhancement is internally driven. If enhancement is also intended to develop the transformative ability of students, then quality monitoring needs to adopt a transformative framework, rather than simplified operationalisations such as fitness for purpose. Only if external quality monitoring is clearly linked to an internal culture of continuous quality improvement that focuses on identifying stakeholder requirements in an open, responsive manner will it be effective in the long run. Quality monitoring is in need of a `paradigm shift' that turns it from an accountability tool to a fundamental support in the development of a culture of continuous improvement of the transformative process. Hope

NAAC will act upon this. Education at all levels can shape the world of tomorrow, equipping individuals and societies with the skills, perspectives knowledge, and values to live and work in sustainable manner. The higher education system in India has developed in a noteworthy way, particularly in the Post-independence period, to become one of the prime systems of its kind in the world. It has been used as a reliable tool to build a knowledge-based information society. The main aim of Higher education is to contribute to the development and improvement of society as a whole in the sustainable manner. It also aims at meeting the needs of all sectors of human activity. New developments in higher education require a major transformation in the accreditation process. The overriding public interest of the present century is promoting accountability for moving to excellent quality and performance. In order to survive in the competitive world of globalization, all higher education institutions should pay special attention to quality in higher education. NAAC has taken a number of steps to promote the quality of Indian higher education. NAAC's assessment has made great attempts in bringing about quality culture among the Higher Educational Institutions of India. Quality is the major life giving force in the Institutions of higher education. Without quality, higher education is of no use to anyone. In the recent past, there has been a mushroom growth of higher educational institutions with sub-standard quality of education. However, after NAAC's inception, there has been a massive change in the total scenario of higher education. NAAC's assessment has brought about quality development in the colleges. There has been major improvement in the academic and non-academic activities of the college.

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# Leadership and Teamwork: Going Hand in Hand

**Shikha Agrawal** [1]

## Abstract

The importance of a symbiotic relationship between leadership and teamwork cannot be overstated. In an increasingly knowledge-intensive environment, even the most capable leader may suffer failure if the team he or she leads fails to meet the leader's objectives and becomes derailed. Without strong and smart leadership, teams can become rudderless. There has been a lot of discussion on the leadership styles and traits that lead to optimal team success. Similarly, the characteristics of highly effective teams have been researched and imitated. Leadership and teamwork, of course, are inextricably linked. For best organizational performance and good outcomes, they must be balanced, coordinated, and synergized. The purpose of this review paper is to study and suggest best practices for achieving a successful balance between leadership and teamwork in a competitive context.

## Introduction

The grounded roots of the dynamic act of business are leadership and teamwork. In an organizational environment activated by a constellation of teams, one cannot survive without the other. These groups are essentially make-shift organizations with defined goals, resources, and deadlines. This is because the organization's tactical and strategic goals are mostly achieved through teamwork—something that cannot happen by chance. Critical soft skills are required for both leadership and teamwork, and they must be used

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wisely and in a balanced manner. This symbiotic relationship between leadership and teamwork is necessary to ensure that both be carried out not just in tandem—as two sides of the same coin—but also in synergy, as they draw inspiration for success from each other. Poor leadership will not be able to lead a motivated team to success, and good leadership will not be able to lead an inept and unmotivated team to success.

Organizational leadership is a set of skills and behaviours that enable a person to exert interpersonal control over a group of people. The leader's vision and purpose are thus realized by directing and motivating the team to achieve the leader's desired set of objectives. Indeed, leadership is a deliberate exercise in influencing and motivating people—individually and in groups—while also setting clear expectations for those who follow. The team helps the translation of the leader's vision into reality by utilizing their innate and developed abilities and being empowered by the leader with delegated authority and responsibility. A leader's ultimate achievement is persuading followers to perform seemingly difficult tasks. Indeed, the best leaders inspire their followers to go above and beyond their own expectations when it comes to duties and goals (Bass, 1990). The term "leadership" has a wide range of meanings and is frequently confused with other, similarly complicated notions such as "power," "authority," "management," "administration," and "supervision." (Lim, 2001). Researchers lament the fact that neither academics nor practitioners have been able to define leadership with sufficient definition, correctness, and succinctness (Javidan, et al., 2006; Rost, 1993). This isn't unexpected, because the difference between definitions is in their connotation, especially in terms of the leader-follower relationship (Maak & Pless, 2006). Indeed, normative assumptions are incorporated into the notion of leadership in the relationship between leaders and followers (Ciulla, 2004).In this conceptual study, both leadership and teamwork—vast concepts in and of themselves—are examined as a balanced attempt. A framework is created for best practices to achieve synergy, sagacity, and success in the two complimentary phenomena.

## Definition of Leadership and Teamwork

The underlying ontological assumptions employed to investigate the phenomenon appear to affect how leadership is defined. Trait theorists define leadership as a set of characteristics, whereas behavioural theorists define it as a set of abilities; and social constructivist scholars define leadership as a process and a relationship (Kezar, 2004). Theories of trait, behaviour, power, and influence (reciprocal leadership theories) are the most common methods to leadership study. These reciprocal models of leadership view leadership subjectively as a dynamic process with reciprocal interactions with followers (Barker, 2002). Contingent, cultural, social constructivist, critical, and post-modern leadership theories are among the others (Grint, 1997). Visionary, charismatic, laissez-faire, transactional, and transformational leadership are among the most generally acknowledged leadership theories today (Bass, 1990).

Given the many different definitions of leadership (Gardner, 1995), the operational definition will be heavily influenced by the researcher's goal (Yukl, 1994; Bass, 1990). Yukl's (1994, p. 5) definition of leadership has been selected for this study to connect with the goal of this work having utmost synergy between leader and followers:

Leadership comprises influence processes affecting the interpretation of events for followers; the choice of objectives for the group or organization; the organization of work activities to accomplish the objectives; the motivation of followers to achieve the objectives; the maintenance of cooperative relationships and teamwork; and, the enlistment of support and cooperation from people outside the group or organization.

The term "influence processes" refers to the idea that a leader's predicted efficacy is primarily determined by his or her ability to influence followers, which has been well-documented in the literature (Northouse, 2004; Buchanan & Huczynski, 1997). Without a

doubt, leadership is a function, an attitude, and a set of behaviours—and it requires all of these elements to create, sustain, and foster a culture that will embody a vision while representing stakeholders' best interests. This strategy focuses on performance in order to achieve successful tactical and strategic objectives. To satisfy the stakeholders, the ideal function of both the leader and the team is to assure quality, integrity, accountability, fairness, and balance.

A team can simply be defined as a group of people who are unified in their pursuit of a common objective or goal, often at the expense of personal goals. Diverse individuals, a similar objective, a sense of community, knowledge sharing, and concerted work are all hallmarks of teams. Individuals that are eager opportunity seekers, persistent problem solvers, and incorrigible optimists make up the finest teams. While boosting their own professional development, such teams develop high team dynamics and a great track record. To achieve these admirable objectives, effective leadership is required. Strong leaders do, in fact, create strong teams: groups of individuals that collaborate to achieve a common goal. Leaders inspire and drive teams in today's knowledge-intensive world. They don't use coercion. They get outcomes by creating a shared vision and presenting it to the team, all while influencing with zeal. We can say that leaders identify problems, and teams assist in their resolution. For effective team dynamics, building teams, managing conflict, leading positive change, empowering and delegating, and creative problem-solving are all crucial concurrent activities. Astute leaders adjust their leadership style to fit each situation and create an environment in which the team can thrive. They are also aware of their own and their teams' strengths and flaws. Effective leaders maximize their team's strengths while minimizing their limitations. Undoubtedly, to achieve goals, teamwork necessitates collaborative problem-solving and action-oriented decision-making.

Teams are made up of individuals that provide a variety of skills to the project. Kelchner (2013) emphasizes the need of maximizing diversity within a team to enable for different

skill sets to come together and share ideas for the best potential result. Self-induced barriers are generated within a team when the natural dynamic flow of the team is suppressed—with probable disputes. As a result, the leader should endeavour to understand each team's culture and identify ways to boost that team's and each of its members' natural dynamics. To push the organization's strategic vision through successful leadership, a creative strategy is required. There is no alternative for excellent leadership when it comes to a team's overall performance. Leadership distinguishes a good unit from a bad unit in the military. Leadership distinguishes a successful team from an unsuccessful team in sports. By this definition, organizational leadership is the sensible application of leadership behaviours with the purpose of achieving organizational goals through the motivation of competent teams. For successful outcomes, effective leadership must be balanced with a competent, motivated, and well-coordinated workforce.

**The Five-Dimensional Leadership Competence Model**

Globalization has increased the demand for leaders with a diverse background to handle the wide range of actions required to carry out the strategy plan. Beyond the apparent, environmental complexity has considerably increased stakeholder expectations. Today's leaders must be fully capable and prepared to deal with both known and unexpected hazards. From a plethora of conceivable leadership skills, a select number stand out as the most practical for use in a global setting. Cameron and Whetten (2011) distilled the capabilities that can create a well-rounded leader into a composite, Five-Dimensional Leadership Competency Model. The model comprises of the following: (1) Transformational; (2) Transactional; (3) Organic; (4) Contemporary; and, (5) Ethical. These types are described in Table 1.

It's worth noting that the Five-dimensional Leadership Competency Model includes a complex of complementary leadership styles that can be deployed individually or

simultaneously depending on the situation because they don't conflict. As a result, these styles strike a compromise between the project leader's personality, competencies, and needs, as well as those of the team members. This composite model argues that in today's complicated environment, a one-size-fits-all strategy to leadership and teamwork will not work: a balanced and "multi-faceted" approach is required. This is especially true in the team's typically high-intensity atmosphere as a temporary organization, which is filled with complicated communication channels and diverse personas!

**Successful and effective Leadership and Teamwork**

Today's successful firms rely on teams to succeed, and establishing and inspiring teams is a key part of that success. To maintain high performance throughout their brief existence, teams require constant care and connection. Leadership must now focus on motivating and supporting teams with skills that were previously overlooked but are now essential in a globalizing economy. A variety of traits are required for a team to be tuned to success, including defined objectives, shared leadership, clear roles and duties, interdependent members, mutual encouragement, and trust between the leader and the team. Whetten and Cameron (2011) also mention a few characteristics that lead to efficient team performance. These include a diverse team makeup, increasing familiarity among project team members, team motivation that sharpens competence, team goals and overall feedback, team cohesion, and team decision-making processes. Playing beneficial roles and providing feedback to others are two key abilities connected with a successful team. Task-facilitating roles, for example, improve a team's performance by providing direction, urging, and summarizing; and they affect team members' actions to enable task completion and group cohesion. On the other hand, by sharing feedback, a team can move on with work while also developing relationships with one another. One way team members deliver good feedback is to focus on the behaviour rather than the person. This helps to establish positive relationships rather than destroying team unity. This equilibrium is both beneficial and corrective.

## Transformational Leaders

Transformational leaders are charismatic persons who can persuade a group to achieve the organization's strategic objectives. These leaders promote and facilitate the growth of a company with a culture built on honesty, transparency, and real regard for others. Such leaders motivate their followers to go above and beyond. They also promote positive workplace connections. As a result, motivated team members are continually empowered to achieve goals with evident passion.

## Transactional Leaders

Transactional leaders swap work with their teams in exchange for concrete and intangible benefits for completing assignments. Under transactional leadership, followers are motivated by the leader's rewards rather than the threat of negative consequences (Patterson, 2011, p. 75). By conveying strategic goals that are equally aligned with the team's strengths and capabilities, transactional leaders create the foundation for excellent outcomes. "High performance is related to valuable rewards, which leads to satisfaction," the project leader reminds the staff. (p. 332) (Whetten & Cameron, 2011). The capacity to lead a high-performing, cohesive team is proof of "an engaging style of leadership's" efficacy. p. 14) (Alban-Metcalfe & Alimo-Metcalfe, 2009).

## Organic Leaders

Organic leadership allows for more engagement between team members and significantly builds working connections. Individuals that collaborate or operate in an organic framework are so bound by a common vision and ideals (Patterson, 2010, p. 75). This type of leader empowers and mentors motivated team members to develop their own leadership abilities.

## Contemporary Leaders

Contemporary leaders take a democratic style to leadership, relying on persuasion and influence rather than fear to lead their teams. Contemporary leaders manage ambiguity and contradiction in the following ways to assure effective outcomes: pioneer change and manage stability; articulate vision and achieve objectives; disrupt established, antiquated rules, and monitor adherence (Whetten & Cameron, 2011, p. 17). The modern leader employs structure to effectively lead the team toward the organization's strategic goals and stakeholder expectations. Current leaders also see current difficulties as a chance for growth; they take use of the potential to develop and retain talent in order to achieve a competitive advantage in the long run (Graham, 2012).

## Ethical Leaders

Ethical leaders instil respect in their team members and stakeholders by offering a good example of honesty. Ethical leadership is concerned with how leaders utilise their social authority ethically in the decisions they make, the acts they do, and the ways they affect others (Resick, Hanges, Dickson, & Mitchelson, 2006, p. 346). If it is a common practise of the organisation as a whole, this type of value-based leadership can be contagious. A leader who always acts with integrity is an invaluable role model for both the parent organisation and their teams.

**Table 1: Five – dimensional model of leadership adopted from Cameron and Whetten (2011)**

It's crucial to follow the process that teams go through while metamorphosing—generally known as the four stages of forming, storming, norming, and performing—in order to learn how to develop solid relationships and accomplish team-building (Tuckman, 1965). Team members are courteous and team duties are less apparent during the early 'formation' stage; during this stage, team members rely on leadership to set limits and clarify expectations. The group enters the 'storming' stage as roles and relationships become clearer. Established roles may be questioned at this point, and leadership may be called upon to explain the group's foundation. As the group progresses, they reach the 'norming' stage. The organization has a well-established hierarchy at this point, which makes work easier for the group. As the group understands they have a shared vision, camaraderie develops and relationships get stronger at this phase of group development. Finally, in the 'performance' stage, the general goals of the ensemble are realized. Hierarchy and culture are established, and team members can join or depart without affecting the culture of the business or team. Building strong relationships is critical for success in all four of these stages (Manteklow, 2011). A balance of well-developed team-building and astute leadership is obviously needed to construct strong, successful teams. To effectively get to the fourth stage of performance, teams must progress through the first three phases in a systematic manner. There will, however, be some overlaps between stages, and the time it takes each team to complete each level will vary. Because it is as much an art as it is a science, developing a successful team necessitates significant dedication and awareness on the part of the leader. Each team will be unique in this setting, with a variety of stressors and hurdles for leaders to overcome and adapt to—indeed, to neutralize and balance. A strong team understands that its members are reliant on one another for success, and that in order to overcome hardship, they must work together. With this in mind, a strong, resilient team with great potential to achieve its stated goals will emerge. A high-performing team with the necessary competencies but ineffective leadership, on the other hand, can compromise success.

**Best Practices in Balancing Leadership and Teamwork**

Leadership in today's world necessitates a greater understanding of the human factor in implementation. Indeed, it necessitates a balance of technical and behavioural skills, hard

and soft skills, and leadership and teamwork. Members of a team are driven in different ways. Team leaders must know that the reputation of being part of a successful team may be sufficient motivation for some. Members of the team could just be self-motivated and looking for new challenges. Money, self-interest, exposure, or the learning experience itself may serve as motivation for others. Leaders must also be prepared to create opportunity for team members to develop their leadership skills by putting them on teams that can help them do so. To encourage, coach, inspire, and establish a cohesive team, a skilled communicator with charm is required, as is awareness of each team member's individuality and distinct ambitions. A conceptual framework can be built to balance leadership and teamwork—incorporating a great understanding of human behaviour and motivation—enabling pragmatic leaders to actualize the need for this balance. To encourage, inspire, and develop a cohesive team, the leader must use effective communication while recognizing each team member's individual abilities, drivers, and aspirations. This basic framework of best practices is proposed based on the prior discussion on effective leadership and team dynamics. It consists of eight tenets that combine critical soft skills to create a symbiotic relationship between leadership and teamwork.

**Honesty and Integrity:** Integrity is the unavoidable foundation of leadership and discipleship. It cultivates a sense of trust, respect, and credibility. The activities of the leader set an example for the rest of the team. Integrity is, without a doubt, the most effective way to balance leadership and teamwork. A high reputation for integrity must be maintained across the organization, with the leader leading by example in terms of high ethical standards for the organization and the team.

**Orientation towards a common goal:** Both the leader and the team should keep the organization's goals in mind at all times. In addition, the project's overall organizational goals must be harmonized with the personal aspirations of the team members. The team should accept responsibility for achieving the goal, which will lead to personal achievement and progress. Goal-setting is extremely crucial during both planned and unanticipated

organizational transitions. In order to achieve success, the leader and team must anticipate and welcome change while including pre-emptive risk management procedures.

**Shared Vision:** The visionary leader sees the unseen, feels the unseen, and does the seemingly impossible. From the start, the leader's vision of a successful team must be conveyed with the team. By providing direction for activity while promoting innovation and inventiveness, a clear vision also enables team members to perform without strict supervision. The vision should be based on the company's culture and the duties of individual team members. An effective leader is frequently regarded as someone who has a clear vision of where they want to go and can explain that goal. Change excites visionaries, as does the ability to draw new lines. A visionary leader inspires others, gives them a cause to exist, and gives them the vision and courage to change. Team members can feel like they have a true stake in the project when they work with visionary leaders. They provide people the ability to see their vision as their own. Involving team members in the drafting of the team's vision statement can assist obtain buy-in and benefit from the perspective and experience of the team members who will be responsible for completing the essential tasks. Finally, the leader's job in participative vision building is to guarantee that team goals are consistently aligned with company objectives and policies.

**Robust Communication:** Clear communication regarding goals, duties, performance, expectations, and feedback is essential for effective leadership. The team's leader also serves as the team's conduit to the rest of the company. Transparent communication promotes credibility, trust, and efficiency in all directions. Differences may inevitably arise, but dialogue and discussion should serve as a springboard for finding solutions. To ensure the team's success, the leader must be able to effectively bargain and persuade when necessary. Four primary communication demands exist for team members: responsibility parameters, coordination with one another and the leader, project status knowledge, and synchronization of choices by diverse stakeholders (Verzuh, 1999, p. 222). As a result,

communication is critical not just for team advancement, functionality, and cohesiveness, but also for effective leadership. Communication is so vital in the development of a team that it should be nurtured from the beginning. It's all too simple for a blunder to derail team formation during the first meeting of team members. To guarantee that team members are properly communicating during team formation, the leader must mediate those early meetings. Expectations and objectives must be communicated to all team members in a clear, succinct, and accurate manner, with the leader's support.

**Association or Collaboration:** Strong leaders create strong teams, which are made up of individuals who work together in a cooperative effort. They adjust their style(s) to fit any situation and create a positive environment for the team to thrive in. Members of a team may originate from a single source and provide a highly specialized output, or they may come from a variety of backgrounds and approach a product holistically. The leader's job is to figure out what individual team members think and categories them into common value categories. These values reflect firmly held personal views and serve as a source of inspiration for the entire organization, as well as an encouragement for teamwork and commitment (Martinelli, 2010). This commitment may ensure that team members embrace challenges with zeal, persevere through problems, and put in a valiant effort. Indeed, the value of aggregate individual qualities toward successful collaboration appears to be embraced by the notion of a high-performing team. Every team member has something to contribute, and disagreement brings out a lot of those skills. Conflict is a naturally occurring process that occurs in healthy teams and is required for team success dynamics. This is especially true in cross-cultural circumstances where communication is more complicated. Generally, collaboration is the key to settling issues peacefully and creatively.

**Creativity:** When used productively, creativity may be an asset, providing flexibility, invention, and competitive muscle. On the other side, if the project leader enables the project team to stray from the project's objectives, it could be a barrier. The spirit of innovation can grow by establishing a healthy and inclusive project environment that

nurtures creativity (Abgor, 2008). In the twenty-first century, creativity and innovation are an organization's key source of competitive advantage; yet, implementing this approach requires an understanding leader who is interested in bringing innovation to the firm (Abgor, 2008). Creativity in teams should be fostered because it is a way of creating ideas that can help an organization's bottom line improve or transform. However, creativity isn't just for coming up with new ideas; it can also be a useful tool for addressing problems, especially in a competitive atmosphere. As a result, encouraging value-added, creative work is critical for tapping into team members' tacit knowledge.

**Empowerment:** Helping others create a sense of self-efficacy, self-determinism, personal control, meaning, and trust is what empowerment is all about (Whetten & Cameron, 2011, p. 472). To establish trust and build connections, the leader must be able to communicate effectively with the team members. When people are able to form positive, energy-generating relationships, they have significant physiological, emotional, intellectual, and societal repercussions (Whetten & Cameron, 2011, p. 238). Mentorship aids this activity, which is beneficial because most people have minimal difficulty talking effectively in good conditions. Strong leaders who encourage and coach team members are aware of both their own and the team's strengths and flaws. Delegation is also an aspect of empowerment in this situation. The project manager should be able to delegate, recognizing the team members' talents and competence and assigning work appropriately. This improves trust, which is also an important component of a positive and balanced leader-team interaction. Empowerment demonstrates that the leader believes in the team's ability to step beyond of their comfort zones, be innovative, and come up with fresh approaches to do tasks.

**Team-building:** A good team-builder is required of the leader. A strong person who offers the substance that binds the team together in common pursuit towards the correct objectives is best described as a team-builder. The squad begins as a collection of strangers who must be brought together to become a high-performing unit. Another

important trait a leader should possess is the ability to maintain a sense of team spirit despite several issues with implementation. From the start, the leader must play a key role in establishing a favorable work tone and ethic for the team. A team should be nurtured in a way that evokes a positive, team-building culture.

## Conclusion

In an increasingly competitive market, balancing leadership and teamwork as two sides of the same coin has become crucial, especially in the face of a scarcity of precious resources, most notably human resources. To tap into the best that a team has to offer in the relentless pursuit of organizational success, a larger focus on the 'soft' skills' of leadership is required than has previously been recognized. Balancing the two linked phenomena, on the other hand, is a valuable job that may be accomplished with consistent interpersonal effort on the part of both the leader and the followers. This paper presents a basic framework of eight soft skills that span and balance leadership and teamwork in an attempt to incorporate best practices in this area. It will need to be expanded, categorized, and empirically tested, but it will be a solid starting point. Leadership styles and perceptions, understanding of different cultures, individual and team motivations, interpersonal skills, levels of creativity, ability to manage change, communication style, listening ability, decision-making skills, and personal ethics must all be evaluated on a regular basis by leaders. To successfully establish teams, achieve goals, and avoid pitfalls, a leader must marshal appropriate talents and tasks. All of these, however, necessitate a leader who is adaptable and capable of devising innovative and effective solutions. Organizational change is unavoidable, so take a proactive, forward-thinking strategy. This means that, in addition to the technical components of timelines, risks, and resources, the leader should be able to establish unique and successful techniques of timely and thorough communication, team-building, negotiation, and conflict resolution. Overall, being a good leader entails being able to communicate effectively with team members in order to achieve project success. Strong communication abilities in the leader aid in the development and maintenance of relationships. As a result, the leader will determine the

most effective methods of inspiration, mentoring, and empowerment for each team member. In the end, the leader must strike a balance between intelligent leadership and a unified, high-performing team that achieves its full potential—beyond all expectations.

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