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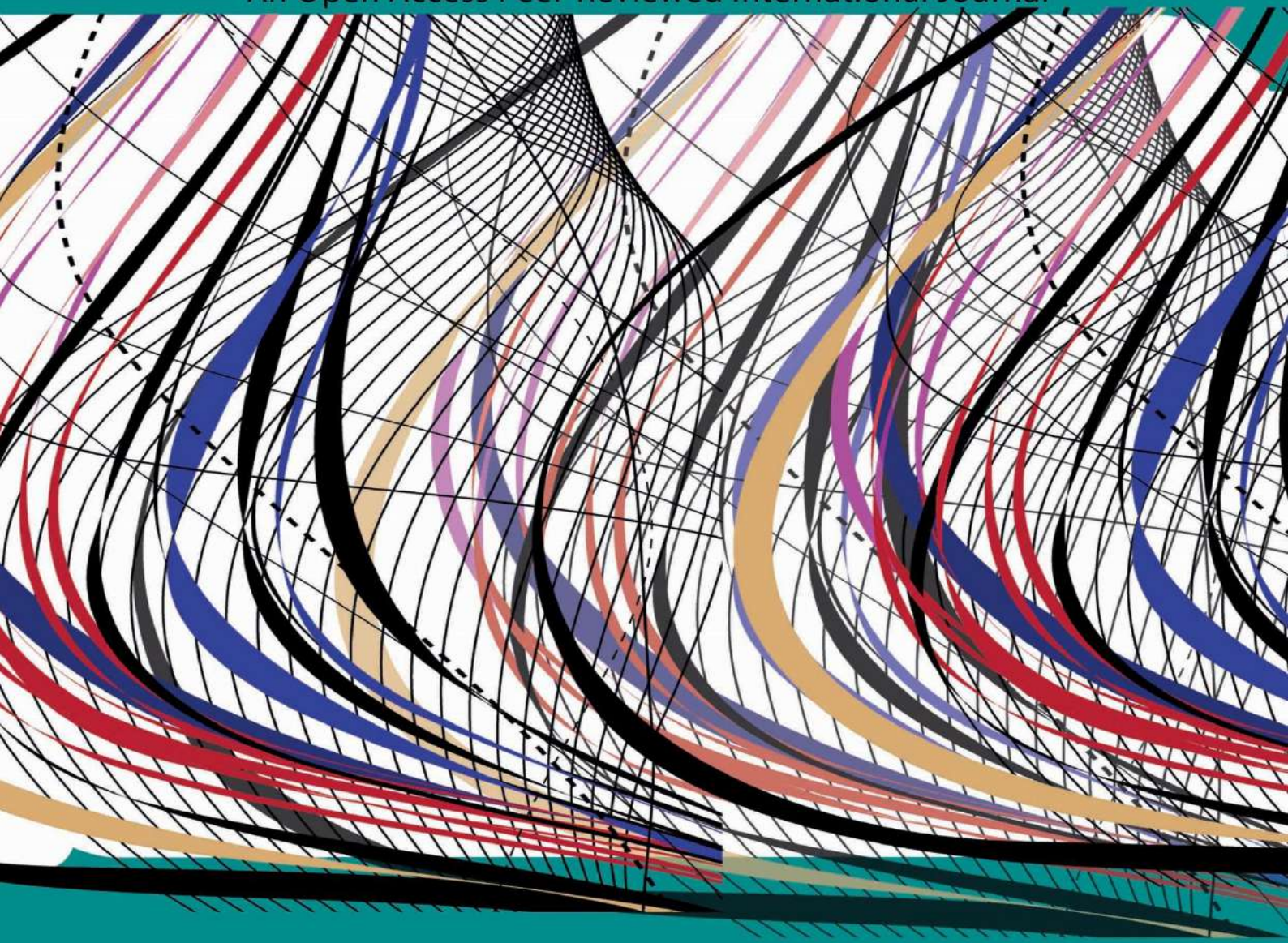

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FOREWORD

I am pleased to put into the hands of readers Volume-7; Issue-5: May, 2021 of "**International Journal of Advanced Engineering, Management and Science (IJAEMS) (ISSN: 2454-1311)",** an international journal which publishes peer reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers.

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Dinh Tran Ngoc Huy
Editor-in-Chief
June, 2021

Editorial Board/ Reviewer Board

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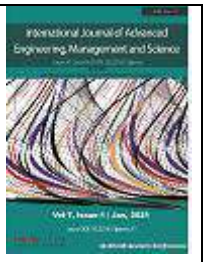

Recent applications of HPLC in food analysis: A mini review

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Abstract— *Chromatographic separation techniques are multistage separation methods in which the components of a sample are distributed between two phases, of which one is stationary and the other is mobile. High-performance liquid chromatography (HPLC) has emerged as the most powerful and versatile separation and analytical method. High-performance liquid chromatography (HPLC) is a type of liquid chromatography used to separate and quantify compounds that have been dissolved in solution. HPLC is used to determine the amount of a specific compound in a solution. This article is primed with an aim to review different aspects of HPLC such as principle, types, and its application in the food analysis field.*

Keywords— ***Chromatography; food analysis; HPLC.***

I. INTRODUCTION

Analytical chemistry is widely used in determining the qualitative and quantitative composition of typical mixtures. These two methods are the main aspects to understand the sample material. Generally, analytical chemistry divides into two branches i.e. qualitative and quantitative analysis. Therefore, in order to carry on these analyses, an analytical technique termed chromatography was founded. The chromatography term was derived from the Greek words namely chroma (color)) and graphein (to write). Chromatography can be described as an analytical technique utilized for the separation, purification, and identification of constituents from the mixture. It works on the principle of differential interaction of solutes with two different phases, viz., the stationary phase and the mobile phase. Many modifications were made to the techniques of chromatography to overcome the shortcomings like analysis time and the range of compounds that could be detected. The application of pressure was practiced by the use of pumps to reduce the time of a run. Technologies like spectroscopy and electrochemical methods were added to enhance detection. With these developments and modifications, the functional efficiency of chromatographic techniques improved to a great extent and also the range and type of substances that could be analyzed (Ravali et al, 2011).

High-performance liquid pressure chromatography is also known as High-pressure Liquid chromatography (HPLC) is an analysis technique used for separation, identification, and quantification of a typical mixture such as organic and inorganic, biological, ionic, and polymeric materials. HPLC is a type of column chromatography in which solvent flows with high pressure, so that sample can be separated into different constituents divided into different types based on the mode of separation, the principle of separation, elution technique, the scale of separation, and based on the type of analysis (Olander, 1984). Increasingly, food analysis methods are built around high-performance liquid chromatography (HPLC), which has proven to be an optimal technology for detecting and/or quantifying the vast majority of food analytes. These methods employ a stepwise approach that first removes the sample matrix, then isolates the analytes of interest and individually resolves them on a chromatographic column. The efficiency of the separation depends on, among other things, the differential interaction of analytes of interest with both

mobile and column stationary phases. Of course, classifying food analytes according to their relative volatility and polarity are factors that must be considered when selecting an appropriate analytical method for their determination. High-pressure liquid chromatography (HPLC) is widely accepted as an invaluable technique for the analysis of many food components. In many instances HPLC methods have replaced laborious analyses and, in general, the chromatographic methods are more specific and precise, coupled with a significant reduction in analysis times.

II. INSTRUMENTATION AND DATA

The basic HPLC chromatography consists of a solvent supply, a pump, an injection system, a column, and a detector coupled to a chart recorder. Figure 1 shows a schematic diagram of an HPLC system.

2.1 SOLVENT RESERVOIR

In HPLC the mobile phase or solvent is a mixture of polar and non-polar liquid components. Depending on the composition of the sample, the polar and non-polar solvents will be varied (Hopmann, 2011). The solvent reservoir may be any convenient vessel, but provision must be made for degassing the solvent, either by application of vacuum or heat or by ultra-sonification. Failure to degas solvents, particularly protic solvents, may lead to air bubble formation in the detection cell, with consequent disruption of the chromatogram.

2.2 PUMP

The pump suctions the mobile phase from the solvent reservoir and forces it to the column and then passes to the detector. 42000 KPa is the operating pressure of the pump. This operating pressure depends on column dimensions, particle size, flow rate, and composition of the mobile phase (Xiang, 2006). Modern HPLC systems have been improved to work at much higher pressures, and therefore be able to use much smaller particle sizes in the columns (< 2 micrometers).

2.3 SAMPLE INJECTOR

An injector for an HPLC framework should give an infusion of the fluid specimen inside the scope of 0.1 mL to 100 mL of volume with high reproducibility and under high pressure (up to 4000 psi) (Simpson, 1976). For liquid chromatography, liquid samples can be directly injected and solid samples need only to be diluted in the appropriate solvent.

Compared with manual injectors, automated sampling systems offer highly reproducible injection volume, low carryover, and increased sample throughput. Modern auto-samplers are designed for online sample preparation and derivatization, and in some cases, to safely handle highly corrosive solvents or mobile-phase additives. They may also offer cooling and heating capabilities to preserve unstable species or to induce reactions.

2.4 COLUMNS

Columns are typically made of cleaned stainless steel, are somewhere around 50 mm and 300 mm long, and have an inward distance across of somewhere around 2 and 5 mm. They are generally loaded with a stationary phase with a molecule size of 3 µm to 10 µm (Martin and Guiochon, 2005).

2.5 DETECTOR

Important detection parameters are dynamic range, calibration linearity, chromatographic selectivity, and qualitative information. A detector is considered selective if it does not respond to co-eluting compounds that could interfere with analyte quantification (Simpson, 1976). The HPLC detector, situated toward the end of the column distinguishes the analytes as they elute from the chromatographic column. Regularly utilized detectors are UV-spectroscopy, fluorescence, mass spectrometric, and electrochemical identifiers. The function of the detector is to examine the solution which is eluting from the column.

2.6 DATA COLLECTION DEVICES OR INTEGRATOR

Signals from the detector might be gathered on graph recorders or electronic integrators that fluctuate in many-sided quality and in their capacity to process, store and reprocess chromatographic information. The PC coordinates the reaction of the indicator to every part and places it into a chromatograph that is anything but difficult to interpret (Malviya et al, 2010).

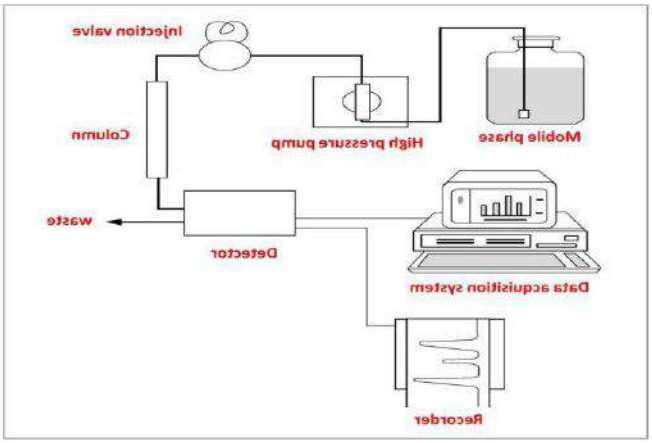

Fig.1: Schematic representation of an HPLC system.

3.1 PRINCIPLE AND TYPES OF HPLC

The main principle of separation is adsorption. Factors determining the Resolving power (R_s) are

$R_s = \frac{\sqrt{N}}{4}\left(\frac{\propto -1}{\propto}\right)\left(\frac{k2}{1+Kav}\right)$

Where

- Number of theoretical plates (N) in the column
- Column selectivity (α)
- Column retentivity (k)

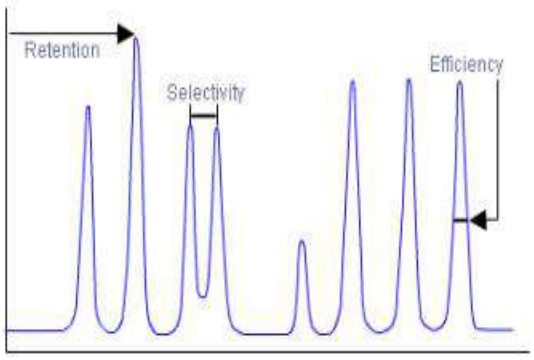

Fig.2: Shows the fundamental parameters

The retention (or capacity) factor (*k*) is a means of measuring the retention of an analyte on the chromatographic column. A high *k*-value indicates that the sample is highly retained and has spent a significant amount of time interacting with the stationary phase. The retention factor is equal to the ratio of retention time of the analyte on the column to the retention time of a non-retained compound. The non-retained compound has no affinity for the stationary phase and elutes with the solvent front at a time t_0, which is also known as the 'hold-up time' or 'dead time'

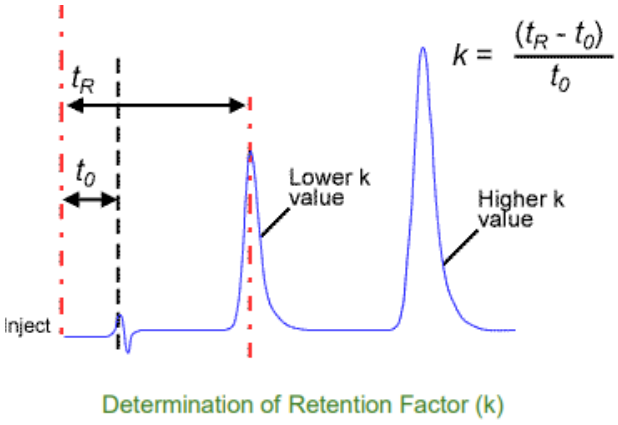

Fig.3: Determination of retention factor (k)

The selectivity (or separation) factor (α) is the ability of the chromatographic system to 'chemically' distinguish between sample components. It is usually measured as a ratio of the retention (capacity) factors (k) of the two peaks in question and can be visualized as the distance between the apices of the two peaks. High α values indicate good separating power and good separation between the APEX of each peak. However, the alpha value is NOT directly indicative of the resolution. By definition, the selectivity is always greater than one – as when α is equal to one, the two peaks are co-eluting (i.e. their retention factor values are identical). The greater the selectivity value, the further apart the apices of the two peaks become. As the selectivity of separation is dependent upon the chemistry of the analyte, mobile, and stationary phases all of these factors may be altered in order to change or optimize the selectivity of an HPLC separation.

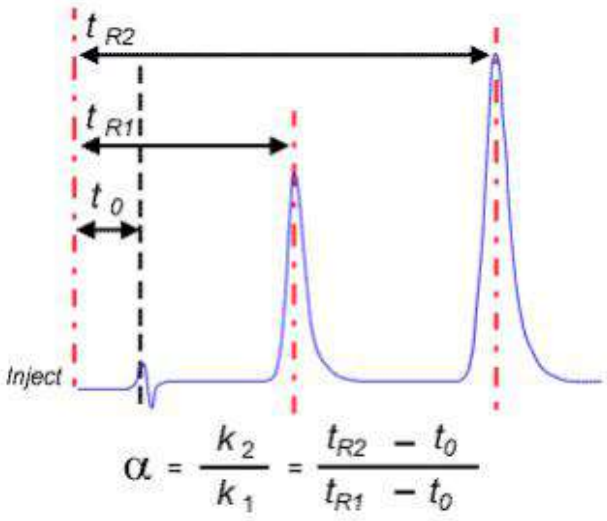

Fig.4: Determination of selectivity (α)

The efficiency of a chromatographic peak is a measure of the dispersion of the analyte band as it travels through the HPLC system and column. The plate number (N) is a measure of the peak dispersion on the HPLC column, which reflects the column performance. Efficiency is derived from an analogy of Martyn and Synge who likened column efficiency to fractional distillation, where the column is divided into Theoretical Plates. Each plate is the distance over which the sample components achieve one equilibration between the stationary and mobile phase in the column.

3.2 TYPES OF HPLC

Types of HPLC generally depend on the phase system used in the process (Abidi, 1991). Following types are of HPLC generally used in analysis-

3.2.1 ABSORPTION CHROMATOGRAPHY

The absorption chromatography solute molecules bond directly to the surface of the stationary phase (Shibasaki, 2012). The liquid-solid interface Molecules are reversibly bound to this surface by dipole-dipole interactions. The

component which has more affinity towards the mobile phase elutes first and the component which has less affinity towards stationary phase elutes later. No two components have the same affinity towards the mobile phase and stationary phase.

3.2.2 ION PAIRING CHROMATOGRAPHY

Ion pairing chromatography is an alternative to ion-exchange chromatography. It is a form of chromatography in which ions in solution can be "paired" or neutralized and separated as an ion pair on a reversed-phase column. Mixtures of acids, bases, and neutral substances are often difficult to separate by ion-exchange techniques. In these cases, ion-pairing chromatography is applied. The stationary phases used are the same reversed phases as developed for reversed-phase chromatography. An ionic organic compound, which forms an ion-pair with a sample component of opposite charge, is added to the mobile phase. This ion-pair is, chemically speaking, a salt that behaves chromatographically like a non-ionic organic molecule that can be separated by reversed-phase chromatography.

3.2.3 CHIRAL CHROMATOGRAPHY

It involves the separation of stereoisomers. In the case of enantiomers, these have no chemical or physical differences apart from being three-dimensional mirror images. Conventional chromatography or other separation processes are incapable of separating them. To enable chiral separations to take place, either the mobile phase or the stationary phase must themselves be made chiral, giving differing affinities between the analytes (Leon, 2014).

3.2.4 ION- EXCHANGE CHROMATOGRAPHY

Ion exchange chromatography is a process that allows the separation of ions and polar molecules based on their charge. It can be used for almost any kind of charged molecule including large proteins, small nucleotides, and amino acids. Retention is based on the attraction between solute ions and charged sites bound to the stationary phase. Ions of the same charge are excluded. The use of resin (the stationary solid phase) is used to covalently attach anions or cations onto it. Solute ions of the opposite charge in the mobile liquid phase are attracted to the resin by electrostatic forces (Malviya, 2010).

3.2.5 SIZE EXCLUSION CHROMATOGRAPHY (SEC) OR GEL PERMEATION CHROMATOGRAPHY (GPC)

This type of chromatography lacks an attractive interaction between the stationary phase and solute. Sample molecules small enough to enter the pore structure are retarded, while larger molecules are excluded and therefore rapidly carried through the column. Thus, size exclusion chromatography means the separation of molecules by size.

3.2.6 REVERSED PHASE CHROMATOGRAPHY

It is the reverse of the normal phase chromatography in which the stationary phase is non-polar and the mobile phase is polar. An example of the mobile phase is organic solvents (methanol, acetonitrile), buffer (phosphate buffer) (Malviya, 2010).

3.3 APPLICATION OF HPLC IN FOOD ANALYSIS

The literature on food analysis can be found in a lot of good reviews. All basic constituents of foodstuffs - proteins, lipids, carbohydrates, and vitamins are amenable to liquid chromatography. Various types of columns and detectors used for those analyses demonstrate the versatility of the technique. Almost any type of food matrix can be extracted in order to identify and quantitate trace amounts of analytes.

3.3.1 CARBOHYDRATES

Simple sugars, mono- and disaccharides, can readily be analyzed by gas chromatography after conversion to the more volatile trimethylsilyl derivatives. However, oligosaccharides, for example, raffinose and stachyose, are not so amenable to this technique, and a precision of only 10% is obtained (Delente & Ladenburg, 1972). HPLC does not require derivatization prior to analysis with the result that the speed of analysis and precision is improved. The majority of analyses, both for simple sugars and oligosaccharides, use partition chromatography on a silica bonded phase, either with amino functionality. In different studies, HPLC has been used for the analysis of sugars in many food commodities, including fruit juices, beverages wines, and many more. Moreover, HPLC has also been used extensively to study the breakdown of polysaccharides both for the production of syrups and the utilization of carbohydrate wastes.

3.3.2 LIPIDS

Both saturated and unsaturated triglycerides have been analyzed. Fats and oils are complex mixtures of triglycerides, sterols, and vitamins. The composition of triglycerides is of great interest in food processing and dietary control. Owing to the low stability of triglycerides containing unsaturated fatty acids, reactions with light and oxygen form hydroperoxides, which strongly influence the taste and quality of fats and oils. Adulteration with foreign fats and the use of triglycerides that have been modified by a hardening process also can be detected through triglyceride analysis.

A number of papers have shown the ability of HPLC to separate cis/trans isomers, for example, the separation of all cis linoleic acid (Kroll & Mieth, 1977). Also, HPLC has been used to study isomeric mixtures in the analysis of the products of oxidation of unsaturated fatty acid. The above

studies made it possible to detect the hydroperoxides formed, which would not have been possible at the elevated temperatures required for gas chromatography.

3.3.2 VITAMINS

Fat-soluble vitamins, such as vitamins E, D, and A, and water-soluble vitamins, such as vitamins C, B6, B2, B1, and B12, have been analyzed. Vitamins are biologically active compounds that act as controlling agents for an organism's normal health and growth. Vitamins generally are labile compounds that should not be exposed to high temperatures, light, or oxygen. HPLC separates and detects these compounds at room temperature and blocks oxygen and light (Nollet, 1992). Through the use of spectral information, UV-visible diode-array detection yields qualitative as well as quantitative data. Another highly sensitive and selective HPLC method for detecting vitamins is electrochemical detection. Figure 5 shows a chromatogram of the analysis of water-soluble vitamins in a vitamin tablet.

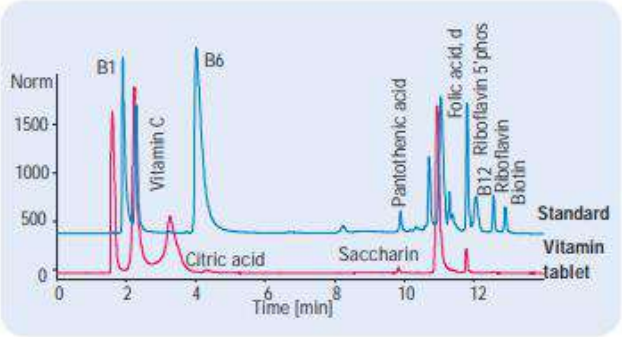

Fig.5: Analysis of water-soluble vitamins in a vitamin tablet

3.3.2 AMINO ACIDS

The amino acid composition of proteins can be used to determine the origin of meat products and thus to detect adulteration of foodstuffs. Detection of potentially toxic amino acids is also possible through such analysis. Through the use of chiral stationary phases as column material, D and L forms of amino acids can be separated and quantified. HPLC in combination with automated online derivatization is now a well-accepted method for detecting amino acids owing to its short analysis time and relatively simple sample preparation.

III. OTHER APPLICATION OF HPLC IN DIFFERENT INDUSTRIES

4.1 PHARMACEUTICAL APPLICATIONS

- Tablet dissolution study of armaceutical dosages form.
- Shelf-life determinations of pharmaceutical products.
- Identification of active ingredients of dosage forms.
- Pharmaceutical quality control.

4.2 ENVIRONMENTAL APPLICATIONS

• Detection of phenolic compounds in Drinking Water.

• Identification of diphenhydramine in sedimented samples.

• Bio-monitoring of pollutants.

4.3 FORENSICS

• Quantification of the drug in biological samples.

• Identification of anabolic steroids in serum, urine, sweat, and hair.

• Forensic analysis of textile dyes.

• Determination of cocaine and metabolites in blood.

IV. CONCLUSION

HPLC has made a significant contribution to the methodology of food analysis and this contribution will doubtless increase in the future. HPLC is a versatile, reproducible chromatographic technique for food analysis. It has wide applications in different fields in terms of quantitative and qualitative estimation of active molecules.

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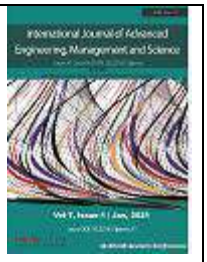

An evaluation study of the degree of need for classification criteria for Jordanian universities from the point of view of administrative academics in Jordanian universities

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Abstract— *The study aimed to find out the degree of availability of classification criteria for Jordanian universities from the point of view of administrative academics in them, and in order to achieve the objectives of the study, a questionnaire consisting of (42) paragraphs was constructed whose validity and reliability was verified, and it was distributed to the study sample consisting of (141) deans, their deputies and heads of departments in University of Jordan. As it retrieved (100) questionnaires. The results showed that the availability of classification criteria for universities in the University of Jordan as a whole was medium, as the highest was for the sixth field "Results and Achievements" with an arithmetic average of (3.88) and with a high degree of availability, and in the last rank the seventh field "Information and its analysis" with an arithmetic average of (3.12) and a moderate degree of availability. The results showed that there were no statistically significant differences in the overall score indicating the differences in the fields of the university classification criteria according to the job title variable, as well as in the fields of the university classification criteria.*

The study recommended issuing an introductory yearbook for the University of Jordan and its achievements and enabling leaders at the University of Jordan to undertake strategic planning.

Keywords— ***Evaluation Study, Classification Criteria, Administrative Academics.***

I. INTRODUCTION

The third millennium is witnessing an explosion of knowledge, which made countries face various challenges, so I was keen to mobilize all material and human capabilities to confront global competition and to enter the global race track, and from the community institutions that have come to face global competition, universities as they are a tool of society, so I was forced to review All its systems and regulations, restructuring its units, improving its outputs, and developing its competitive capabilities in line with the pressures from competitors from all over the world.In recent years, some research centers have begun to measure the efficiency and quality of university institutions by issuing continuous reports that determine the extent to which these universities adhere to specific global standards (Ghabboub, 2016). Announcing the results of the rankings of universities and higher education institutions worldwide every year is highly anticipated. Because the ranks obtained by the ranked universities largely reflect the level of progress of their countries, and this interest is no longer confined to the developed countries where the world-class universities are located, but some developing countries have begun to follow with great interest the results of these classifications (Al-Abbad, 2017).

The ranking of universities at the global level is one of the most important means of evaluating them and demonstrating their quality, whether in terms of scientific research, teaching, or the education they provide. Despite the different indicators used by these classifications, the first universities in the world often maintain their place in the front ranks in the rankings, such as Harvard University, Massachusetts Institute of Technology, Stanford University, University of California, and University of Oxford (Al-Siddiqi, 2015).

The absence of Arab universities from the global list of the best universities is an indication of the low ranking of Arab universities in the international rankings, an indication of the deterioration of the quality of education and its outputs in the Arab world, which poses a challenge to those in charge of universities in order to improve the ranking of universities in the Arab world and internationally (Ghabboub, 2016). Based on the above, this study came with the aim of evaluating the degree of need for classification criteria for Jordanian universities from the point of view of their administrative academics.

II. RESEARCH PROBLEM

In view of the intense rivalry between the countries of the world to take the lead in the field of the information economy, it is no longer possible to disregard universities' global rankings, as the countries that receive many of their universities on advanced world rankings have become a weapon that attracts international students. from all over the world.

Those who follow the position of Jordanian universities in the international rankings will notice that it is very weak. The Times Higher Education World University Ranking Of 2016-2017 report The University of Jordan ranked between 801-1000, while the University of Science and Technology ranked between 601- 800 (2017, Times Higher Education World University Rankings) While the report of the Spanish Center for WebMetrics for the year 2016 indicated that the University of Jordan ranked 1220, 41 in the Middle East, while the University of Science and Technology ranked 1729, and at the level of the Middle East 76 (2016 Webometrics of World Universities Ranking).

The World Bank report also indicated that higher education systems in the Middle East are facing pressures due to the quality gap between the skills sought by the labor market and the skills acquired by university graduates. Arab universities need innovation in order to provide an education that enables their graduates to become competitors and contributors to development (the Bank International, 2010).

The problem of this study is determined in defining the "degree of need for classification criteria for Jordanian universities from the point of view of their administrative academics."

The study problem can therefore be

summarized in replying to the following questions:

1- What is the degree of availability of university classification criteria at the University of Jordan from the point of view of its administrative academics?

2- What is the importance of providing classification criteria for universities at the University of Jordan from the point of view of its administrative academics?

3- What is the degree of need to provide classification criteria for universities at the University of Jordan based on the difference between the degree of availability and the degree of importance attributable to the variable of job rank?

III. RESEARCH OBJECTIVE

The study centered on the degree of need for Jordanian university classification requirements from the academic point of view of the administrators within it.

- **Importance of studying**
  The results of this study are as follows:
  Employing the results of the study and disseminating them to Jordanian universities. It is hoped that an introduction will benefit from it, a role in future projects in this context.
- **Terminology of study**
  The study adopts the following terms: An evaluation study: a study of quality indicators and Jordanian universities.
- **University Rankings:** A process by which universities and educational and academic institutions are arranged in a sequential manner according to the classification body that undertakes this task and on the basis of the criteria and indicators adopted in this regard, and there are many trends and institutions in the world that undertake this task (Wildavsky, 2010). As for procedural, it is: the degree obtained by the sample members of the academic administrators at the University of Jordan through their answers to the paragraphs of the "Jordanian Universities Ranking" scale used in this study
- **Classification criteria:**
  Ahmed (2012) defined them as the levels related to competencies required to be met in all educational programs offered by educational

institutions, and these criteria differ according to the classification body.

As for the procedures, they are: The competencies that must be provided in Jordanian universities in order to join the higher level and perform their function in society.

- **Administrative academics**: They are the deans of the colleges, their deputies, and the heads of departments in the official Jordanian universities.

The limits of the study

The study includes the following limits:

- **Human Limits:** The study was limited to administrative academics.
- **Time limits:** This study was conducted on the 2018/2019 academic year.
- **Spatial boundaries**: The study was limited to the University of Jordan.

Theoretical framework:

The theoretical framework consists of an introduction to the emergence and development of university rankings, followed by an enumeration of the most important university rankings.

The emergence and development of university rankings The first roots of university classification attempts go back to 1904 in Britain, where studies appeared trying to provide a list of several universities arranged according to the number of pioneers and scholars who graduated from them, and in the United States of America, "Gibbs Michael Cattel" issued a list of colleges, which he called "Leading" Institutions "in an attempt to familiarize students and help them define their academic choices. Stephen Fisher analyzed that list in 1920, and a group of scholars were influenced by what both Cattle and Fisher wrote.

In 1951, the American Universities Union requested a study on the classification of colleges, and 344 higher education institutions were classified and divided into four groups, and a summary of that classification was published in newspapers, which provoked reactions that reached the demand to close the union, and the result of that was the suspension of these attempts. Until 1959, when the University of Pennsylvania conducted an initiative to compare universities in the United States of America by conducting a survey based on the popularity of these universities, in which the opinions of department heads were taken in 35 universities, and they ranked the best 15 departments in 25 universities, and they were classified into four areas of humanity. Social sciences, natural sciences, biology, and from that year until 1966 there was a growing interest in making classifications (Luke & Robe, 2009).

Most famous university rankings:

Among the most famous university rankings in academic and administrative circles:

1. Ranking of Shanghai Jiao Jong University A classification issued by Shanghai Jiao Tong University, which is known as the Academic Ranking of World Universities (ARWU). The first ranking was issued in 2003 by the University's Institute of Higher Education, and the aim of issuing it was to know the location of Chinese universities among International universities in terms of academic performance and scientific research. The classification depends on the university's scientific production rate, and on the extent of its obtaining the Nobel Prize or the best-known field for mathematics.

The classification method includes four criteria, which are as follows:

First: The quality of education: represented by the Nobel Prize winners or prizes in the quality of mathematics education. % 10.

Second: the competence of faculty members: represented in the percentage of those who win the Nobel Prize or Field Awards in mathematics quality 20% and the percentage of recourse and citation of their research. % 20.

Third: Academic achievement: compared to the size of the scientific institution, represented by the university's performance in relation to its size. %

Fourth: Research production: represented in the number of papers published in the two journals of Nature and Science 20%, and the research mentioned in the reference book for the social sciences and the expanded reference 20%. (Salmi, 2013).

The researcher believes that this classification is concerned with the natural sciences at the expense of other sciences, in addition to being concerned with individual projects, and this is not considered an indication of the quality of performance.

THE World Ranking: The TIMES- QS

This comes from a professional education company called Quacquarelli Symonds, which was founded in 1990 and aims to raise global standards for higher education. And obtaining information about the study program in various universities, especially in the fields of science and technology, and making a comparison for the best (500) universities among more than (30) thousand universities around the world with the aim of issuing a guide that helps students and professional companies choose universities.

This classification is based on six indicators, which are as follows:

a. Peer evaluation: Academic Peer Review, with a rate of 40%.

B. The percentage of faculty members for students is 20%.

C. Academic research and reference Citations Per Faculty, and its rate is 20%.

Dr. The Employer Review labor market calendar and its 10% rate.

H. For foreign professors, the rate is 5%.

And. International Students, a rate of 5% (Al-Sayegh, 2010).

3. Webometrics Spanish classification

This classification is issued by the Cybermetricslab Studies Unit of the largest research institution in Spain, the Spanish Center for the Evaluation of Universities and Institutes, which is a center of the Spanish Ministry of Education, and publishes its results on www.webmetrics.info 2004, and depends on monitoring the movement of academic websites and the most advanced electronic pages in the field of research. Studies and reports; It aims to urge the academic authorities in the world to present their scientific activities in a way that reflects their distinguished scientific level on the Internet.

This classification is issued every six months. As for the criteria for this classification, they are the following:

1. The university's global performance and visibility of the university

It includes the following indications:

A- Web Size, which means the size of the university's website pages, according to the periodic reports issued by the four search engines (Google, Yahoo, Alexa, and Live) and its percentage is 20%.

B. Rich files standard, where the number of files of various types, whether in (pdf), (document) or (presentation) type, is calculated and is monitored by search engines, and its rate is 15%.

C. Research criterion (Scholar), where the number of published research is calculated electronically under the scope of the university's website and its rate is 15%.

2. Impact: It is measured through the Link Impact and Visibility (Isidro & Agullio, 2008).

Previous studies related to the subject of the study:

This part deals with a presentation of previous studies related to the subject of the study:

Amal Akl (2005) conducted a study aimed at developing standards of excellence for the university level in higher education institutions in Jordan. A questionnaire consisting of 103 items was developed and distributed to (230) members of the study community consisting of deans, department heads and directors of administrative units. The study showed the following results: The absence of statistically significant differences attributed to the university variable, and the existence of statistically significant differences due to the variable of job title and experience, and the study also showed that the degree of evaluation of the study sample for the areas of classification was high and the highest was the field of leadership.

Sheil (2010) conducted a study aimed at uncovering the reasons for the development of the university system in Australia beyond the international rankings of higher education institutions. The results showed that the most important of these reasons is the focus on providing resources and financial support, developing information systems in universities, ensuring diversity in educational methods and techniques, and training Qualifying academic bodies, and strengthening university administrative bodies.

Carroll (2014) also conducted a study aimed at knowing the relationship between university classification and some measures in higher education such as the level of fees and research support according to the classification known in Australia as the Group of Eight (Group of eight, where the study adopted the descriptive approach, and the study showed that there is a positive effect. These rankings include the level of graduates of these universities and their employment, the research performance of faculty members, attendance at international conferences and seminars, electronic services and advanced technologies and their use in education.

Houria's study (2013) also aimed to know the reality of planning to prepare a Taibah University to achieve global university ranking policies, and to come up with a proposed vision to prepare Taibah University to achieve global university ranking policies. The study adopted the qualitative approach, as qualitative interviews were conducted with an intentional sample of 14 respondents, all of whom were decision-makers and faculty members at Taibah University in Medina, from various colleges of the university. The study found a consensus on classification policies among international ranking institutions for universities in terms of objectives, methods of data collection, and the criteria and indicators used in classification. It also found that there is a general trend in the university to compete in the world university rankings. The study revealed that there is a weakness in the standards of the rankings, which may prevent the university from participating in the international rankings

of universities, related to human resources, administrative aspects, and financial aspects.

Barakat (2016) conducted a survey study aimed at knowing the opinion of a sample of administrative and academic workers in some Palestinian universities about the dimensions of the proposed strategy to prepare these universities for the international classification of universities. This sample consisted of (192) individuals on whom a questionnaire was applied consisting of (37) paragraphs representing each Of these, an element of the proposed strategy is divided into three areas: the first is related to human resources, the second relates to the financial aspect, and the third relates to the administrative and academic aspect. The results of the study showed that the estimates of the study sample individuals for the different elements in the three areas were at a high level, and the results showed that there were no statistically significant differences in the level of the study sample's estimates on the proposed strategic areas to prepare Palestinian universities for the international classification of universities according to the variables: gender, specialization, and qualification. Scientific, academic rank, experience, and scientific rank.

Al-Abbad (2017) studied the study aimed at presenting the identification of requirements for raising the competitiveness of King Saud University in light of the international application standards for universities, and the study adopted the descriptive approach by analyzing the lists of international rankings that included the ranking of some Saudi universities such as Webo matrix, the SCImag universities research classification and the Shanghai classification For the year 2014 and the global designation of universities in 2015, it also relied on analyzing the experiences and experiences of some leading models such as Harvard University, and the study presented the axes of excellence based on the strategic planning of the university in light of the Kingdom's 2030 vision, and information for economic and societal development.

Previous studies and the location of the current study, including:

The researcher was able to review a set of previous studies related to the subject of the study, "an evaluation study of the degree of need for classification criteria for Jordanian universities from the point of view of the administrative academics in them." For previous studies, the subject of the study, and the location of the current study, including:

- Previous studies have dealt with classification in universities and have adopted various curricula such as the qualitative one: such as the study of Houry (2013), including those that have adopted the descriptive curriculum as the study: Al-Abad (2017), Barakat study (2016), Carroll study (2014), and Amal Aql study (2005) Also, the current study adopted the descriptive method.

The tools of the previous studies are covered in the questionnaire, such as: Barakat's study (2016), Carroll's study (2014), and Amal Akl study (2005), as well as the current study using the questionnaire.

- This study was distinguished from other previous studies by the researcher studying "an evaluation study of the degree of need for classification criteria for Jordanian universities from the point of view of administrative academics in them" with the aim of raising their efficiency and achieving their quality, which was not carried out by any previous study within the limits of the researcher's knowledge.

Study methodology and procedures:

Study Approach:

The researcher used the descriptive approach to suit the purposes of the study, and a questionnaire was used to collect the study data.

Study population:

The study population consisted of all deans, their deputies, and department heads in Jordanian universities. And their number (789).

The study sample:

An intentional sample was chosen, which is the University of Jordan, and (141) questionnaires were distributed to the academic administrators at the University of Jordan, from which (100) were retrieved. This statistic was obtained from the Ministry of Higher Education website 2017/2018, **distributed as follows:**

Table.1. Distribution of study sample individuals for the three levels according to the job title variable (dean, deputy dean, department head)

University Name	Job title			
	Dean	Deputy Dean,	Head	Total
The University of Jordan	22	30	89	141

No	field	Number of paragraphs	Cronbach's alpha, α
1	Leadership	6	0.88
2	Strategic Planning	6	0.72
3	External focus	7	0.76
4	Information and its analysis	7	0.83
5	Teaching staff	5	0.81
6	Results and achievements	6	0.78
7	Pointers	5	0.77
	Total marks	**42**	**0.84**

Stability Of The Study Tool:

After preparing the tool in its final form, the stability parameter was extracted using the Cronbach Alpha equation for the internal consistency of the fields of the study tool, and It appears from Table (2):

- That the Kronbach alpha coefficients for the fields "to the degree of the need for classification criteria for Jordanian universities from the point of view of administrative academics in them" ranged between (0.88-0.72), the highest was in the field of "leadership", and the lowest was in the field of "strategic planning", and the Cronbach alpha coefficient reached the degree of need for classification criteria for universities Jordan as a whole (0.84); And all the stability coefficients are high and acceptable for the purposes of the study, where the stability coefficient (Cronbach Alpha) is acceptable if it exceeds (0.70).

Scale correction:

The questionnaire consisted in its final form of (42) paragraphs, where the researcher used the Table (2) shows the values of the stability coefficients for the fields of the study tool, which are considered acceptable for the purposes of the study.Likert scale of the five-point gradient in order to measure the opinions of the study sample members, and agreement was given to a very large degree (5), highly agree (4), agree with a medium degree (3), agree with a degree Few (2), agree very little (1), by placing a sign () in front of the answer that reflects the degree of their agreement, and the following classification has been relied on to judge the arithmetic averages as follows:

-Less than 2.33 a few.

- from 2.34-3.66 medium.

-From 3.67 to 5.00 high.

Statistical Treatment:

To answer the study questions, the following statistical treatments were used through the Statistical Packages Program (SPSS):

Frequencies and percentages of job variables for the study sample.

- Cronbach internal consistency coefficient alpha for all fields of study and Pearson correlation coefficient. To extract the replay constancy.

- The arithmetic means and standard deviations of the answers of the study sample individuals for all areas of the study tool.

One-way-ANOVA.

Study Results and Discussion

This part includes a detailed presentation of the statistical analysis of the results of the study, which aims to define the degree of availability of classification criteria for universities at the University of Jordan from the point of view of administrative academics and discuss them, and these results will be presented based on the assumptions of the study.

Results related to the answer to the first question: What is the degree of availability of university ranking criteria at the University of Jordan from the point of view of its administrative academics?

To answer this question, arithmetic averages and deviations were calculated for each field of "degree of availability of ranking criteria for universities at the University of Jordan" and "degree of availability of classification criteria for universities in the University of Jordan" as a whole. Table (3) illustrates this:

Table.3: The arithmetic averages and standard deviations for the domains of the degree that provide classification criteria for universities at the University of Jordan, and the degree of availability of classification criteria for universities in the University of Jordan, as a whole, ranked in descending order (n = 100)

No	field	**AV**	α	R	D V
6	Results and achievements	3.88	.535	1	H
5	Teaching staff	3.83	.553	2	H
1	Leadership	3.81	.300	3	H
7	Pointers	3.69	.624	4	H
3	External focus	3.59	.535	5	M
2	Strategic Planning	3.55	.553	6	M
4	Information and its analysis	3.12	.464	7	M
4	A degree that provides	**3.64**	**.372**	**-**	**M**

	classification criteria for universities in the University of Jordan "as a whole."				

Table (3) shows that the arithmetic averages (AV) for the fields “Availability of ranking criteria (R) for universities at the University of Jordan” ranged between (3.88-3.12), the highest was for the sixth field “Results and Achievements (R)” with an arithmetic average of (3.88) and with a high degree of availability (DV), followed by the first field. Teaching “with an arithmetic average of (3.83) and a high degree of availability, and with a final rank in the seventh field“Information and its analysis ”with an arithmetic mean of (3.12) and with a moderate degree of availability, and the arithmetic average is a degree that provides classification criteria for universities in the University of Jordan“ as a whole ”(3.64) and with a degree Medium availability.

Results related to the answer to the second question: What is the importance of the availability of ranking criteria for universities at the University of Jordan from the point of view of its administrative academics?

To answer this question, arithmetic averages and deviations were calculated for each of the areas of "the importance of providing classification criteria for universities at the University of Jordan" and the importance of providing classification criteria for universities in the University of Jordan "as a whole, and Table (4) shows this:

Table.4: The arithmetic averages and standard deviations for the fields of "The importance of providing classification criteria for universities at the University of Jordan" and the importance of providing classification criteria for universities in the University of Jordan as a whole in descending order (n = 100)

No	field	**AV**	α	R	D V
1	Leadership	5.00	0.000	1	H
7	Pointers	4.86	0.206	2	H
3	External focus	4.80	0.279	2	H
6	Results and achievements	4.79	0.363	3	H
4	Information and its analysis	4.77	0.122	4	H
5	Teaching staff	4.68	0.189	5	H
2	Strategic Planning	4.58	0.184	6	H
	A degree that provides classification criteria for universities in the University of Jordan "as a whole."	4.74	0.096	-	H

Table (4) shows that the arithmetic averages for the fields of "the importance of providing classification criteria for universities at the University of Jordan" ranged between (5.00-4.58), the highest was for the third field "leadership" with an arithmetic mean of (5.00) and with a high degree of importance of availability, followed by the seventh field.

The indicators with an arithmetic average of (4.86) and a high degree of importance of availability, and with a high degree of importance, and in the last place in the fourth field, “strategic planning,” with an arithmetic mean of (4.58) and a high degree of importance of availability. Availability importance is high, The results related to the answer to the third question: What is the degree of need for the availability of classification criteria for universities at the University of Jordan based on the difference between the degree of availability and the degree of importance attributable to the variable of job rank

To answer this question, arithmetic averages and standard deviations were calculated for the need for each field of classification criteria for universities according to job title, and the results showed that there are only apparent differences in these averages Table (5), and to know the significance of these differences, the One Way ANOVA analysis was used.), As in Table (5).

Table.5: Averages and standard deviations of the differences between the importance and reality of the classification criteria for universities according to the job title variable.

Field	Job Title	NO	AVR	α
Leadership	**Dean**	16	0.83	.350
	Deputy Dean	28	0.92	.233

	Head Dept.	56	.83	.314
Strategic Planning	**Dean**	16	1.04	.493
	Deputy Dean	28	1.00	.456
	Head Dept.	56	1.04	.530
External focus	**Dean**	16	1.13	.699
	Deputy Dean	28	1.18	.585
	Head Dept.	56	1.24	.578
Information and its analysis	**Dean**	16	1.56	.582
	Deputy Dean	28	1.70	.452
	Head Dept.	56	1.65	.442
Teaching staff	**Dean**	16	0.74	.714
	Deputy Dean	28	0.84	.415
	Head Dept.	56	0.90	.638
Results and achievements	**Dean**	16	0.95	.547
	Deputy Dean	28	0.88	.652
	Head Dept.	56	0.96	.659
Pointers	**Dean**	16	1.28	.473
	Deputy Dean	28	1.06	.678
	Head Dept.	56	1.19	.709
Total marks	**Dean**	16	1.08	.366
	Deputy Dean	28	1.08	.307
	Head Dept.	56	1.11	.396

Table.6: Results of a single variance analysis of differences indicating the fields of the universities' classification criteria according to the job title variable

Field	The source of the contrast	Sum of squares	Degrees of freedom	Average of squares	Value (P)	Indication level
Leadership	**Between Group**	.169	2	.085	.941	.394
	Inside Group	8.721	97	.090		
	Sum	8.890	99			
Strategic Planning	**Between Group**	.035	2	.017	.069	.934
	Inside Group	24.708	97	.255		
	Sum	24.743	99			
External focus	**Between Group**	.159	2	.079	.220	.803
	Inside Group	34.954	97	.360		
	Sum	35.112	99			
Information and its	**Between Group**	.204	2	.102	.464	.630

analysis	**Inside Group**	21.317	97	.220		
	Sum	21.521	99			
Teaching staff	**Between Group**	.327	2	.164	.457	.634
	Inside Group	34.701	97	.358		
	Sum	35.028	99			
Results and achievements	**Between Group**	.134	2	.067	.163	.850
	Inside Group	39.866	97	.411		
	Sum	40.000	99			
Pointers	**Between Group**	.502	2	.251	.560	.573
	Inside Group	43.423	97	.448		
	Sum	43.924	99			
Total marks	**Between Group**	.029	2	.015	.108	.897
	Inside Group	13.191	97	.136		
	Sum	13.220	99			

Table (6) shows that there are no statistically significant differences in the overall degree to indicate the differences in the fields of university classification criteria according to the job title variable, as well as in the fields of university classification criteria.

Discussing the results: Related to the answer to the first question: What is the degree of availability of ranking criteria for universities at the University of Jordan from the point of view of its administrative academics? The results were as follows:

The degree of availability of university classification criteria at the University of Jordan "was medium, with an arithmetic average (3.64), and a standard deviation (.372). The field of" results and achievements "came in the first rank with an arithmetic average of (3.88) with a high degree of availability, and in the last rank. Information and its analysis "with an arithmetic average of (3.12) and with a moderate degree of availability. This result may be attributed to the lack of Jordanian universities, including the University of Jordan, for a clear strategic vision that would improve their academic ranking at the global level, and this may be attributed to the low spending on scientific research, and this may be attributed to the low wages of faculty members.

The result of this study differs with that of Barakat's study (2016).

The achievement of the field of "results and achievements" in the first place may be attributed to the study sample's belief that concern for students and beneficiaries and meeting their needs and expectations will reflect positively on the educational institution and thus achieve its goals.

The results of this study differ with that of Amal Akl (2005).

Discussing the results related to the answer to the second question:

What is the importance of providing ranking criteria for universities at the University of Jordan from the point of view of its administrative academics? ? The results were as follows:

The importance of providing classification criteria for universities at the University of Jordan was high, the highest being for the third field “leadership” and with a high degree of availability, and in the last place for the fourth field “strategic planning” and with a high degree of importance. It may be attributed to the University of Jordan’s keenness to be in the forefront of world classifications.

And it came in the first rank in the field: “Leadership.” This may be due to the fact that the university president is the main pillar in the scheme of any university that

wants to join the elite club in the world. The university president is its window to the world.

And in the last rank is "strategic planning". This may be attributed to the fact that strategic planning is linked to the vision that the university seeks to achieve through the application of legislation, regulations and instructions that lead to the required results.

The researcher believes that strategic planning is related to all classification criteria, as the importance ratio came to 4.58. It is high, but not of the required level.

Discussing the results related to the answer to the third question: What is the degree of need to provide classification criteria for universities at the University of Jordan based on the difference between the degree of availability and the degree of importance attributable to the variable of job rank? The results were as follows:

- The results showed that there are no statistically significant differences at the level of significance ($\alpha \leq 0.05$), due to the fact that all academic administrators at all levels perceive the need to provide classification criteria for universities at the University of Jordan.

The results of this study are consistent with Barakat's study (2016).

IV. RECOMMENDATIONS:

In light of the findings of the study, the researcher concludes with presenting a set of recommendations:

1. The results of the first question showed that the study sample's estimates of the degree to which university classification criteria are available at the University of Jordan "as a whole" was of a medium degree in the field of "external focus", the field of "strategic planning", and the field of "information and its analysis." The researcher recommends:

Issuing an introductory yearbook of the University of Jordan and its achievements.

* Empowering leaderships at the University of Jordan for strategic planning.

* Establishing information incubators in which to make use of the available information. It is intended to create centers within universities that transform available information into innovations with the help of students, through the establishment of small projects that transform the university into a productive university.

2. The researcher recommended conducting other studies in the field of classification of Jordanian universities.

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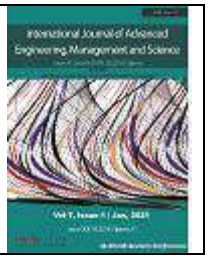

Application of Quality Tools to Reduce Failure Identification in an Automotive Production Line

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Abstract *— Quality tools utilization is a reality in several industry segments, including automotive. Its adoption comes from the business needs of more robust and reliable process, promoting actions that reduce deviations and losses related to rework, through teamwork activities and easy visualization graphic tools that reach all operation levels. This case study found the effectiveness of quality tools application on an engine factory with the target to solve issues related to identification issue and increase process traceability through a Kaizen activity, where during a discussion were utilized some quality tools such as Pareto Analysis, Ishikawa diagram, 5 Whys, 5W1H and brainstorming. As results, it was possible to reach more than 50% evolution on the engines identification inconsistencies indicator. At the end of the study, it was found too additional benefits that came from a cross-functional team with several departments from the studied factory, such as paper waste reduction and simple automation tool application within logistic process, items that align the production process to the market demand of paperless concept application and increase the process automation level.*

Keywords *—* ***Automotive, Automation, Kaizen, Quality tools.***

I. INTRODUCTION

This study was idealized based on the possibility of performing an evaluation of the practical application of the quality tools that are so demanded in the current market to solve a quality problem found in a manufacturing environment.

Industry in general is undergoing a transformation related to the implementation of the Industry 4.0 concept (or at least modernization of Industry 3.0) in which automation levels are much higher compared to current facilities and processes become more robust and consequently have greater reliability and data transparency according to [1].

[2] concluded in a study with auto parts companies in Thailand that total quality management is mainly affected by strategic planning, product quality, knowledge management and the application of new technologies and innovations in their processes, and also states that this last point (Technology and Innovation) will be determinant in defining the level of competitiveness of these companies in the market.

For [3] automotive companies will continue in this search for innovations in processes related to automation to reduce costs and increase productivity, but the transformation to fully automated industries will still elapse for a considerable time, due to the very high investment to change the design of production processes, because only automating the current processes will not be enough, being necessary totally innovative techniques in manufacturing to meet the new designs and processes of the future.

[4] highlights the impact of the constant evolutions of the markets on the application of continuous improvement tools by companies in all industries. And from this high level of competitiveness and market volatility, cost reduction activities are highly demanded, but always with improvements in product and/or service quality being worked in parallel.

To reduce the levels of rework, to have better processes and to implement a culture of continuous improvement, it is important that quality tools are used and that the engagement of people and employees involved in the process in the culture of continuous improvement is also worked on to improve the organizational climate, which allows us to state that large investments are not always necessary to improve the quality of the final product [5].

With the intention of validating the scientific relevance of the proposed study, searches were conducted in the [6] and [7] databases with the key words of the work. Thus, it was possible to identify the relationship between the automotive industry and Quality tools from the number of publications and citations on the themes when searched together: 1438 publications in the period from 1995 to 2021.

At the same time, it was possible to notice that combined the themes traceability and automation, the number of publications was reduced or null in the researched databases. Among the publications found, the great majority is related to traceability in product development, and not to the production process itself or to the products.

When centralizing the search for the main identified combination of key words (Automotive; Quality tools) in the period from 2015 to 2021, we have a trend of growth of publications related to the theme in the [7], except for the year 2020 whose volume of publications presented a small reduction in comparison with the volume of 2019.

Thus, this research is justified because, at the same time that it promotes a benefit through the use of quality techniques and tools in the company in question, it contributes to the scientific community by relating themes that so far are not in publications in the researched databases.

The objective of this work is to promote improvements in the process of moving engines by applying quality tools to contribute to the solution of engine identification problems in an automotive industry based in the Sul Fluminense region of the state of Rio de Janeiro - Brazil.

The work was divided into 4 chapters: Chapter 1 consists of an introduction of the theme and the justification for conducting the study. Chapter 2 presents the theoretical framework of the research. Chapter 3 details the development of the study and describes the research method. Chapter 4 presents the results and the entire development of the work with details of the quality tools used, and in Chapter 5, there is a conclusion regarding the entire research work to validate the objectives proposed in the study.

II. THEORETICAL BACKGROUND

2.1 Automotive Industry

For [8] companies in the automotive sector in general, have improvement programs that seek a greater involvement among all employees, from the operators to the managerial level, which provides a broad environment of continuous improvement and problem solving, and from this environment, the small improvements in the process can be freely suggested by the operators who can follow the implementation with support from technicians, engineers and process managers, while the most impactful improvements occur in a timely manner.

[9] concluded that automation is a great option to improve and enhance the quality and production of an automotive company by allowing an increase in agility, flexibility, and traceability in the processes. The application of robots is widely used for these purposes, but for some of these uses may become unfeasible due to the high cost involved and the space required for installations.

According to [8], in the automotive sector, quality improvement actions within companies are characterized by a participatory culture, involving shop floor strategies and also those coming from management levels, which allows the participation of a high number of employees, having the supervision and collaboration of managers and with the program being managed by a department intended for continuous improvement.

2.2 Quality in Organizations

Processes are an ordered sequence of operations that transform inputs into outputs for internal or external customers. In these operations and sequences are the opportunities for improvement that companies should focus their efforts on to add more value to the final product and increase their competitiveness. And one of the main factors that determine the level of consumer demand to have their needs met is quality [10].

According to [11], the principles ordered for quality management that demand high commitment and great effort from all members of a company, especially the highest hierarchical levels, are: total customer satisfaction, participatory management, human resources development, constancy of purpose, continuous improvement, management and process control, information dissemination, delegation of activities, technical assistance, management of interfaces with external agents and quality assurance.

With the advancement of technology and the increase of competitiveness in the markets, it is possible to observe the growing demand for quality improvement and reduction of process failures, and for this reason companies from

virtually all segments have been seeking innovations to have increasingly reliable production processes, and that present a quick response to variations in demand and less risk of quality problems in the final product [12].

In this context of competitiveness, companies need to reduce the levels of rework in their production processes so that this additional cost related to the waste of inputs and labor intended for these rework operations does not significantly impact the profitability of their products and, ultimately, the competitiveness of these companies in their market segment [13].

At the same time that there is a demand for a higher quality product, the level of competitiveness among companies also demands that products meet all customer needs so that market shares are larger, consumer loyalty guaranteed, and profitability increased [14].

2.3 Quality Tools

[11], characterizes the Quality tools as important instruments to bring into practice all the theory of quality. The application of these tools makes the problems of different orders to be identified, elucidated, and solved in a direct and simple way, even those more complex problems found in business environments of all segments and sizes.

The use of quality tools can be considered very important in both the academic and industrial environments due to the low cost of implementation and the practicality and ease of application. And the application of these tools helps companies to make decisions based on facts and data in a simpler way than complex statistical analysis [15].

[16] classifies the main benefits of applying quality tools with increasing quality levels, reducing waste, minimizing rework time, and standardizing processes and products, which consequently results in reduced production costs and benefits to society as a whole.

The main objectives of quality tools are, for [11], to simplify the visualization and understanding of problems, to summarize knowledge and conclusions, to promote the stakeholders' creativity, to facilitate the knowledge of the process, to provide elements for its monitoring, and to enable process improvements. And in summary, quality tools can be divided into 3 groups: support tools, basic tools and advanced tools.

2.4 Process Mapping

The graphical representation of all steps that arrange a process allows the global view of the activity and also the detailed characteristics of these steps and how they are interconnected, which makes the critical operations are highlighted and the focus of improvements is clearly represented [13].

For [17], process mapping consists of demonstrating the logical sequence and interaction of activities. Despite the huge variety of ways of development, all methods aim to identify the standardized procedures that are performed in the process as a source of information for decision making.

[15] describe a flowchart as simply a diagram-like representation of the process flow, with each step divided into different types of figures connected by arrows. Each figure represents a type of operation, between logistics, storage, transportation, and operation. The use of this standardized and practical tool facilitates the understanding of all those involved in a process.

According to [18], some of the benefits identified in the application of process mapping are the standardization and control of processes, improvement of quality levels, identification of operation bottlenecks and consequently elevation of production outputs. From the critical analysis of the process mapping, it is possible to identify which activities do not add value to the product and have a better operation of the production, and these evolutions allow the product and/or service to have a better level of acceptance by the final consumer.

2.5 Pareto Analysis

[19] describe the Pareto diagram as a graphical representation performed through vertical columns, with one axis representing the failure modes and another with the numbers of occurrence of decreasingly. It is usually used to represent the frequency of occurring causes, which allows the prioritization of the main failure modes for decision making.

For [20], the basis of the Pareto Analysis is the principle that 80% of occurrences are caused by 20% of all causes, which allows observing in a simple and practical way, which are the main offenders of a particular indicator, and after performing this survey, proceed with the construction of a table containing the absolute frequencies of each cause analyzed.

According to [15] the Pareto diagram is a tool widely used to define the priorities of various types of problems, serves to schematize and facilitate the visualization of problems encountered, and has as its main function to analyze and understand the criticality of the problems, and thus separate the many trivial problems of the few vital to the fluidity of the process.

2.6 Cause and Effect Diagram (Ishikawa Diagram)

According to [11], the cause and effect diagram (also known as fishbone diagram) has the purpose of organizing information by similarity according to 6 main axes, usually called six M (method, material, machines, environment, labor, and measurement), which allows the identification

and visualization of the causes of a problem or effect in a clear and targeted manner.

[21] conducted a study of applying the seven basic Quality tools to reduce defects in an automotive industry and was able to conclude that after the use of the Cause and Effect diagram, defects reduced dramatically, and although all tools have their usefulness and share in solving problems, the cause and effect diagram was the most impactful for allowing the identification of the root cause of the problem and what its potential effects are.

According to [22], the application of the Ishikawa method for identifying the root cause of a problem in conjunction with other tools of the lean production concept allowed the identification and reduction of waste in the inspection and packaging processes in an auto parts company.

For [23], the Ishikawa diagram is an interesting and practical tool to be used in brainstorming and problem analysis with diversified teams due to its simplicity of use.

2.7 Brainstorming

For [24], the brainstorming (also known as "brainstorming") has as main objective to facilitate that the ideas are created starting from the main concept of deferred judgment, avoiding that the mental barriers hinder the activity and the imagination, which makes the creativity to be used freely, without there is a prior judgment that an idea is bad, leaving the evaluation of the solutions proposals generated to be held in a second stage of the activity.

[11] classifies the tool as very flexible, due to the possibility of application in different contexts and for different purposes, such as: product development, systems implementation, detailing activities, solution proposition for specific problems, among others. And to ensure the effectiveness of the tool, it is suggested that the team involved should be previously trained in the tool, in order to enhance the quality of idea generation.

[25] describes that the main benefits of using brainstorming are the fact that it stimulates open thinking, which enthuses the group and avoids the domination of the team involved by a few members, and thus allows everyone's creativity to be shared, while the final solution is formulated by the group.

2.8 5W1H

For [26] this tool aims to bring together the information needed to act to solve a problem and synthesize the work action plan so that it is clear to everyone how the process improvement will be carried out. Briefly, it consists in organizing a list of actions that allows having all the problems quantified in a single table.

The acronym 5W1H has its formation based on key questions so that essential information is provided in a clear way for an activity to be conducted and avoid misunderstandings between those involved in the work group, so [11] signals that normally all elements of the activities are specified as much as possible in this final stage of planning the activity. The key questions that refer to the acronym 5W1H are listed as follows:

- What (What): What will be done? What tasks are considered to attack the root cause?

- Who: Who is responsible for the task? Which department is involved?

- When: When should it be done? What is the deadline for this step?

- Where: Where will this activity be executed?

- Why: Why was this task considered?

- How: How will the task be accomplished? What is the method?

Some authors, such as [25], also consider adding one more H to the tool, which stands for How much (how much does it cost to perform this activity?).

2.9 Kaizen

Kaizen is a word of Japanese origin formed by two other words: Kai (change) and Zen (better), which in a literal translation allows us to say that the word means to change for the better.

[27] describes the Kaizen philosophy as a simple essence directly related to continuous improvement that involves everyone, from operators to company managers. And it signals that this philosophy is not only related to work, but that the experience and way of life, whether at work, in society, or at home, deserves to be continuously improved.

Currently the Kaizen methodology has been widely used in business due to its low cost of implementation and by acting directly on how to minimize waste required, reduce process variability and promote continuous improvement in various departments and thus increase the efficiency of operations in general [19].

[4] reports the effectiveness of applying Kaizen combined with other Lean Manufacturing tools to reduce costs and also to improve quality in a textile industry by allowing the solution of problems that could devalue the company's brand and consequently impact its operational results.

The implementation of Kaizen promotes results in a short period of time and with a low level of investment, considering that the pillars of the tool are the collaboration among the members involved and the continuity of this

cooperation, considering that the employees will make improvements in order to reach the goals established for a certain process [27].

2.10 Paperless

According to [28], the concept of paperless manufacturing applied in an automotive component welding industry can present benefits both in record completion time, paper cost reduction, and additional benefits and improvements to the company's productivity such as in document controls, communication, work environment, daily activities, and customer service.

For [1] companies currently implement automations and digital information controls systems to reduce paper documentation and facilitate the management of their process information throughout the product life cycle. This has been a major activity in the economy, and companies have the option to either upgrade current systems through gradual and slower automation, or else replace all of the software used and its elements, which allows for faster change in this transition of technologies and concepts.

[29] depicts some of the goal opportunities to be drawn from a company adopting the paperless strategy and thus enabling increased efficiency of its operations, as well as reduced operation cycle time, improved traceability of records, ease of data collection for periodic process reporting, promotion of a sustainable process, and an overall improvement of the process as a whole.

III. MATERIAL AND METHODS

The present research can be considered of an applied nature, as it aims to generate knowledge to apply to a particular problem. It has a qualitative approach, that is, its argumentation is based on the results through analysis and perceptions, and from the point of view of objectives it has a descriptive character and was applied through a case study in an automobile industry located in the Sul Fluminense region of the state of Rio de Janeiro – Brazil based on the comparison of data and indicators for the years 2018 and 2019.

[30] describes the case study as an empirical investigation, considering the deep and detailed investigation of an event that occurred in the present time in a real environment, with the aim of assuming an understanding that manages to gather relevant contextual conditions for the topic addressed, which allows stating that the case study method is not only a defined and applied strategy for data collection nor an isolated structured project, but rather encompasses several activities together so that it is possible to answer the research questions.

For [31], the case study has its structure defined in four main phases, the first being the delimitation of the theme of the case to be studied, then data collection, understanding and evaluation of these data collected and finally the preparation of a case study report.

The development of the work begins with a literature review on the delimited theme, and the selection of the problem of identifying motors to conduct the case study. With the problem defined, observations were made at the site of the failures for a better understanding of the situation and the consequent collection of data so that the analyses could be based on facts. In possession of the information about the case, the interpretation of the data and the evaluation of the intensive discussion session that was applied with the group for the use of the quality tools and the proposition of solutions that would meet the objectives of reducing the identification failures had its effectiveness proven from the data obtained.

The method chosen to develop this work was the case study, which is described by [32] as an opportunity to expand the awareness of real events in environments experienced by those involved and from this, create new ways of acting and theories for solving these problems based on the defined theoretical conceptual framework.

Considering the methods of execution of the research and the entire process of engine identification, a multidisciplinary group was created to propose solutions related to the failures of engine identification in the production process. The work began with interviews conducted with each of the stakeholders in the process to prepare for a day of discussion with the team.

During the intensive discussion activity, the team used the Process Mapping tool to identify the process gaps, and also performed a more detailed root cause analysis with the team together through some quality tools. The second step of the activity was the organization of the process improvement opportunities through brainstorming and the creation of an action plan through the 5W1H tool with the possible solutions for the identified gaps.

With the action plan developed, the process improvements were implemented in the following weeks and once all action items were completed, the results and additional benefits achieved by the group were verified.

IV. RESULTS AND DISCUSSION

In the automotive industry, the traceability of vehicles and engines is done through serial numbers recorded in the chassis (vehicles) and cylinder block (engines) that have their data registered and computed in a production control system at each step of the process completed.

The identification of the engines is done through a paper label that contains several information such as the engine identification number, the engine model, destination, identification code, date and time scheduled for manufacturing, barcodes, and QR Codes containing the necessary information for systemic registration of the engine's status in the production process.

Initially the label's layout was conceived by the company's headquarters and its format contemplates 3 parts detachable from each other: one that is retained by the logistics team for shipment registration in the production control system and the other two parts that accompany the engine to the vehicle plant, where they are discarded after being used for registration in the system.

Each label follows its respective engine from the beginning of the production process when recording the engine's serial number until it is connected to the transmission in the vehicle plant, as shown in the process map in Fig. 1. This type of label is not fixed to the engine and there is the risk of losing or exchanging it with those of other units during the engine's movement flow.

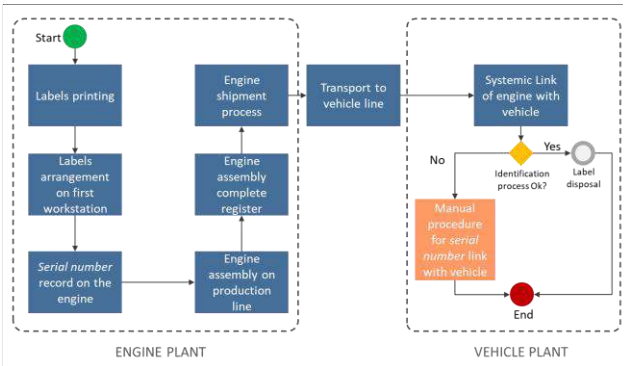

Fig. 1: Process Flow for the handling for the engines tags

In Fig. 1, it is possible to see that whenever the identification process through the bar code reading of the engines presents some failure, it is necessary to perform a manual procedure to finalize the systemic link of the engine with the vehicle.

The problem in the identification of engines during the production process and movement of the engine units was characterized. From this, there were impacts in quality indicators of the process and a new manual activity was demanded to solve this identification failure. At each failure occurred, a person from the Manufacturing team becomes responsible for making a call (via radio or cell phone) to the Production Control sector and to inform the engine codes and the respective vehicle for the manual linking in the operational system and also the reason for the failure to file the information.

In order to evaluate the reasons for the identification failures that occurred at the customer, a Pareto analysis was performed (Fig. 2) to identify the main causes of the problem by number of occurrences over a one-year period.

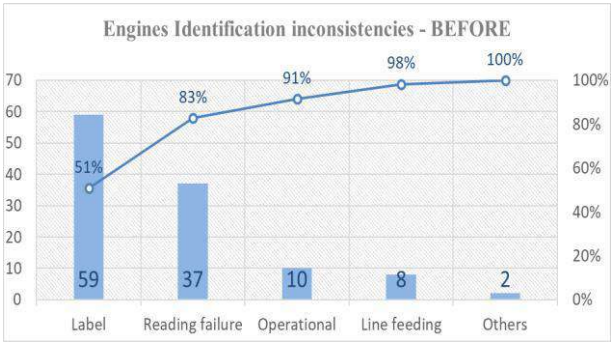

Fig. 2: Number of the identification fails in the inner client-BEFORE

In this analysis, it was possible to identify based on the data in Fig. 2, that 51% of failures are related to the labels, which illustrates the need for immediate action on the motor labels, the main reason for identification failures in the internal customer. The second main reason (32%) were reading failures that are related to the QR Code reader device not working properly, and the third main reason (8%) are operational failures in the QR Code reading process. Some secondary problems that were not part of the scope of the project were also identified.

In order to classify the identified failures and map the main causes of the problem for the proposition of efficient solutions a Cause and Effect Diagram was prepared by the team, where the causes were divided according to the 6M's (Method, Machine, Labor, Environment, Material, and Measures) and the graphic representation is in Fig. 3.

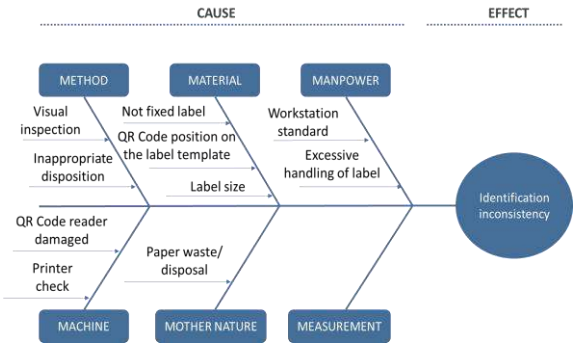

Fig. 3: Ishikawa Diagram

Considering the current situation already known by everyone on the team and the main causes of the problems identified, we began the stage of defining the solutions that will be implemented.

From this deeper analysis of the main causes, the 5 whys tool was used for each of the main failure modes related to the motor labels with the objective of arriving at a root cause for each failure mode, and then propose, through the use of brainstorming, solutions for the reduction of motor identification failures.

Once the main solutions needed to address the motor identification problem were defined, the group started the last stage of the intensive discussion, which was the creation of a detailed action plan using the 5W1H tool, where it was possible to create a document that could clarify to everyone involved what the expected timeframe was, the reasons for each solution, and how they should be broadly accomplished.

This 5W1H tool proves to be of great value in avoiding conflicts due to the lack of alignment of the expectation for each activity in terms of deadline, responsibility, and justification, because at this point all those responsible build together and are part of the plan defined for the solution of the problem.

Once the solution priorities were defined, the team implemented the solutions using as a basis the action plan built using the 5W1H tool. During the implementation some adaptations in the action items were necessary, and from these actions it was possible to identify a series of improvements in the identification process as a whole.

A new label model was defined by the group with dimensions six times smaller than the one previously used and a different type of paper than the previous one, thus the value of the new label became 60% smaller, the printing time was reduced by more than 50%, in addition, paper disposal was reduced by almost ten times in comparison with the previous label, since the label now sticks to the engine.

In addition to the benefits created by the new label, improvements were also identified in the engine logistic sequencing process, where with the previous model it was necessary to file a paper stub detached from the label to ensure the physical record of the information for sending the engine to the vehicle line.

To enable the use of this adhesive label (without the stub previously used by the logistics team), a database was created in an electronic spreadsheet that is fed from a simple computer automation that translates the information collected by the logistics operator through a QR Code reading device of the engine label into the necessary data to register the systemic note in the engine shipment process.

In the production process of the vehicle plant there were also additional benefits related to the reduction of the paper disposal operation and the change of the engine reading location, which facilitated the operation and reduced the chances of engine reading error with another part that has a similar process in the same workstation.

Because it was a multidisciplinary project, and involved many departments (13 of the company in question), it demanded a high number of alignment meetings and additional tasks so that the solutions could be applied successfully, since many people saw the proposed solution with resistance because it demanded a significant change for some departments of the company, and one of the points that must be worked on for improvements in the company in question is the culture of resistance to change.

Finally, the result of inconsistencies in the identification of engines in the period of one year after the implementation of the improvements defined by the group was evaluated, as shown in Fig. 4.

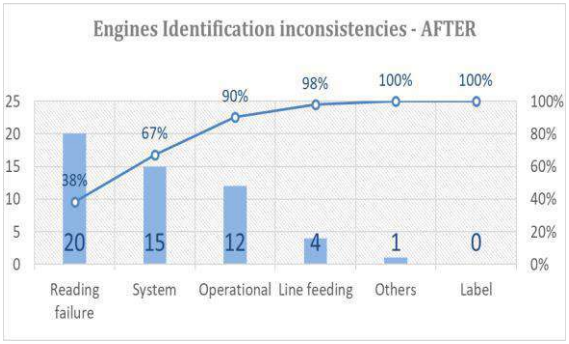

Fig. 4: Number of the identification fails in the inner client-AFTER

The total number of failures that occurred after the implementation of the proposed improvements was reduced by more than 50% (from 116 occurrences to 52) and the number of inconsistencies due to the label was zero (from 59 to none).

V. CONCLUSION

The objective of the research was to promote the application of quality tools in the solution of motor identification problems and, through the use of: Process Mapping, Pareto Analysis, Ishikawa Diagram, 5 Whys, Brainstorming and 5W1H, it was possible to evidence that the process had a significant reduction in the level of failures in the studied process and to verify that the quality tools were efficient in solving this type of identification problems.

One of the objectives of the case study was to highlight the possibilities of additional benefits from projects involving cross-functional teams, and from the application of the aforementioned tools it was possible to confirm that the activity performed with the involvement of a cross-functional group provided a solution that met not only the defined problem, but also involved additional benefits for the company such as the reduction of paper discarded daily, contributing to the implementation of the paperless concept in a production process of the industry in question, cost reduction, and also for the use of automation tools in the sequencing and shipping logistics process of the engines.

The contribution of this work to the academic environment and to the automotive sector could be evidenced by allowing the dissemination of concepts related to quality tools and the automotive industry. Based on the theoretical framework used and the literature researched, it was possible to confirm, from the strong relationship identified between the themes, the important role of quality tools in solving problems in the automotive industry.

The present work contributes to the evaluation of the literature in question through a qualitative analysis of the application of quality tools in the automotive industry and had as a limitation the non-use of complex statistical tools for a deeper quantitative analysis of the root causes and also for the prioritization of the available solutions.

As with all research with a qualitative approach, this study presents certain restrictions as to the generalization of the results obtained, and the evaluation of the same type of problem in other companies in the industry is a suggestion for further study.

It is also recommended as opportunities for future work the use of analysis of variance to understand quantitatively also the possible further improvements in the process of engine identification. Another opportunity identified was the intensification of the frequency of failure assessment by the teams through the creation of a KPI to control this type of problem, which would allow for a periodic in-depth evaluation of each occurrence, its root cause, and consequently propose solutions in a shorter period of time.

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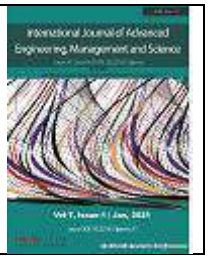

Factors Affecting Consumer Behavior in Purchasing Home Furnishing Products in Bangladesh

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Abstract— *Home furnishing products are not the frequently purchased item that's why majority people in Bangladesh are more conscious about selecting and taking final decision to purchase furniture. The decision of purchasing furniture is affected by several factors like store aesthetic design, customer consciousness, brand, reference, convenience and price. The degree of importance of these factors is also exaggerated by demographic variables of consumers considering family size, income and educational qualification. The purpose of the study is to examine how different factors plays significant roles behind purchase intention of furniture among the people in Bangladesh. To conduct this research purposive random sampling technique was used to yield a sample size of 230 people in Bangladesh. Statistical Package for the Social Science (SPSS) version 22 is used as data analysis method. The outcome of the analysis reveals that, consumers decision making process in purchasing home furnishing items is affected severely by the mentioned factors though they are aware regarding those factors. So, marketers of furniture industry can build a strong competitive position for their companies by emphasizing on those factors because consumers in Bangladesh significantly aware about those.*

Keywords— ***Consumer Behavior, Home Furnishing Products, Store Aesthetic Design, Customer Consciousness, Brand, Reference, Convenience, Price, Bangladesh.***

I. INTRODUCTION

In today's competitive market, though there are so many factors that affect consumer behavior, simultaneously sellers are also more conscious about their buyer and the factors that affect their purchasing behavior. Furniture is the most indispensible household items from essentials to fashionables. In Bangladesh people normally choose durable, comfortable and easy to maintainable as well as fashionable furniture. There are different people from different socio-economic levels who respond to the factors that affect purchasing behavior of household items differently. Though there are different options in the hand of customer both local and national level brands are available, customer normally o some pre-purchase search, that's why sellers have to understand from top to toe of customers purchasing behavior. Consumer behavior is difficult to predict though consumer plays different roles buyer, payer and user, who will finally buy seller have to understand and make them buy (Gajjar, N. B., 2013). Household furnishing items reveals the choice and social status of people and the degree of self satisfaction and comfort.

Though there are very few research focused on purchasing behavior of household furniture and on pre purchase search factors but there is no way of negligence that for everyone home is the place of peace if it is well decorated and comfortable there may not have any argument. The characteristics of consumer buying behavior may vary with the nature of market competition exists in the industry which ultimately affect the bargaining power (Porter, M. E.,2011). Consumers are more conscious about the material quality specially the wood quality and the finishing of design even if the traditional design is not a matter of fact in Bangladesh. Though most of the people in Bangladesh are middle income group they focus on durability and they belief that wood is the top material which is most durable. They want to pass more than a decade with furniture and think there is huge cost involved in the replacement of furniture. Purchasing behavior of consumers from semi-urban and rural area is different from those of urban area in Bangladesh. Income level,

social status, self identity and other demographic indicators may affect purchasing behavior of people in Bangladesh. Brand image works more in purchasing behavior of urban people whereas rural people are more conscious about durability, price and material especially wooden furniture they prefer most. Sellers who offer best quality, comfort, after sales service, repairing service, good material can achieve the faith of customers and satisfied customer do word-of-mouth promotional activity on the basis of their past good experience.

In Bangladesh many people like to make furniture from the trees they grown in their land, they think it is cheaper, quality is assured and satisfaction level is higher. Many people like to purchase furniture from fair though it is less costly and they feel joyous to purchase from a fair that is normally observed once in a year. Urban people most of the time depend on either local level brand or national level, they gather information, analyze information and finally make purchasing decision. Leather, plastic, oak wood and metal furniture have also become popular in some sense and same as in case of imported furniture all over the country. The furniture at home is self expletory regarding lifestyle and identity of people that's why they are too much engaged on information search regarding many factors before purchase (Ponder, N., 2013).Furniture purchasing decisions depends on some factors and those factors also influenced by demographic profile in some extent. The study is undertaken to find out the factors and their degree of influence in furniture purchasing decisions.

Few researches have been conducted on the consumer behavior towards purchasing household furniture in Bangladesh perspective before. Delivery time is related with demand, if there is a change in delivery time ranges 2-7 days demand may be reduced by 37.5 percent in furniture market (Marino, G., Zotteri, G., & Montagna, F., 2018). Mashao, E. T., & Sukdeo, N. , (2018) argued that the influencing factors like product features, price, market reputation, advertising and experience are analyzed by customer before purchasing long lasting household goods. Different age group and monthly income per household influence furniture purchase where three important factors are material, price and service (Oblak, L., Glavonjić, B., Barčić, A. P., Govedič, T. B., & Grošelj, P., 2020). Environmental awareness, health consciousness are significant elements which are responsible for purchasing green furniture (Khojasteh-Khosro, S., Shalbafan, A., & Thoemen, H., 2020). Furniture industry always face newer pace of competition in attracting and keeping customers. Finding those factors that a customer evaluate before purchasing furniture is a matter of research that's why the study was undertaken and reveal new ways to the furniture marketers in designing marketing strategies. The study is aimed at finding those factors that are considered during furniture purchasing process by the people in Bangladesh. There are some emerging issues considered in this study which are overlooked in previous study.

The objectives of the study intend finding the factors which works behind the purchasing behavior of household furniture comparing to their demographic information of Bangladeshi people in recent years in this competitive market and the degree of importance of those factors.

II. LITERATURE REVIEW AND HYPOTHESES

Review on the study of consumer behavior in Home Furnishing Products is limited though this chapter reveals the meaning of Social Factors, Consumer Behavior and Home Furnishing Products. Prior this study, some significant factors like sensitivity, durability, uniqueness, customization, finishing quality, innovative design, wood quality and influence of media (expression of self image) have influence on Furniture purchasing (Nayeema A., Husna A., 2015). There is positive and significant relationship among reference group, family, quality, price, color and purchasing decision factors and these are the greatest indicator of behavioral intension (Al-Azzam, A. F. M., 2016). Some other factors like damaged furniture, new furniture for new residence, new form are considered when purchasing a new furniture (Sakpichaisakul, T. (2012).

Various dimensions on merchandizing display such as window display, store layout, store front, creative display, shelf display, trend and coordination have impact on consumer behavior in furniture market (Mehta, N., & Chugan, P. K., 2015). Store image and Customer lifestyle have profound impact on customer patronage in furniture market (Hassan, Y., Muhammad, N. M. N., &Bakar, H. A., 2010). Physical health concern and past experience are positively associated with customer's intention to purchase green furniture whereas attitude and perceived behavioral control have no significant association in purchase intention (Xu, X., Hua, Y., Wang, S., &Xu, G., 2020). Before buying furniture customer undertake some pre-purchase search such as role, cost, durability of furniture which has connection with customer characteristics (Mona Kamal Ismail, 2010).People prefer to purchase home furnishings in festival, marriage and renovation time (Ruhil, A., Yadav, N., & Arya, N., 2017).

There is a positive and significant relationship between Purchasing decision, Social factors like- family, social status, role, reference group; product attributes like-quality, price, design, color; lifestyle is identified (Duong Thi Hanh Phuong, 2016). Also, there may possibly eight factors that have influence on making choice or selecting furniture, those are: ease of maintenance, comfort, price, style, quality, color, material and matching with other

items (Yoon and Cho, 2009). Consumer purchasing decision of furniture mostly depends on short delivery time (Marino, G., Zotteri, G. and Montagna, F., 2018). People having difficulty in purchasing costly furniture can avail if stores provide them Equal Monthly Installment (EMI) facilities. Store decoration has critical role in consumer's intention to purchase (Yaoqi Li, Hui Fu, Songshan (Sam) Huang , 2015). Purchasing furniture from store which are next to the door minimize time, cost and effort, even there may work personal relationship. Customers are fascinated by new design, which are uncommon and avoid obsolete one. Furniture those are on sale people don't want to lose that chance and grab it. Discounted price format is less effective than fixe price because it shows less perceived value and quality. Higher price indicates higher quality but it varies from product to product (Gerstner, E., 1985). Customer's interaction with salespersons increased due to their support on products information and reviews from varieties (Mallalieu, L., 2006).

2.1 Factors that affect Consumer in purchasing furniture

Brand image

Brand can differentiate an organization's product and service from those of other organization. The role of a brand in an organization is condemnatory as it makes higher margin and loyal customers for the organization (Philip Kotlar, Brand Management, and Marketing Management). Branded furniture indicates higher quality and performance. Brand indicated some unique features of furniture and customers are normally eager to pay higher price for purchasing branded furniture. Brand image management is a process which includes selecting, introducing, elaborating and stimulating brand concept sequentially (Park, C. W., Jaworski, B. J., & Mac Innis, D. J., 1986). Brand equity can be exploited by providing specific brand relations that's create image and attitude towards brand equity (Faircloth, J. B., Capella, L. M., & Alford, B. L., 2001). Product features specially technology and design associated with Brand (Adidam, P. T., Mallela, J., & Eesley, D. T., 2016).

Equal Monthly Installment (EMI) Facility

EMI or equated monthly installment, every part is equally divided charged monthly basis settlefull outstanding loan within expiry (The Economics Time). EMI is one of the payment method which helps customer to purchase products by paying a lamp-sum down payment and the rest amount in monthly basis. Many non-bank financial institutions now promote and make available their consumer durables or non durables in the competitive market by introducing EMI facility at 0% interest rate, Non-bank financial organizations use EMI to serve its customers in retail market by understanding their problem (Gadre, M., & Soni, S., 2019).People having problem in paying whole payment at a time while purchasing furniture can be benefited by EMI facility**.**

Store display

Store display is the most useful promotional tool (Kinley, T. R., & Brandon, L., 2015). Store display can attract customer to the most attractive piece (Moore, C., 2006). Vertical display of furniture can broaden the warehouse and minimize the store length and customer can enjoy this furniture display cart (Farlow, C. B. 1990). A miniature display kit can be helpful in promotional activity so that customer can take a look in brief (Nelson, S. D., & Underwood, D. M., 2016). The arrangement the furniture store display should be on group basis where each group consists similar items that ultimately help customers to choose according to their lifestyle (Thompson, D., 2005). Store display with perfect arrangement and attractive decoration can easily attract customer and lead them to take purchasing decision (Suri, R., Manchanda, R. V., &Kohli, C. S.,2000). Different extent of display like: store display, window display, store front, store environment, store layout and co-ordination have impact on the consumer's purchasing behavior. It is important for the sellers to differentiate themselves in this regard store display become an important tool for them (Mehta, N., & Chugan, P. K., 2014).

Furniture design and material

Furniture design rely on people's choices like how they sit, rest, work which are influenced by cultural, political, and societal conditions (Postell, J., 2012). A good design is a unquestioned determinant in attracting the customers and build a good experience of quality and uses (Bloch, P. H., 1995). Consumer prefer lightweight furniture which are made of wood-based-panels with sub-criteria like design, price, quality and guarantee even with a bit more price (Khojasteh-Khosro, S., Shalbafan, A., & Thoemen, H., 2020). Wood is the most popular form of material of furniture though it reveals several finer attributes compared to other raw materials and also wood is good looking and trendy and finding a substitutes of it is difficult to achieve (Pakarinen, T., 1999). Wood is the most preferred furniture compared to others which influence customers in of interior and exterior furniture purchasing decisions (Kaputa, V., Barčić, A. P., Maťová, H., & Motik, D., 2018).

Price

Price is the most sensitive factor of purchasing behavior among consumers in Bangladesh. Price is the sign of quality, consumer decision process is affected by pricing strategy (Gijsbrechts, E., 1993). Some consumer suffers from price discrimination bias (Haucap, J., & Heimeshoff, U., 2011). The persuasion of price fairness increase

customer's target to purchase but it has also some adverse effect like negative-word of-mouth activity, switching the seller etc. (Malc, D., Mumel, D., & Pisnik, A., 2016). There is a positive relation among price fairness, trust, satisfaction and buying intension (Konuk, F. A., 2018). Consumers are price sensitive in nature but higher price dictates higher quality. Intense competition in the market leads consumers to be more sensible towards loss and less sensible towards gains (Han, S., Gupta, S., & Lehmann, D. R., 2001).

Quality and comfort

Quality and comfort these two are parallel concept. Furniture which is made of quality materials is usually comfortable. Comfort is related with quality perception and which ultimately leads to satisfaction (Rodriguez, M. C., Ooms, A., & Montañez, M., 2008). Loyal customers are comfortable with the quality service and they became satisfied (Ribbink, D., Van Riel, A. C., Liljander, V., & Streukens, S., 2004). People even ready to pay a bit higher price for getting a comfortable furniture.

Demographic Factors

Demographic factors like disposable income, age are most spontaneous buying indicator whereas educational qualification, gender are marginal indicator of buying behavior (Bashar, A., Ahmad, I., & Wasiq, M., 2013). Family size, marital status, income, gender, number of children influence purchasing behavior of households (Abdullahi Farah, A., Zainalabidin, M., & Ismail, A. L., 2011). Income and educational qualification significantly and directly related with impulse buying behavior simultaneously age and gender also affect the same (Awan, A. G., & Abbas, N., 2015). Consumer behavior is not a static phenomenon it is ever changing with the change of demographic factors like- age, sex, family size, income, geographic factors, psychographic factors (Kumar, R., 2014). The review of the product uses, brand preferences, buying habits, the way of gathering information are closely tied with demographic profiles (Juyal, S. A., 2013). Five demographic factors such as- age, gender, family size, income and education are considered as the influencers of consumer responses to sales promotions (Vipul, P., 2010). Consumer behavior and degree of involvement to a particular product category are significantly influenced by income level, age, culture and effective marketing strategy is designed on the basis of market segmentation which is based on demographic factors (Yousaf, S., & Huaibin, L., 2013).

Table 1: Hypotheses Statements Table

Hypotheses Statements
H1: There is positive relationship between furniture design and Consumer's furniture purchasing decision
H2: There is positive relationship between store aesthetic design and Consumer's furniture purchasing decision
H3: There is positive relationship between customer's consciousness and Consumer's purchasing decision
H4: There is positive relationship between promotional factors and Consumer's purchasing decision
H5: There is positive relationship between brand and Consumer's furniture purchasing decision
H6: There is positive relationship between reference influence and Consumer's purchasing decision
H7: There is positive relationship between convenient furniture and Consumer's purchasing decision
H8: There is positive relationship between Price and Consumer's purchasing decision

III. METHODOLOGY

To serve the purpose of the study, the researcher selects a criterion in order to select participants as respondents. The criterion is that, participant must have the experience of purchasing furniture for household purpose. The researcher used digital self-administered questionnaire to collect data. Physically it was difficult to collect data due to lockdowns and social distancing regulations due to covid-19 pandemic. The study is undertaken in Bangladesh covering several divisions. 230 respondents provided useable data to carry out the study. There are Eight factors considered in the integrated model i.e. furniture design, store aesthetic design, consciousness, promotional factors, brand, reference influence, convenience and price.

The main source of secondary data is related articles, websites, books from which literature review is prepared. Structured questionnaire having 3 parts containing 54 items is prepared for data collection where part-1 represents demographic variables such as gender, age, educational qualification, occupation, marital status, family size, family income, residential area. Part-2 contains 25 items regarding consumer's furniture purchasing behavioral intention where respondents have given their opinion as five point Likert Scales were used. Part-3 consists 21 items regarding the degree of importance of the factors that matches the respondent's opinion. Primary data is collected from 230 respondents by applying convenience and purposive sampling technique. The purposive or judgmental sampling is used because of the objective of the study. Participants who have furniture purchasing experience are selected as respondents. Pre-test for the questionnaire items on target population was conducted to evaluate the reality and validity of the survey. The questionnaire items are picked from existing literature and target population is pre tested

on the basis of their past experience of furniture purchase. Several statistical tools like mean, median, standard deviation and regression analysis are applied to analyze the data which are collected through questionnaire by using SPSS.

IV. THEORETICAL FRAMEWORK

Identifying of factors that affect consumer's behavior has a numerable consideration in previous research. Theory of anticipated behavior model is selected as basic theoretical framework which includes variables based on survey data where perceived behavior control consumer's purpose to purchase furniture (Xu, X., Hua, Y., Wang, S., & Xu, G., 2020). Philip Nelson (1970) argued that, if there are limitations in the knowledge and information about quality, consumers are continuously making choices among alternatives which ultimately affect purchasing decisions. The research study consider Brand image ((Park, Jaworski, & MacInnis, 1986, Faircloth, Capella, & Alford, 2001, Adidam, Mallela, & Eesley, 2016), Equal Monthly Installment (EMI) facility (Gadre, M., & Soni, S., 2019), store display (Kinley, Brandon, 2015, Moore, 2006, Farlow, 1990, Nelson, Underwood, 2016, Thompson, 2005, Suri, Manchanda, & Kohli, 2000, Mehta, Chugan, 2014), furniture design and material (Postell, 2012, Bloch, 1995, Khojasteh-Khosro, Shalbafan, & Thoemen, 2020, Pakarinen, 1999, Kaputa, Barčić, Maťová, & Motik, D., 2018), Price (Gijsbrechts, 1993, Haucap, Heimeshoff, 2011, Malc, Mumel, & Pisnik, 2016, Konuk, 2018, Han, Gupta, & Lehmann, 2001), quality and comfort (Rodriguez, Ooms, & Montañez, 2008, Ribbink, Van Riel, Liljander, & Streukens, 2004) are considered as dependent variables. Customer's demographic factors (age, income, family size, educational qualification, profession) are also considered dependent variables in this research study. On the other side, Consumer's purchasing decision (Al-Azzam, 2016, Sakpichaisakul, 2012, Mehta, Chugan, 2015, Xu, X., Hua, Y., Wang, & Xu, G. 2020, Ruhil, Yadav, & Arya, 2017), is considered as independent variable in this research study.

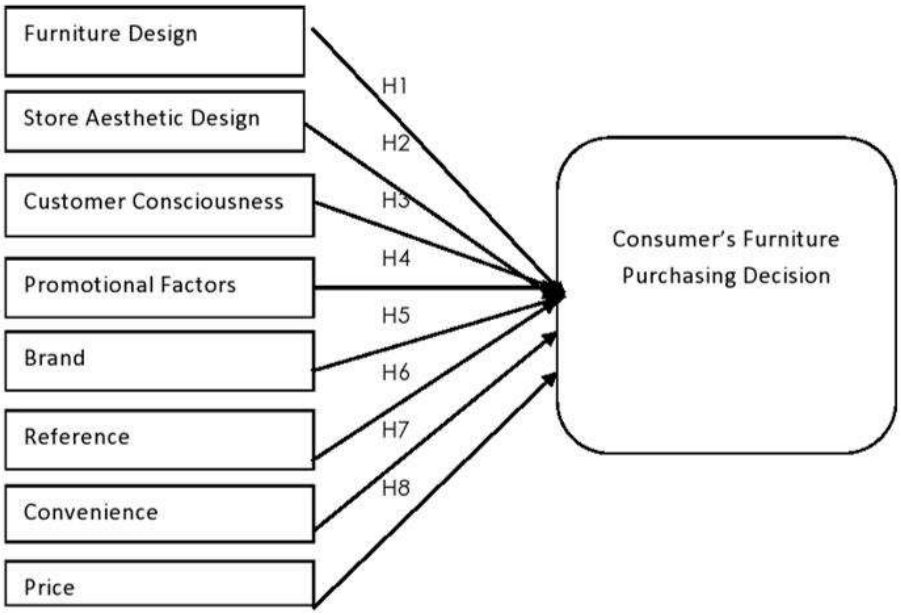

Fig.1: Theoretical Framework
Source-Author

V. RESULTS AND DISCUSSION

5.1 Demographic profile of the respondent

The various frequencies and percentages of the demographic profiles of respondents are shown in Table 2. Most of the Respondents are males (61.7%) while 38.3% are females. It is noted that respondents are predominantly of age range 31-40 years old. With respect to educational qualification, 69.6 % of respondents are post graduates, 19.6 % of respondents are graduates, and it indicates that educated people are more conscious about different variables that affect their purchasing behavior. In case of occupation, most of the respondents are service holder (64.3% are service holder. 53% respondents are belong to the family having 3-4 members and 29.6% belong to family having 5-6 members. While considering income, 27.4% respondents are from 590 $- 825 $ monthly income group and 26.1% from 355 $ -590 $ monthly income group. Highest number of respondents are from urban locality (75.2%) while second highest from semi urban (18.3%).

Table 2: Demographic Profile

Variables	Frequency	Percentage
Gender		
Male	142	61.7
Female	88	38.3
Age		
21-30 years	60	26.1
31-40 years	128	55.7
41-50 years	32	13.9
51-60 years	10	4.3
Educational Qualification		
Below than Secondary School	2	0.9
Secondary School Certificate (SSC)	5	2.2
Higher Secondary Certificate (HSC)	8	3.5
Under Graduate	8	3.5
Graduate	45	19.6
Post Graduate	160	69.6
PhD	2	0.9
Occupation		
Student	5	2.2
Service Holder	148	64.3
Self-employed	27	11.7
Housewife	28	12.2
Retired	5	2.2
Unemployed	3	1.3
Others	14	6.1
Marital Status		
Single	29	12.6
Married	201	87.4
Family Size		
1-2	23	10.0
3-4	122	53.0
5-6	68	29.6
7-8	11	4.8
More than 8	6	2.6
Family Income (Monthly)		
Less than 120 $	3	1.3
121 $- 355 $	22	9.6
356 $ - 590 $	60	26.1
591 $- 825 $	63	27.4
826 $- 1065 $	30	13.0
More than 1065 $	52	22.6
Residential Area		
Urban	173	75.2
Semi Urban	42	18.3
Rural	15	6.5

5.2 Consumers furniture purchasing behavior

A complete picture of different factors that influence consumer furniture purchase behavior is shown in Table 3 by expressing opinion of respondents on different issues related to knowledge formation. Most respondents agreed that customer consciousness (M=4.398533 & SD=0.652577) are the most relevant factors in the perception of consumers furniture purchasing behavior.

The second concern is **Convenience** (M= 4.01955 & SD= 0.69808) which are most important that affect furniture market positively. Brand (M=3.930467 & SD=0.748473) is the third critical element. The fourth one is Price (M=3.7913 & SD=0.87164). Furniture design (M=3.545675 & SD=0.904985) is fifth, Store Aesthetic Design (M=3.370675 & SD=1.08948) is sixth, Reference (M=3.15 & SD=0.91865) is seventh important variables. Whereas, promotional factors (M=2.827533 & SD=1.049063) are the least important that influence consumer's purchasing behavior as per the respondents opinion.

Table 3 Descriptive Statistics Analysis

Descriptive Statistics

Variable	Mean	Std. Deviation	N
Furniture Design			
1. Innovative Design	3.8957	0.74616	230
2. New Furniture Model	3.7913	0.78184	230
3. Nearest Furniture Store	2.8435	1.10253	230
4. Matching with other furniture	3.6522	0.98941	230
Average	3.545675	0.904985	
Store Aesthetic Design			
1. Vertical arrangement in furniture store	3.2957	1.06942	230
2. Creative shelf display and layout	3.5217	1.10456	230
3. EMI facility on furniture store	3.3696	1.17764	230
4. Positive store image	3.2957	1.00630	230
Average	3.370675	1.08948	
Customer Consciousness			
1. Role, cost, durability of furniture	4.4565	0.65772	230
2. Physical health issues	4.2348	0.70346	230
3. Adjustable with lifestyle	4.5043	0.59655	230
Average	4.398533	0.652577	
Promotional Factors			
1. Salesperson's influence on furniture selection process	2.6652	1.06394	230
2. Furniture on sale	2.2217	1.06080	230
3. Discounted furniture	3.5957	1.02245	230
Average	2.827533	1.049063	
Brand			
1. Purchasing branded furniture is easier task	3.8609	0.87555	230
2. Branded furniture built with unique feature	3.9696	0.72022	230
3. Brand assured quality	3.9609	0.64965	230
Average	3.930467	0.748473	
Reference influence			
1. Reference group influence in furniture purchase	3.4174	0.86648	230
2. Social media influence	2.8826	0.97082	230
Average	3.15	0.91865	
Convenient furniture			
1. Comfortable Furniture	4.4043	0.67841	230
2. Easy to maintainable furniture	4.2217	0.69838	230
3. Timely delivery service	3.8739	0.70353	230
4. Environmental factors	3.5783	0.71200	230
Average	4.01955	0.69808	
Price			
1. Quality dictates price	3.7913	0.87164	230
Furniture purchasing decision			

1. Purchasing furniture for decoration	4.1217	0.75516	230

Table 4 shows that correlation coefficient value (R) is 0.478 that indicates there is a moderate positive relationship between consumer's furniture purchasing decisions and furniture design, store aesthetic design, customer consciousness, promotional factors, brand, reference influence, convenient furniture, price. Furthermore, Just 22.9 percent (R-square values of 0.229) of the difference in consumer's furniture decisions is accounted for furniture design, store aesthetic design, customer consciousness, promotional factors, brand, reference influence, convenient furniture, and price. The author's finding also represents the degree of relevance of influencing factors with the demographic factors in addition to the findings from the previous studies. This gap will contribute to the existing literature.

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.478[a]	.229	.201	.67516	.229	8.186	8	221	.000

Source: Researcher field data

5.3 Confirm the model fitness

Table 5 represents that multiple regression analysis is conducted to analyze the relationship between consumer's furniture purchasing decisions and furniture design, store aesthetic design, customer consciousness, promotional factors, brand, reference influence, convenient furniture, price. Eight hypotheses are suggested and the conclusions are enumerated in Table 3. The F-statistics is 8.186 (F = 8.186) and significance level is 0.000 which is less than 0.01 and for regression analysis the model fitness is assured.

Table 5 ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	29.851	8	3.731	8.186	.000[b]
	Residual	100.740	221	.456		
	Total	130.591	229			

Source: Researcher field study

5.4 Factors influencing consumer's furniture purchasing decisions

The findings of multiple regression analysis for H2 is described in Table 6 as store aesthetic design, which influences Consumers' furniture purchasing decisions significantly and positively (β2 = 0.038; t-value = 0.604; p > 0.05). H2 is accepted. Therefore, store aesthetic design has influence on customer's furniture purchasing decisions. People are attracted by store design because they can easily find out their desired one from a planned shelf rather than a messy one. H3 substantiates that customer consciousness has positive and substantial impact on consumer's furniture purchasing decisions (β3 = 0.194; t-value = 2.864; p > 0.05). H3 is accepted. Customer consciousness has effect on consumer's furniture purchasing decision. Consciousness regarding health issues, environmental impact has enormous effects on furniture purchasing decisions. H5 presents Brand as a critical factor which positively and considerably influence consumer's furniture purchasing decision (β5 = 0.064; t-value = 0.971; p > 0.05). H5 is accepted. People generally feel proud and get satisfied for using or getting owner of a furniture of well known and famous brand. Then, H6 refers reference influence which is a major factor that has positively and noticeably impact on consumer's furniture purchasing decision (β6 = 0.174; t-value = 2.763; p< 0.05). So, H6 is accepted. Reference group have a powerful position in Bangladeshi people's mind. Before purchasing furniture they normally search information and try to get opinion regarding final selection. Furthermore, H7 is described as convenient furniture which is another crucial factor that influence consumer's furniture purchasing decision positively and extensively (β7 = 0.166; t-value = 2.510; p< 0.05). H7 is accepted. Furniture which is easy to maintain, easy to carry significantly attract people in Bangladesh. Next, H8 specifies price which is a critical factor that positively and notably influence consumer's furniture purchasing decision (β8 = 0.103; t-value = 1.602; p> 0.05). H8 is accepted. Price is an important and sensitive factor for people from a developing country like

Bangladesh. Due to price factor low-medium income group have to compromise many other factors.

The results in Table 6 confirm H1 as furniture design, which influences Consumers' furniture purchasing decisions negatively and insignificantly (β1 = -0.146; T = -2.226; p < 0.05). H1 is not accepted. Then, H4 specify promotional factor influence consumers furniture purchasing decision negatively and insignificantly (β4 =-0.122; t-value = -1.880; p> 0.05). So, H4 is not accepted. It is assured that furniture design and promotional factor has no impact on consumer's furniture purchasing decision.

Table 6 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.480	.604		2.452	.015
	Furniture design	-.169	.076	-.146	-2.226	.027
	Store aesthetic design	.034	.057	.038	.604	.546
	Customer consciousness	.288	.101	.194	2.864	.005
	Promotional factor	-.162	.086	-.122	-1.880	.061
	Brand	.078	.081	.064	.971	.333
	Reference influence	.172	.062	.174	2.763	.006
	Convenient furniture	.282	.112	.166	2.510	.013
	Price	.089	.055	.103	1.602	.111

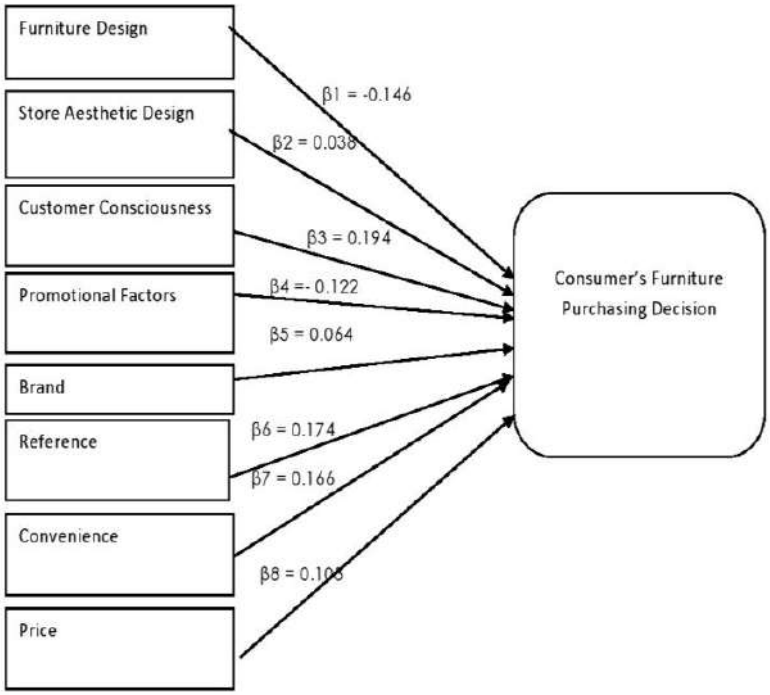

Fig.2: The outcome of the full model

VI. CONCLUSION AND IMPLICATIONS

The study has been initiated with the objective to analyze different factors that persuade consumer's decision making process of purchasing furniture that may highlight on consumer behavior towards furniture purchase. The research has been conducted on Bangladesh perspective. The outcome may vary depending on geographic changes. The findings of the study represents several factors such as store aesthetic design, customer consciousness, brand, reference, convenient furniture and price have positive and significant persuasion on consumer behavior towards furniture purchasing decision and also the degree of importance of those factors depend on demographic profile of the respondents. To carry on the study, primary data has

been collected through structured questionnaire from different areas inside Bangladesh. Literature review has been developed from numerous sources of secondary data. Convenient and judgmental sampling was used in this survey. From regression analysis, the degree of significance between the influencing factors and consumer's decision making process has been revealed.

The study found many factors that are considered in furniture purchasing decision in Bangladesh. The findings are based on the data provided by 230 respondents from different area within Bangladesh. Some of the factors are considered in previous research in Bangladesh perspective. Some are considered beyond Bangladesh. The researcher had tried to accumulate all those factors that are considered from Bangladesh perspective.

The main implication of this study is for the marketers of furniture industry. They could be benefited by the outcomes of this research which helps them to restructure their marketing strategies for furniture market to build more competitive position in the industry. Marketers can segment their markets based on demographic profiles of customers by following the factors that influence the purchasing decisions. Actually, what consumers want; which factors they mostly consider while purchasing furniture could be better understood from the insights of this study. On the other hand, the outcome of this research could be beneficial for the future researchers, who want to conduct research on this sector and want to find out more weighty factors that may affect consumer's behavior towards furniture purchasing decision.

VII. LIMITATION OF THE STUDY AND FURTHER RESEARCH

The results of this research is applicable for Bangladesh only, probably the outcome has little help for other countries perspective. The outcome may not present whole Bangladeshi peoples view because of the sample size. Further analysis is recommended by expanding the sample size in other areas of the country. There may have some overlooked factors that have crucial impact on consumer's behavior towards furniture purchasing decision that could be addressed in further research.

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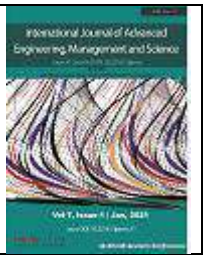

4Ps of Marketing Among Selected Resorts in Cabanatuan City

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Abstract— *This study aimed to explore the 4P's or marketing mix of selected resort businesses in Cabanatuan City. The study employed a descriptive method of research. The study was conducted in (6) six registered resort businesses. The findings show that most resort owners aged 20-30, female, single, and college graduates. All the resorts have swimming facilities and rental facilities for cottages and videoke equipment. For travellers, some resorts provide accommodation in hotel rooms and the use of function halls for social events such as, but not limited to, are birthdays, weddings, recollection activities, and anniversaries. The selling of souvenir items is not in priority by some resorts. The facilities and amenities are main factors that influence prices. In terms of place, the resort owners considered accessibility, security, and competition. The resort employs advertising on the internet; brochures and banners, and flags are also part of the promotion. High competition and improper marketing effort are the top problems encountered by the resort. It is recommended that the resort should also utilize other methods of marketing its goods and services under the traditional and modern techniques. In handling competition, the resort should be producing and sustaining quality goods and services that meet the needs of the shared target customers better than others.*

Keywords— ***marketing mix, 4Ps, resort, strategies, problems.***

I. INTRODUCTION

Marketing deals with customers and maintains successful partnerships with clients. The two-fold aim of marketing is to attract new customers by offering superior value and providing satisfaction, to retain and expand current customers [1]. Marketing is a means of contact between a corporation and its clients to sell its goods or services [2].

Marketing is perceived as managing the marketing mix by AMA's latest concept. The 4Ps remain a staple of the marketing mix [3].

The Marketing Mix consists of four decisions that should be taken into account before a product is launched. Four equally significant variables characterize the marketing mix. For these four distinct components, businesses should prepare a focused approach: Product, Price, and Place & Promotion. All four variables help the organization formulating the requisite strategic decisions for competitive advantage [4]. The marketing mix refers to factors that can be managed by a marketing manager to affect the revenue or market share of a brand [5].

A variety of new problems emerging from changing travellers and the world face the resort industry today [6]. The resort industry provides a special atmosphere where managers have to deal with a wide variety of unique problems [7]. One of the P's of marketing which is the place or location is very significant such as beaches, mountains, lakes, tropical settings or in areas such as golf, skiing, tennis and others that provide outdoor facilities for leisure and sports [8]. Many individuals consider resorts to be the best vacation experience when they see the resort prefix added to a hotel, and the inference is that they should expect superior hotel facilities and service [9].

Nueva Ecija has places for company trips, family bonding and other swimming activities, a selection of resorts that fit the needs all around the city. Cabanatuan is a 1st class component city in Nueva Ecija. The purpose of this research is to explore the marketing mix or 4Ps and the problems encountered of the resorts in Cabanatuan City.

Statement of the problem

This study aimed to explore the marketing mix or 4P's of selected resort businesses in Cabanatuan City. Specifically, it sought answer to the following:

1. How may the profile of the respondents be described in terms of:

1.1 age;

1.2 position;

1.3 gender;

1.4 civil status and;

1.5 highest educational attainment?

2. How may the profile of the business be described in terms of:

2.1 type of ownership;

2.2 no. of employees;

2.3 no. of years in operation; and

2.4 average monthly income.

3. How may the marketing mix or 4Ps of the resort business be described in terms of:

3.1 product/ service offered;

3.2 price;

3.3 place, and;

3.4 promotion?

4. What are the problems encountered by the resort businesses?

II. METHODOLOGY

The study employed the descriptive method of research. According to [10], descriptive method involves determining information about variables rather than individuals. She added that this method is employed to measure existing phenomenon without inquiry into why it exists.

Its importance is based on the assumption that, through observation, analysis, and explanation, problems can be solved and practices improved. The survey, which involves questionnaires, personal interviews, phone surveys, and normative surveys, is the most popular descriptive research process [11].

The researcher used informal interviews and survey questionnaires in data gathering. The study was conducted in six (6) registered resort businesses in Cabanatuan City.

The respondents of the study were the owners or managers of the resorts.

III. RESULTS AND DISCUSSION

3.1 Profile of the Respondents

Most of resort owners aged 20-30, female, single, and college graduates.

According to the respondent, being in resort business is a great achievement at their age. The focus on resort management also is an advantage for single-status owners. Extrinsic, intrinsic, and general job satisfaction have a profound influence on normative involvement and affective engagement on resort operation [12]. Owners of resorts can restore, innovate and develop infrastructure and encourage services such as signage, building/resort facilities, including facilities for people with disabilities [13].

3.2 Profile of the Resort Business

Most resort businesses are the sole-proprietorship type that has been in the industry for more than eleven (11) years, employing 1–10 employees, and with a monthly income of P40,000 and above. As this type of organization has the least government interference in formation and there is unlimited liability [14].

According to the respondent, the number of employees was based on the demand for resort services. The existence of the resort for eleven (11) years and its average income could support the business's sustainability.

3.3 Marketing Mix or 4Ps of Resort

3.3.1 Product/Services Offered

All the resort businesses chosen have swimming facilities. There are also rental facilities for cottages and videoke equipment. For travellers, some resorts provide accommodation in hotel rooms. The prefix resort attached to a hotel is expected superior facilities and service at that hotel [15]. For several decades, tourist hotel resorts have been seen as crucial elements in the tourism industry's leading accommodation sector [16].

Some resorts do not prioritize the sale of souvenir products. Event services for debuts, birthdays, and anniversaries are also provided by most resorts. Other activities, such as weddings, baptisms, and corporate

events, are included in the event packages of the resorts. In terms of food, the resort primarily provides bottled water, soft drinks, and junk food.

3.3.2Price

The majority of the resort business has different rates given to customers for kids and adult amounting to P50 and P80, respectively. In other services, videoke rental prices at P1,501 to P3,000; cottage rent, P300 is the cheapest rate; hotel room accommodation ranged from P2,501 to P5,000 for families; dormitory room at P3,001 to P6,000; and lastly, function halls for social events ranged from P5,000 to P15,000. Social events, such as wedding, amounts from P50,000 to P100,000.

According to the manager, price sensitivity is considered. The demand for a good depends on several factors, such as the good price. It was noted that prices lead to the resorts' bankruptcy and, in particular, reliance on the tourists' characteristics [17].

3.3.3 Place

Factors considered by the owners in the location of the resort business. The owners believe in the accessibility of the resort to customers, the security of the premises, proximity to competition, business rates such as utility bills and taxes, workforce, and growth potential.

According to the manager, accessibility is very important once the customers look for it in an online search engine, i.e., Google Maps. [18], asserted resort hotels are now located in urban and suburban areas and have extended the idea of the resort by connecting it to meetings, conferences, and business travel. In terms of security, including the parking areas, all customer belongings are safe. In the study of [19], retailers also have a judgment in the resort area considerably more favorably than the visitors did.

3.3.4. Promotion

The resort employs advertising on the internet, print, i.e., brochures, and outdoor advertising like banners and flags.

In terms of sales promotion, lifestyle discounts are given to customers, e.g., students, employees, senior citizens. The resort also has a holiday promo. Included in this promo is a limited lifetime promo package in the form of a privilege card, indicating rebates from various resort services. According to the respondent, the resort gives more significant discounts to a group rather than individuals.

In terms of public relations, the resort staff is accommodating and welcoming. According to the respondent, the security and safety of the guest are of utmost importance. The resort also generates employment in the barangay.

Another promotional activity that the resort employed is direct marketing. According to the manager, through social media like Facebook, they send e-flyers, e-brochures online to different private and government offices such as LGU or local government units.

Any business enterprise needs to promote its products and service to be known. [20] stated that the promotional variables consisting of ads, direct sales, promotion of sales, advertising, and word of mouth had a significant impact on room occupancy rates at the same time.

IV. RESORT PROBLEMS ENCOUNTERED

Resort Problems	***WM (n=6)***	***Verbal interpretation***	***Rank***
High competition	4.67	Strongly Agree	1
Improper marketing effort	3.83	Agree	2
Poor customer satisfaction	3.50	Agree	3
High service rates	2.83	Neither agree nor disagree	5
Cleanliness issue	3.50	Agree	3
No proper transportation facility	2.33	Disagree	6
Security challenges	2.83	Neither agree nor disagree	5
Lack of refreshing events and entertainment	3.17	Neither agree nor disagree	4
Overall weighted mean	**3.33**	**Agree**	

Among the resort problems, high competition with a verbal interpretation of “strongly agree” (WM=4.67) as rated by the manager, which they believe

high competition affect the resort operation. It is followed by improper marketing effort with a verbal interpretation of “agree” (WM=3.83). Meanwhile, the cleanliness issue with the verbal interpretation of "agree" (WM=3.5) ranked third. High service rates (WM=2.83), security challenges (WM=2.83), and lack of refreshing events and entertainment (WM=3.17) were rated as “neither agree nor disagree."

The lowest item rated by the manager is no proper transportation facility (WM=2.33) with a verbal interpretation of "disagree."

The rivals, consumers, and even the weather are all uncontrollable variables that can affect an organization's performance. According to the respondent, some customers compare resort prices, which is a normal thing.

Due to the growing interest in a resort destination, competition is increasing. [21], reasoned that the resort destination is a converged location targeting broad market segments for gaming and non-gaming travel facilities, including accommodation, eating and drinking places, entertainment, shopping, and convention. To stay ahead in the competition, the availability of amenities and facilities makes up a better destination.

V. CONCLUSIONS AND RECOMMENDATIONS

The life of the resort is focused on its services and facilities and those that clients want and are aware of all the options that they can choose from. To fulfill their needs for relaxation and other reasons, they could make their wise choice over another one. Swimming facilities have become standard features in resort which becomes as one of the guests' favorite facility. Other facilities and amenities such as cottages, hotels, camping sites, etc., are constructed and added to the existing resort's continuous innovation. With these changes or improvements, the resort is in competitive advantage in terms of product and services. But with good client relationship is more than anything else and worth remembering. Improvements in the facilities can justify competitors’ prices. Satisfied customers can pass the stories of their great experiences or word of mouth. The resort should be continuously promoted to be known. The resort should continue promotional activities to make them always visible. The resort can make use of various online platforms, which marketing the promotion is done digitally nowadays. Other forms of promotion in terms of advertising, personal selling, direct marketing, public relations can also be options. The resort can still employ both traditional and modern ways of promoting its products and services. To cope with the competition is to create and maintain better products and services better than others would to the shared target customers' needs.

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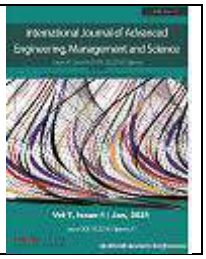

Study Habit in Remote Learning Education: A Basis for Teachers Modern Pedagogical Strategies in Tertiary Level

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Abstract— *According to the study of Korir, D. and Kipkemboi F. (2014), School as a second home has a solid relationship to the academic performance of the students. However, because of the pandemic, home seems to become the second School of the students, affecting their study habits. Thus, this study was conducted to determine the factors that affect the students' study habits at the tertiary level using remote learning mode of education. The study used a descriptive-quantitative research design, and a self-made questionnaire is a primary tool in gathering data. Simple statistical tools were used to interpret the data. A total of 375 students from Nueva Ecija University of Science and Technology – San Isidro Campus, San Isidro Nueva Ecija, Philippines 3106 are the study respondents. The results show that students used their free time to study, and most of them use 2 hours and above to study, which shows why most students are able to cope with the current education model. It also shows that the students' environment dramatically affects the study habits of the students, thus, another reason why most students are struggling to survive in their online/remote learning mode of education.*

Keywords— ***Study Habit, Remote Learning, Education, Tertiary Level, Pedagogical Strategy.***

I. INTRODUCTION

Education in the present time has changed a lot since Covi19 Pandemic hits the country. As mandated by the government, all schools are forced to stop face-to-face class in response to the slowdown, if not eliminate the virus's spread. Children in the Philippines are not going to go to school until a Covid-19 vaccine is available, officials said, causing fears that millions of students might be left without access to education(Theguardian.com). True to its mission to keep the learning going, Secretary Leonor Magtolis Briones and other Southeast Asian ministers of education, in response to the COVID-19 global crisis, presented their different educational strategies during the first ministerial e-forum on Southeast Asian Ministers (SEAMEO) held last Thursday, June 18 (DepEd, 2020). The department of education, which is committed to providing quality education for Filipino people, looks for a different opening class strategy, and one of these and is being implemented now is Remote Learning education. In the Philippines and the USA, schools have implemented remote learning in response to the spread of COVID-19, a new Coronavirus(Morgan, 2020).

Remote Learning education is the non-face-to-face mode of learning. Remote learning aims to re-create the environment in the classroom as students learn on the computer. It means that the student logs into the virtual classroom at scheduled times to see lectures or participate(Geneva.edu, 2020). It also means to deliver education to the students, such as the use of the internet, printed materials, and computer. In remote learning, students can learn and do their school activities even when they are at home.

Using this model of education, also change the strategies of teachers in delivering lessons and conducting their class to their students. Teaching pedagogy continuously evolves as the education system evolves. According to Harper et al. (2004), pedagogy must be kept changing and growing as technology changes.

These profound changes in the students' learning modality affect not only the teaching pedagogy but also the student's study habit of learning in their time. That's the habits that students form in their years of education. A student cannot succeed without good study habits(Ebele and Olofu, 2017). Habit is a practise of a routine that practice does consistently. Different study habits are developed for students where education is implemented. Learners' needs include different learning styles, which can influence learning performance(Çakıroğlu). Study habits act as another variable connected with distance learners' performances. Study habits reflect students' usual act of studying and call forth and direct the learner's cognitive processes during learning(Proctor et al., 2006). Thus, this study was conducted to identify the factors that affect students' study habits during this mode of education.

This study would help the teachers to chose and develop the appropriate strategy in teaching. It will also help the administrators of the school in their plans in implementing the mode of learning. Lastly, the student will be aware of the different habits that others are doing to have effective learning.

OBJECTIVE OF THE STUDY

This study aims to determine the different study habits among learner during the implementation of Remote Learning (RL) in Higher Education Institutions (HEI). Specifically, it attempts to:

1. Demographic profile of the respondents
2. Length and schedule of Study Habit of the Respondents
3. The effects of the following factors to the student habits of respondents
4. Challenges encountered by the respondents in their study habit.

II. METHODOLOGY

This study used a descriptive-quantitative research design. Descriptive research is usually defined as a type of quantitative research, though qualitative research can also be used for descriptive purposes(McCombes, 2020). This study was conducted to determine the effects of different factors in students' study habits.

This study's respondents were the 375 students in different courses of Nueva Ecija University of Science and Technology – San Isidro Campus, San Isidro, Nueva Ecija Philippines 3106.). The primary tool used to gather data is a self-made questionnaire. It is collecting data through an instrument consisting of a series of questions and prompts to receive a response from individuals it is administered. Questionnaires are designed to collect data from a group(Formplus.com).

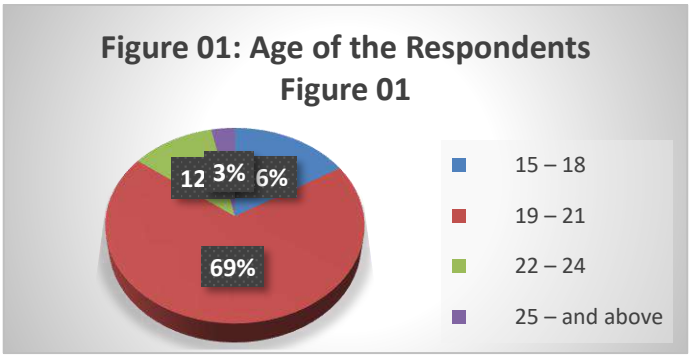
The respondents' responses were organized, classified, tabulated, analyzed, and interpreted using frequency distribution, percentage, and ranking. All Computations were done using Microsoft Excel.

III. RESULTS AND DISCUSSION

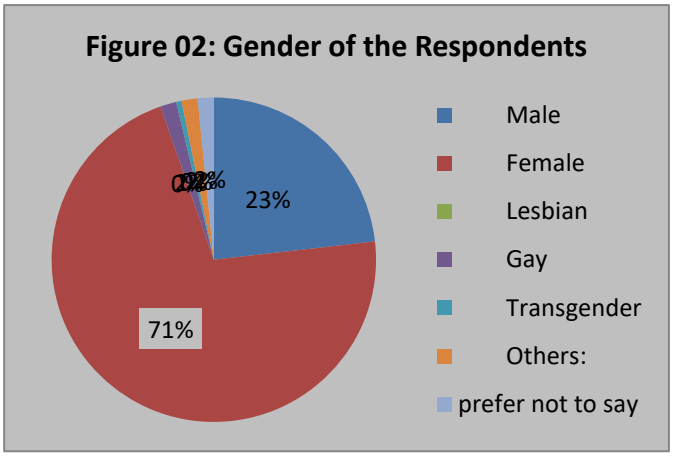
This section presents the survey results concerning the study habits of the students of Nueva Ecija University of Science and Technology – San Isidro Campus, San Isidro Nueva Ecija University of Science and Technology.

1. Demographic Profile of the Respondents

1.1. Age of the Respondents



The data shows in figure 01 that most or 69 % of the respondents are between the ages of 19-21 which is appropriate to be a college student. Data is supported by the Philippine Education System (2021) states that most Bachelor Degree for four years is usually 17-20 years old.

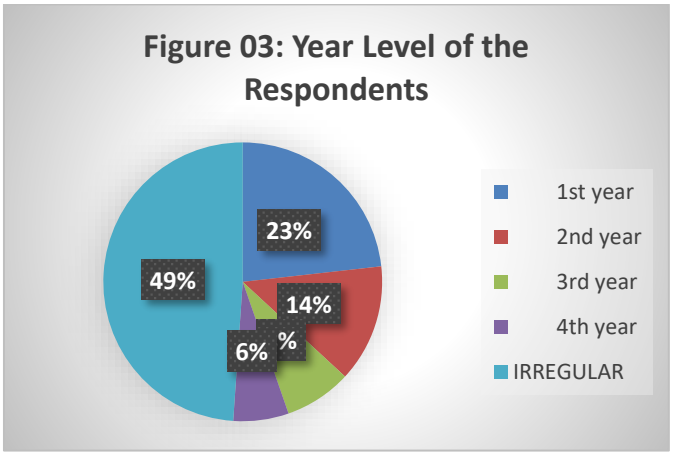


1.2. Gender of the Respondents

Figure 02 states that 71 % of the respondents are female far from the number of males that is only 24 % of

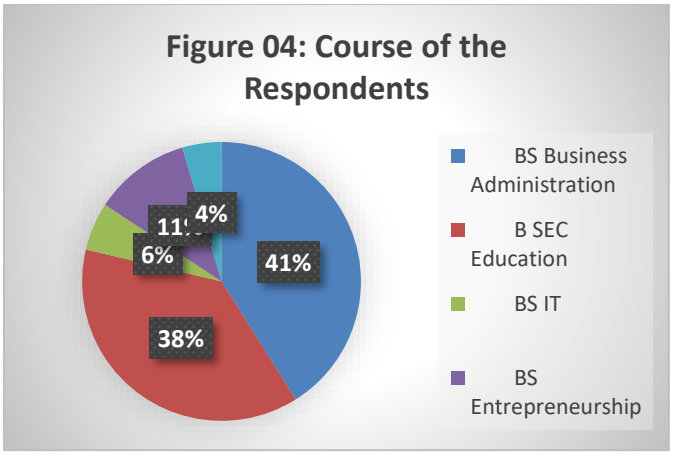
the total respondents. The data proves that the majority of the college students are women that emphasize from the 1990s onwards, men have begun to perform less well in higher education compared to women (Evers and Mancuso 2006; Jorgensen et al. 2009; OECD 2008).

1.3. Year Level of the Respondents



The figure 03 shows that 49% or majority of the respondents are 1st Year students. Thus, this figure emphasizes that 1st year students are more active than in any other year level because this is their discovery stage in their college's life as agreed by Habibah et.al (2011) in their findings that the first-year students had low stress level.This only proves that since they are freshmen their eagerness and willingness to learn as college students are still there.

1.4. Course of the Respondents



In figure 04, indicates that 41 % of the respondents are from BSBA (Bachelor of Science in Business Administration). Seconded by the respondents from B SEC Education with 38 %. The reason of this is 60 % of the total population of the whole campus (NEUST-SIC) is coming from the BSBA (Bachelor of Science in Business Administration)

1.5. Units Enrolled by the Respondents

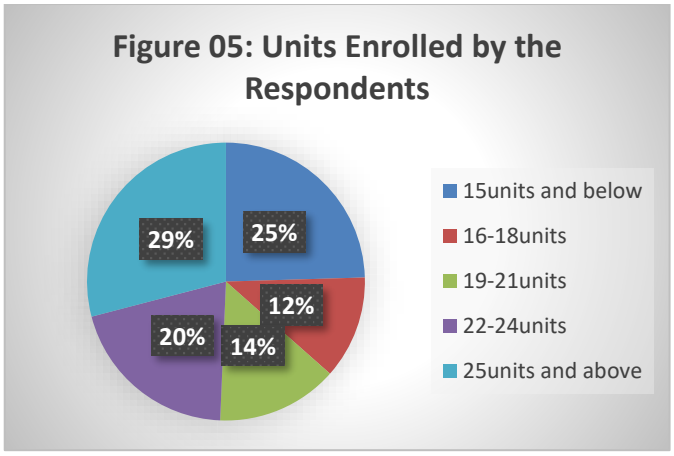
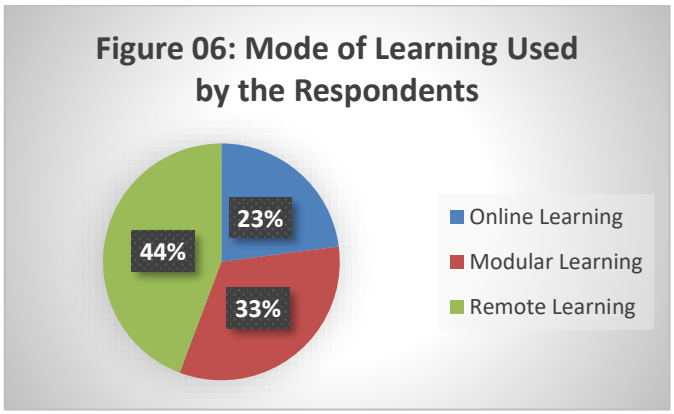


Figure 05 shows that 29 % of the respondents are enrolled with 25 units and above, this data is parallel in the Revised-UP Code: Art. 338 p. 85, states that "a regular freshman is a student who has not finished the prescribed subjects of the first year of his/her curriculum or has finished only or less than 25 percent (25%) of the total number of units required in the entire course"In short, the subjects of the respondents are ranging from 8-10 subjects a week times 3 hours per subject, with a total of 30 hours a week. The average subject per day is 3-5, which shows that the respondents have enough time or have time for them to study their lessons every day.

1.6. Mode of Learning Used by the Respondents



It is clearly shown in the Figure 06 that majority of the respondents (44 %) are on the Modular Learning. The figure only certifies the study of Mina et.al. (2020) that that majority of the learners in the same institution do not have an internet provider at home. Since, modular learning does not need so much internet connection because the activities and lectures are already in the module. That provides the respondents more time to study and understand the lessons in the modules.

1.7. School Graduated in Senior High School by the Respondents

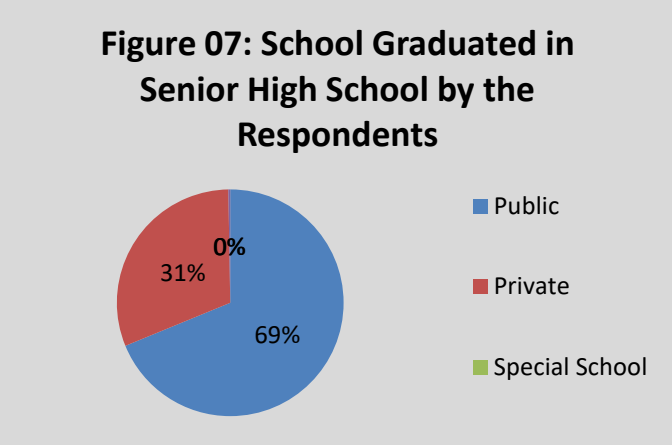
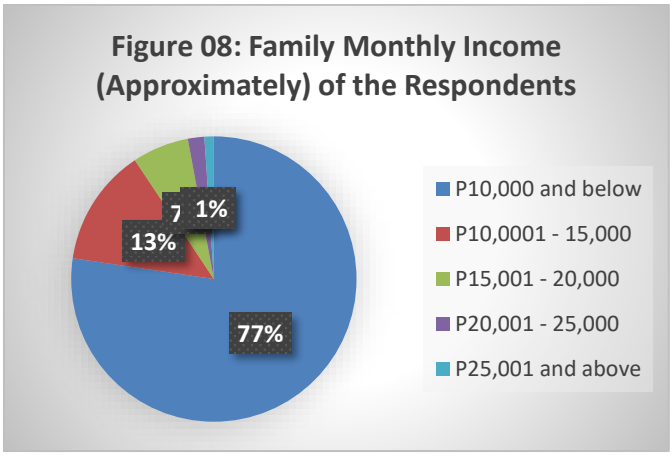


Figure 07 shows that 69 % of the respondents graduated from public schools while only 31 % of them come from the private school nearby the University understudy, thus the result of these figures shows that the majority of the students of this university preferred to study in a government school as what they were graduated in their Senior High School. This only means that parents of the respondents decided to enroll them in public school for an economic reason but still, they can learn the expected knowledge that they must learn on the course that they choose as what private students are expected to learn in the same course.

In this regards, Ali (2012) proves that "it may be predicted that private school students had stronger study habits than those attending public schools. Private school students study regularly. Public students are likely to study last minute. Private schools have a greater amount of total study hours. However, public school students tend to study in complete silence, while private school students' study while watchingTv or listening to music, lacking focus".

1.8. Family Annual Income (Approximately) of the Respondents

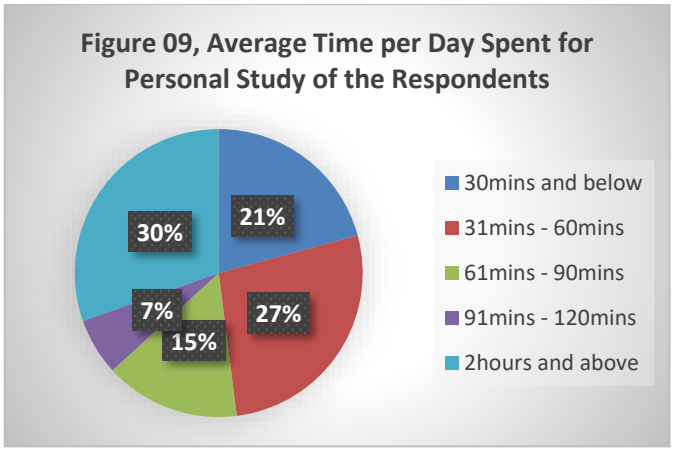


The data in figure 08 shows that the majority of the respondents or 71 % of them stated that the approximately monthly income of their family is P10,000 and below. Base on the "Income Groups in the Income Distribution, Income Thresholds and Sizes of Income Groups in 2018" states that a family with a monthly income of less than P 11,000 is classified as "Poor". This only shows that the majority of the respondents are classified their family as "poor" when they choose the monthly income of P10,000 and below.

Figure 08 support the data in figure 06 that 69 % are graduated in public schools in their SHS and also decided to enrolled in SUC for them to have a free education to porsue their closen carrer or profession.

2. LENGTH and SCHEDULE of Study Habit of the Respondents

2.1. Average time per day spent for personal study



The result of figure 09 are very close to each other, 30 % of the respondents used 2 hours and above as their average time per day spent for personal study, followed by 27 % used 31 minutes to 1 hour, and the third is 30 minutes and below consumes their time in their personal study.

Supporting this finding, Awolabi (1996) explains that there is a significant difference between thirty (30) minutes study time and one-hour academic performance ratings of students. According to him, thirty minutes study time is not academic performance oriented, as it often leads to poor examination grade. Awolabi maintains that a combination of the study time and other factors explain students' academic performance in any course of study. In the same way, Adeyemo (2005), opined that study time is a pattern of activity that goes beyond merely reading for pleasure.

A student who wants to graduate with good grade has to read his/her books with understanding, and that will

take more time to accomplish. In the same vein Kunal (2008), observes that students who are very successful in their desired career have longer study time. It is stated in the website that students who apply these attitudes in all of their courses, always come out successful. It is necessary for students to develop good study habits in order to know how long it will take them to study and understand their course of study. Supporting this finding, Dika (2002) agreed that a grade is a primary parameter showing such learning (Uklong and George, 2013)

2.2. Time used for personal study of the respondents

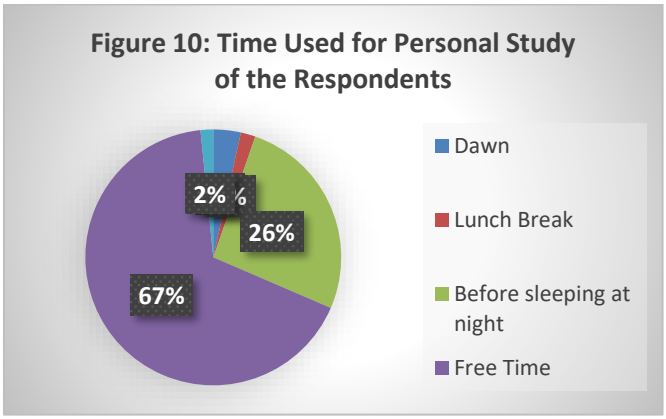


Figure 10 shows that 67 % of the respondents used their free time in school as their study time in reviewing their lessons, reports, and other related activities. This data proves that no particular time in a day may consider as the best time for studying as supported by an article posted last 17thJanuary 2020, entitled "When is the Best Time to Study: Morning, Noon or Night?" in PSB Academy, emphasizes that different timings work for different students and you can find your best time of the day to study if you consider the following factors. Firstly, when are you most alert? Think about that, but different qualities of memories and alertness seem to be better at different times of the day for different people. For example, you can have a better visual memory in the morning, but your critical thinking ability peaks in the afternoon. Secondly, if your optimal time is prone to distractions, such as dinner time, which might disrupt your routine, It is best to find another timing. Lastly, make sure you select a time that you can stick to consistently, at least for a few days every week because consistency helps ensure you study daily and improves the quality of your study time.

Just like each student has a unique learning style, different students may learn better at different times of the day. But if you study at the same time every day, you will condition your mind and body gradually, and soon, you will be in your best frame of mind for study. Once you know what works best for you, you can start your studying routine more effectively and efficiently.

To further elucidate that findings here are the two habits from the "10 Habits of Highly Effective Students" by Loveless (2021)

1. Plan when you're going to study.

   Successful students schedule specific times throughout the week when they are going to study -- and then they stick with their schedule. Students who study sporadically and whimsically typically do not perform as well as students who have a set study schedule. Even if you're all caught up with your studies, creating a weekly routine, where you set aside a period a few days a week, to review your courses will ensure you develop habits that will enable you to succeed in your education long term.

2. Study at the same time.

   Not only is it important that you plan when you're going to study, it's important you create a consistent, daily study routine. When you study at the same time each day and each week, you're studying will become a regular part of your life. You'll be mentally and emotionally more prepared for each study session and each study session will become more productive. If you have to change your schedule from time to time due to unexpected events, that's okay, but get back on your routine as soon as the event has passed. (Loveless, 2021).

3. The EFFECTS of the Following FACTORS to the Study Habits of Respondents

Table 01: Specific factors affecting the Study Habits of Respondents

No.	Indicator	Weighted Mean	(Verbal Interpretation)
1	Environment/Community of the learner/respondent	3.12	A (Affected)
2	Interest related to the Course Enrolled of the learner/respondent	3.05	A (Affected)
3	Work/Duty related Issues of the learner/respondent	2.89	A (Affected)
4	Family/Relatives Related Problems of the learner/respondent	2.33	NA (Not Affected)

The data in table 01 signifies that the number 1 specific factors affecting the study habits of respondents are their

"Environment or Community' which 3.12 %, these findings agreed to Ozmert (2015) emphasized the importance of environmental influence as a major factor in the development of students studying habits. Although it is good to study in a peaceful environment sometimes students cannot get that environment. In this manner, students should have to adjust themselves in that environment like, in noisy classrooms or hostels some students study in silence but some do not. If they have good study habits, they can adjust easily. Some students cannot cope up with the non-suitable environment. Due to this reason, some students lose their positions. Effective study habits help students to achieve good results (Sadia, 2005).

Followed by "Interest related to the Course Enrolled of the respondents" which is 3.05 %, Most of the respondents are taking their course it is not because they want it or it is their line of interest, they took the course because it is free. And another reason is a general notion or a fact that only education can free us from poverty. This statement certifies the data gathered in figure 6 that most of the respondents are graduates of public schools and further certifies in figure 07 that most of the respondents signify that their monthly family income is below P10,000.

The third factor is "Work or Duty related Issues of the respondents which are 2.89 %, thus also correlated to the data in figure 06 (monthly family income) for them to survive while studying is to earn an extra income for their financial support.

3.1. Other factor given by the respondents

Table 2: Other factors given by the respondents

Rank	Factors	Frequency	Percentage
1	Time Management	71	19%
2	Resources,gadget,equipments for study	50	13%
3	Personal Problems	41	11%
4	Internet Connections	31	8%
5	Social Media	25	7%
6.5	Distraction from surounding/neigborhood	14	4%
	What others says/ comment/ critism	14	4%
8	House responsibility	5	1%
	No answer	120	33%
	TOTAL	375	100%

As shown in Table 2, are the lists of specific factors affecting the study habits of respondents that they have given are interrelated like; rank 3 is "Personal problem" (41 frequency or 11% of the respondents), rank 6.5 with 14 frequency or 4 % of the respondents are "Distraction from surrounding or neighborhood" and "What others say or comment/criticism", and "House responsibility" with 5 frequency or only 1 % of the respondent. Those factors mentioned have a big impact on rank number 1 which is "Time management" with 71 frequency or 19 % of the total respondents mentioned. The above given specific factors that respondents gave are the manifestations of the result in Table 1 which is the main factor identified by the respondents as rank one is "Environment/Community of the learner/respondent".

While rank 2 which is "Resources, gadgets, study equipment",rank 4 "Internet Connections", and rank 5 "Social Media" are also connected which further proves the result in figure 6 regarding the respondents "family monthly income".

But as notice on the same table, 33 % or 120 respondents do not give anymore specific examples because almost all the possible factors affecting the study habit of the respondents are given already in table 1.

4. Challenges Encountered by the Learners/Respondents in their Study Habit

Table 3. Challenges encountered by Learners/Respondents in their study

No.	Indicator	Weighted Mean	Verbal Interpretation
1	a. Time Pressure in their studies	3.47	Strongly Agree (SA)
2	b. Mode of Learning	3.30	Strongly Agree (SA)
3	c. Resources (e.g. cellphone, modules, etc.)	3.44	Strongly Agree (SA)
4	d. Study Habit Behavior	3.20	Agree (A)
5	e. Family Issues	2.76	Agree (A)
6	f. Financial Issues/Problems	3.12	Agree (A)
7	g. Work Related Issues	2.17	Disagree (D)
	Average Weighted Mean	3.07	Agree (A)

Table 3, shows the "Challenges Encountered by the Respondents in their Study Habit", the respondents

"strongly agreed" the following challenges "Time Pressure in their studies", "Mode of Learning", and "Resources (e.g. cellphone, modules, etc.)". The mentioned challenges point out the most common factors that are given by the respondents in table 3 and emphasizes its relationship in table 1.

IV. CONCLUSION AND RECOMMENDATION

From the data presented above, a conclusion was made. The result shows that majority of the respondents have an approximately P10,000 income monthly. This can be related why most of the students are using their free time to study and most of them are spending 2hours of their time to study as part of their study habit. This shows the reason why students can cope up in their study. In the factors that affects the study habits of the students, it shows that environment has the highest mean that affects students, since they are studying at their house, most of the students based on their approximate income monthly does not have a good environment which really affects their study habit. This is also shown on the challenges of students in their study habit are the Mode of learning that is the Remote learning. The environment of the students are different from one another that why one teaching strategy of teachers for all students might not be effective to some of them if not majority.

The researchers strongly suggests that school administrators conduct further studies of the different environment of the students and how they will be able to help the students based on the kind of environment they have. It will greatly help them in their study habit if their environment will be suitable for learning. To the teachers, it is suggest that they observed the pattern or routines of the students in complying to their requirements.

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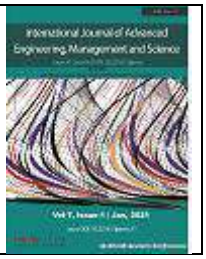

Analysis of the efficiency of public policies in municipalities, with a population of over 10.000 habitants in the administrative region of Presidente Prudente - Data from COVID-19

Prof. Dr. Moises da Silva Martins

Faculdde de Tecnologia de Presidente Prudente

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Abstract**—** *Pandemics, such as that of COVID-19, affect a large number of people, imposing new rules and social habits on them, aiming to modify the behavior that influences economic and social problems. In this context, the objective of this study was to be investigative, using the DEA tool (data envelopment analysis), seeking the efficiency of proposed and economic measures, seeking to assist them and also public policies in improving planning, trying to avoid problems such as those caused by the current pandemic. This is a cross-sectional and quantitative study, of an exploratory nature, carried out with data from the 10th. Region of the state of São Paulo, based on municipalities with 10,000, or more, inhabitants in the time interval from 05/03/2020 to 05/05/2021. This work is justified by the fact that the COVID-19 pandemic exposes structural weaknesses, economic differences and bottlenecks in the Brazilian health system, especially the lack or uneven distribution, in the territory, of health professionals and health professional, infrastructure, as well as limited production capacity, poor income distribution, the human development index and, still, the glaring differences in the GDP of the municipalities. It has been noted that 53% of the municipalities are deficient and that only 47% of them are above the average ideal efficiency rate of 0.823150. It is concluded, in this work, that the economic and social factors need to be better addressed and that social distance, the use of masks and personal hygiene must be encouraged by the representatives of the public power, in order to avoid a greater number of deaths.*

Keywords**— COVID-19. Data envelopment analysis. Economy. Pandemic.**

I. INTRODUCTION

The year 2020 brought worries to the whole world. The covid-19 pandemic has caused many difficulties in the lives of millions of people. Many died, many were contaminated and suffered serious consequences, making their lives much more difficult. . In all countries, the poorest people have suffered the greatest impacts, losing jobs and income. The covid-19 pandemic is believed to have exposed and increased economic inequalities everywhere.

It is well known that the COVID-19 epidemic found the Brazilian population in a situation of extreme vulnerability, with high unemployment rates and deep cuts in social policies. Over the past few years, especially after the approval of Constitutional Amendment No. 95, which imposes a radical ceiling on public spending and with the economic policies implemented by the current Government, there is a growing and intense bottleneck in investments in health and research in Brazil.

Pandemics are known as epidemics that spread quickly to different countries and affect a relatively large number of people and, in general, generate consequences of a high level of difficulties for the population, imposing, for the time that they last, new social rules and habits, as

well as mobilizations of different kinds for their containment.

According to data from the World Health Organization (WHO), the outbreak of COVID-19 began in China in December 2019. Since then, it has been reaching different places and populations.

With regard to social aspects, the Ministry of Health issued a series of recommendations to the population, in order to inform them about issues of transmission, prevention and procedures in case of contagion of the disease.

One of the main consequences, in this sense, was the social distance as a measure to prevent the spread of COVID-19, being all she was oriented about the need to leave their homes only in case of extreme need, such as going to the market, pharmacies or health care.

For Wilder-Smith and Freedman, (2020), a distinction must be made between social distance, social isolation and quarantine. The distance, still according to Wilder-Smith and Freedman (2020), refers to the effort to reduce contacts and physical approximation between people in a population, in order to reduce the speed of contagion; isolation as a way of separating people already infected from those who are asymptomatic; and quarantine as a way to mitigate the movement of people who may have been potentially exposed to the disease. However, these three concepts are often used interchangeably, as a way of communicating to the population in an easy to understand manner.

In this work, we investigated, using the DEA tool (data envelopment analysis), how the efficiencies of proposed measures and economic measures could have helped public policies in improving planning and avoided the problems caused by the pandemic.

One of the advantages of using DEA, according to Guedes (2002), is that DEA, as it is a non-parametric evaluation method, has different characteristics in relation to other methods. In contrast to parametric methods, whose objective is to improve a simple regression plan, the DEA individually improves each of the observations, one in relation to the others, in order to determine the efficiency frontier. Parametric and traditional analysis applies the same production function to each of the observations. Therefore, the DEA's focus is on “n” optimizations, in contrast to the parameter estimates of the statistical approximations used by other methods.

In order to ascertain the objectives, the tenth administrative region, based in Presidente Prudente, was taken into account. And, with the help of the choice of main components, municipalities with a population above 10.000 habitants were studied, taking into account, as input, the area in question. square kilometers, which served to analyze social distance; the human development index (HDI), which served to assess the quality of life of the inhabitants; the gross domestic product (GDP), which aims to show the importance of the wealth of the municipality and what consequences they brought to the outputs, such as the number of cases and deaths for the population of the municipalities in studies and how the related studies of these items can contribute to efficient and effective public planning.

This work is justified by the fact that the COVID-19 pandemic exposes structural weaknesses, economic differences and bottlenecks in the Brazilian health system, in particular the lack or uneven distribution, in the national territory, of health professionals and infrastructure, as well as limited production capacity and poor income distribution, the human development index, as well as the stark differences in the GDP of the municipalities.

II. DEVELOPMENT

2.1 COVID-19 in Brazil

COVID-19 is a disease caused by the SARS-CoV-2 corona virus, which, for Wilder (2020), presents a clinical picture that ranges from asymptomatic infections to severe respiratory conditions. According to the World Health Organization (WHO), most patients with COVID-19 (about 80%) may be asymptomatic and about 20% of cases may require hospital care, as they have difficulty breathing. And, of these cases, approximately 5% may need support for the treatment of respiratory failure (ventilatory support).

According to WHO (2020), the first case of COVID-19 in Brazil, was confirmed on February 26, 2020. It was an elderly man residing in São Paulo / SP, who had returned from a trip to Italy. The disease spread quickly. In less than a month, after the confirmation of the first case, there was already community transmission in some cities. On March 17, 2020, the first death from COVID-19 occurred in the country. He was another elderly man living in São Paulo / SP, who had diabetes and hypertension, with no history of traveling abroad. On March 20, 2020, the community transmission of Covid-19 was recognized throughout the national territory.

According to the Ministry of Health (2020) on March 5, 2020, at the beginning of the introduction of the disease in the country, cases were mostly imported and the strategy to contain the epidemic was based on the search and isolation of cases and contacts, to avoid transmission of the virus from person to person, in a sustained manner.

With the increasein the number of cases ofCovid-19 and the occurrence of community transmission, mitigation strategies began to be adopted, seeking to avoid the occurrence of serious cases and deaths from the disease. Such strategies included hospital care measures for severe cases, as well as isolation measures for mild cases and contacts, social isolation and use of gel alcohol with hand hygiene instructions.

2.2 COVID-19 in the study region

The first case of COVID in Presidente Prudente, headquarters of the tenth administrative region, according to the Municipal Health Secretariat, took place on March 6, 2020. This was a 23-year-old girl, a student in the health field in the city of São Paulo .

On March 4, the young woman came to Presidente Prudente and, two days later, began to show symptoms characteristic of the disease. When looking for a health unit, it was found that there was no need for hospitalization and the patient was instructed to remain in social isolation for 14 days.

The patient confirmed with the new corona virus fulfilled social isolation during the 14 days, so she avoided contact with other people during the virus incubation period, as reinforced by the City Hall. From there, there was a need to channel attention to the non-dissemination of the virus.

2.3 Data Envelopment Analysis (DEA)

Data Envelopment Analysis is a mathematical programming tool designed to assess the relative efficiency of production units in a homogeneous set of organizational units, called Decision Making Units (DMUs), which use similar technological processes, to transform the same inputs and product resources, but differ in the amount of inputs used (inputs) and goods produced (outputs) (BANKER et al., 1984; COOPER and SCHINDLER, 2004; RAY, 2004; COOK and ZHU, 2008).

Efficiency is the comparison of the results achieved with the resources used. The more “results” obtained for a given amount of available resources, the greater the organizational efficiency.

According to Fraser and Cordina (1999), the DEA generates a performance analysis system, which explicitly shows the relationship between several inputs and outputs, simultaneously. This is a more consistent multicriterial measure of efficiency than the most common mono-critical indicators used in evaluating the performance of other products.

2.4 DEA models used in research

Two basic DEA models were used as references for measures of technical efficiency at scale: the CCR model and the BCC model.

The CCR model (acronym originating from the authors Cooper, Charnes and Rhodes), also called CRS (Constant Returns to Scale), has as its main property, the proportionality between inputs and outputs at the border. That is, they adopt the hypothesis of constant returns to scale, considering that the proportional growth of the inputs will produce proportional growth of the outputs.

The BCC model (acronym from the authors Banker, Charnes and Cooper) also known as VRS (Variable Returns to Scale), is considered an innovation of the CCR model. It was presented in 1984 (BANKER et al., 1984) in order to analyze economies with variable returns to scale (CHARNES et al., 1978; COOPER and SCHINDLER, 2004; RAY, 2004; LINS and CALÔBA, 2006; COOK and ZHU , 2008; FERREIRA and GOMES, 2009). In the BCC model, the proportionality observed in the CCR model, between inputs and outputs, is not considered. In this model, a DMU will be efficient, if it better takes advantage of the inputs, considering the scale of operation, while, in the CCR model, the DMU is considered efficient, when better to use the inputs, without considering its scale of operation (BANKER et al., 1984).

III. METHOD

This study, according to Yin (2015), is cross-sectional and quantitative, of an exploratory nature, carried out with data from the tenth region of the state of São Paulo, considering municipalities with a quantity of 10 thousand or more inhabitants in the time interval of March 5, 2020 , until March 5, 2021. This research integrates a study by the researcher and scholar in social economic problems with the use of DEA.

The initial part of this study, as reported, began on March 5, 2020 and ended on March 5, 2021. And it is currently underway, with the aim of studying economic measures that will inform and help Brazilian public managers of different regions of the country in decision-making.

For this study, however, we opted for the investigation of some variables that are relevant to its cut. The choice of using the data is due, only, to the use of the tool of main components in DEA to have pointed a great difference in measures of social distance, hygiene in the municipalities with population with more than 10.000 habitants.

IV. ANALYSIS PROCEDURE

The analysis procedure was based on DEA associated with the Integrated Decision Support System (SIAD), due to the versatility of the software in order to reduce the number of inputs, as suggested in Abreu (2004).

According to Martins (2015), to give consistency to the conclusion, the arithmetic average of the standard efficiency of the BCC and CCR models is considered, and the municipalities that present efficiency above the average will be considered with public and growing policies. And the others, with below average efficiency, will be considered decreasing, that is, with inefficient public policies.

Table 1 contains data showing the inputs (population, area, GDP and HDI) and the outputs (cases of infected, percentage and total number of deaths) between March 5, 2020 until March 5, 2021.

Table 1- data for the study of efficiencies

Cidades	População	Área Km^2	PIB/18 (R$) anual	IDH	Casos	%mortos	Mortes
Adamantina	35.111	411.781	1,084.405,13	0,790	2003	2,45	49
Álvares Machado	24.813	347.647	530.717,81	0,758	1009	2,18	22
Dracena	45.847	488.041	720.338,00	0,776	3894	4,16	162
Martinópolis	26.123	1.253.564	496.100,11	0,721	884	3,96	35
Mirante doParanapanema	18.130	1.238.931	345.876,15	0,724	416	3,13	13
Osvaldo Cruz	32.593	247.941	309.960,23	0,776	1278	3,29	42
Pirapozinho	27.021	477.675	950.942,90	0,776	1537	2,54	39
PresidenteBernardes	13,420	749.233	270.320,30	0,757	668	2,84	19
Presidente Prudente	225.271	560.637	7.994.539,21	0,806	15234	2,7	411
Quatá	13.893	651.341	460.246,49	0,738	831	1,56	13
Rancharia	29.821	1.587.498	1.105.058,95	0,751	1895	1,43	27
Regente Feijó	20.394	265.087	710.647,43	0,768	391	6,91	27
Rosana	16.281	741.216	1.195.602,74	0,764	772	1,94	15
Santo Anastácio	21.030	552.876	412.908,13	0,753	572	2,97	17
Teodoro Sampaio	22.914	1.555.803	437.472,13	0,741	1156	1,47	17

Source: Author-Painel coronavírus

Table 2 shows the quantitative of the efficiencies, results found using the BCC model, oriented for input.

Table 2- Efficiency ratios using BCC

DMU	Padrao	Invertida	Composta	Composta*
Adamantina	0,965216	1,000000	0,482608	0,948205
A.Machado	1,000000	0,982059	0,500000	0,982375
Dracena	1,000000	1,000000	0,508970	1,000000
Martinóplis	1,000000	1,000000	0,500000	0,982375
M.Paranapanema	1,000000	1,000000	0,500000	0,982375
Oswaldo Cruz	1,000000	1,000000	0,500000	0,982375
Pirapozinho	0,974085	0,993824	0,490131	0,962964
Pres.Bernardes	1,000000	0,997871	0,501065	0,984467
Pres.Prudente	1,000000	1,000000	0,500000	0,982375
Quatá	1,000000	1,000000	0,500000	0,982375

Rancharia	0,989443	1,000000	0,494721	0,972004
Reg.Feijó	1,000000	1,000000	0,500000	0,982375
Rosana	0,965166	1,000000	0,482583	0,948155
S.Anástácio	0,998074	1,000000	0,499037	0,980483
Teod.Sampaio	0,994126	1,000000	0,497063	0,976605

Source: Author

Table 3 shows the quantitative of the efficiencies, results found using the CCR model, oriented for input

Table 3- Efficiency ratios using CCR

DMU	Padrao	Invertida	Composta	Composta*
Adamantina	0,693596	0,898295	0,397651	0,573715
A.Machado	0,587867	1,000000	0,293934	0,424076
Dracena	1,000000	0,613770	0,693115	1,000000
Martinóplis	0,845757	0,898359	0,473699	0,683435
M.Paranapanema	0,884332	1,000000	0,442166	0,637940
Oswaldo Cruz	1,000000	1,000000	0,500000	0,721381
Pirapozinho	0,750541	0,838660	0,455941	0,657813
Pres.Bernardes	1,000000	0,997871	0,539624	0,778548
Pres.Prudente	1,000000	0,920753	0,500000	0,781381
Quatá	0,769404	1,000000	0,384702	0,555033
Rancharia	0,748173	1,000000	0,374086	0,539718
Reg.Feijó	1,000000	1,000000	0,500000	0,721381
Rosana	0,724886	1,000000	0,362443	0,522919
S.Anástácio	0718857	1,000000	0,359429	0,518570
Teod.Sampaio	0,618928	1,000000	0,309464	0,446482

Source: Author

Table 4 shows the average number of standard efficiencies, results found, using the CCR and BCC models, oriented for input.

Table 4; Averages of standard efficiencies between CCR and BCC

DMU	CCR	BCC	CCR/BCC	Eficiência de escala
Adamantina	0,693596	0,965216	0,718591	Decrescent
A.Machado	0,587867	1,000000	0,587867	Decrescent
Dracena	1,000000	1,000000	1,000000	Crescent
Martinóplis	0,845757	1,000000	0,844332	Crescent
M.Paranapanema	0,884332	1,000000	0,884332	Crescent
Oswaldo Cruz	1,000000	1,000000	1,000000	Crescent
Pirapozinho	0,750541	0,974085	0,770509	Decrescent
Pres.Bernardes	1,000000	1,000000	1,000000	Crescent
Pres.Prudente	1,000000	1,000000	1,000000	Crescent

Quatá	0,769404	1,000000	0,769404	Decrescent
Rancharia	0,748173	0,989443	0,788013	Decrescent
Reg.Feijó	1,000000	1,000000	1,000000	Crescent
Rosana	0,724886	0,965166	0,751048	Decrescent
S.Anástácio	0718857	0,998074	0,720244	Decrescent
Teod.Sampaio	0,618928	0994126	0,622585	Decrescent
average			0,823150	

Source: Author

V. RESULTS

The sample consisted of 15 municipalities that served as a basis for the study of components that assist decisions in public policies.

The municipalities that showed prominence in the efficiency of public policies, in relation to COVID-19, were classified with an average above 0.823150. By this criterion, the municipalities of Presidente Prudente, Presidente Bernardes, Regente Feijó, Mirante do Paranapanema, Martinópolis and Dracena were classified. It is worth mentioning that the municipalities of Martinópolis and Mirante do Paranapanema need a little more attention, because, even though they are above average, they are below index 1, which is considered satisfactory.

The municipalities of Rancharia, Pirapozinho, Quatá, Rosana, Santo Anastácio, Adamantina, Teodoro Sampaio and Álvares Machado were rated efficiently below 0.823150, which presupposes that there is a need for improvement in public policies and that, in a general aspect of this analysis , the municipalities of Alvares Machado and Santo Anastácio need a little more attention from those in charge of public policies, with regard to social actions on COVID.

The equation, in DEA, shows, with assertive property, the existing correlation between the studied items. Some limitations of this study relate to the sample's scope, and it is not possible to generalize the results found here beyond the participants of this study. Generalizations are not possible for the rest of the municipalities in the state or country.

VI. FINAL CONSIDERATIONS

At the moment, public policy decisions must be associated in the quest to save lives, guaranteeing safe, efficient information and providing recovery assistance to infected patients, since the COVID-19 pandemic reached the population in a situation of extreme vulnerability, with very high unemployment rates and low investments in social policies.

Considering that 53% of the municipalities are in deficit and only 47% are above the average ideal efficiency rate of 0.823150, it is concluded, in this work, that the economic and social factors need to be better addressed; and social distancing, wearing a mask and personal hygiene need to be studied and guided by the representatives of the public power, in order to avoid a greater number of deaths; and that the municipalities considered ineffective here will overcome this pandemic period and the others considered efficient will continue to increase efficiency.

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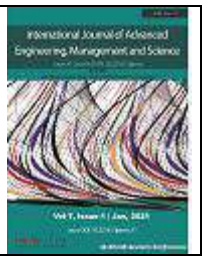

Forms of Water Supply, Conservation and use in Banigbe District, Municipality of Ifangni, Benin (West Africa)

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Abstract— *Rural populations in underdeveloped countries like Benin have difficult access to safe drinking water. This research aims to study the forms of water supply, conservation and use in Banigbé district. The methodological approach revolves around data collection through documentary research; data processing and results analysis. It appears that 88.75% of the 80 households selected for the survey in Banigbé, use at-risk sources (rivers; Private PEA; traditional wells). Only 11.25% have access to water from conventional sources such as the National Water Society of Benin (SONEB) and the Drilling of Human Motric Pumps (FPM). 88.75% of those selected for the survey also said that they do not treat drinking water at any source. It is therefore necessary to improve the quality of the water to which the populations of Banigbé have access to, and this through the disinfection of water from at risk sources and the proliferation of village hydraulic equipment in the district of Banigbé.*

Keywords— ***Municipality of Ifangni, drinking water, water supply, conservation and water resources.***

I. INTRODUCTION

Water is the most important natural resources. It makes life possible and supports human ecosystems and businesses. Water is therefore both a strategic resource and the fundamental building force for a healthy economy (L. Odoulami 1999, p. 17). Some years ago, water allowed the birth of great civilizations in the majority (92%) (World Meteorological Organization and UNESCO, 1997, p. 11). Cities were developed where water was abundant in order to satisfy the then limited social, physiological and economic needs. Humanity has now reached a decisive turning point in the sense that it is now civilizations that are shaping their water resources. Population growth has led to ever-increasing water needs (Mr. Guidibi, 2010, p. 16). Water is inescapably a good and essential to human life, as air does. Access to this resource is now a huge challenge in many parts of the world (WHO 1996, p. 13).

The problems associated with access to safe drinking water in Benin are mainly due to the lack of adequate water and sanitation infrastructure (T. Adjakpa, 2002, p. 41). Nowadays, the issue of water is an integral part of today's major research concerns for improving people living conditions in Benin. The various work of eminent academics such as P. Agbo (2010, p. 17) on water management on Abomey Plateau; H. Totin (2005, p. 14) on water resource management in Southern Benin lies in this perspective. In this context, Banigbé people turn to other alternatives for water. This makes these populations more concerned about access to water and less considering the questionable quality of the water they consume.

II. MATERIALS AND METHODS

2.1. Study area

The district of Banigbé is one of the six (06) districts of ifangni municipality located in southern Benin. It is located between 6° 34' 50' and 6'40' 18' of north latitude and between 2-40' 17' and 2'44' 57' of east longitude (A. A. Logbo, 2020, p. 25). The latter is located in the centre of the municipality and is limited to the north by the Boroughs of Ifangni and Lagbè, to the south by Daagbé

district, to the east by Nigeria and to the west by Ko-Koumolou and Tchaada Boroughs. Figure 1 presents the geographical and administrative situations of the district of Banigbé.

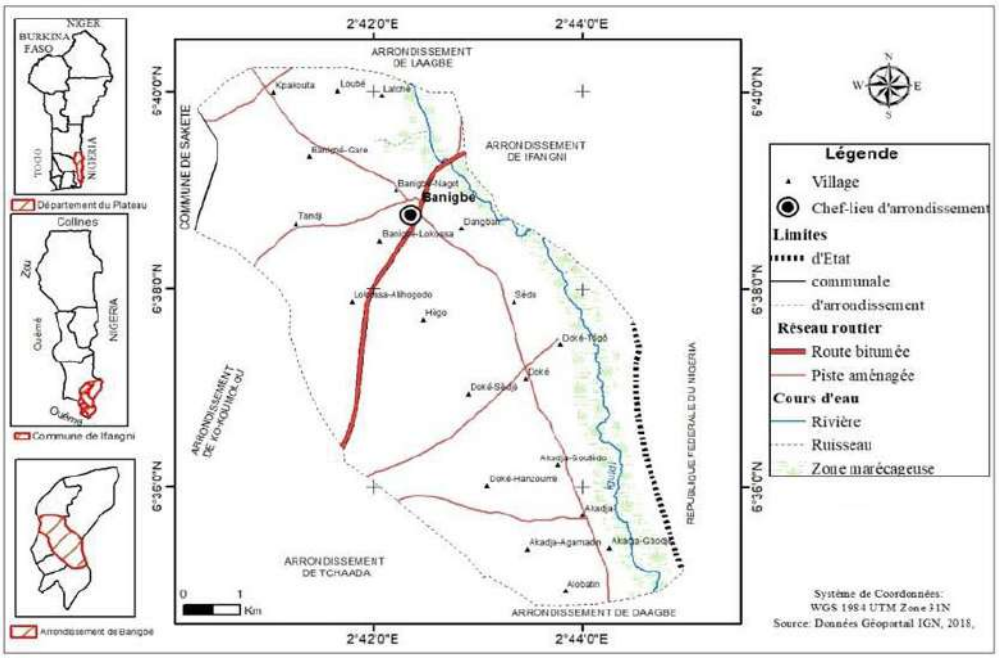

Fig.1: Geographical and administrative location of the borough of Banigbé

Figure 1 shows that the district is divided into eight villages: Akadja, Banigbé-gare, Banigbé-Lokossa, Banigbé-Nago, Dangban, Doké, Hego, Sedo. This closeness of the borough to the big Nigeria promotes various economic activities for which Nigeria is a major market. Indeed, the geographical location of the study area is subject to a wet or Beninian subequatorial climate (A. A. Logbo, 2020, p. 27). It is surrounded to the east by a swamp crossed by a small river and favors the production of off-season crops, market gardening and the setting of nurseries of diverse species. Also, ferralitic soils, clay hydromorphic soils and low-slope soils can be found. Vegetation is dominated by oil palm plantations (*Elæis guineensis*) (A. A. Logbo, 2020, p. 29)

2.2.Data and Methods

2.2.1. Data collection

In one hand, it involved collecting all existing information through documentary research and on the other, carrying out empirical research in the field. In the field, the pre-survey made it possible to know the level of understanding of these populations and provide further clarifications to the latter. The sample size at the level of each village was determined by the probabilistic theory of D. Schwartz (1995).

X - Z-2 x pq/i2 with x - sample size, Zα = 1,96 reduced deviation corresponding to a α risk of 5%; p = n/N with p = proportion of households in each village (n) in relation to the number of households in the borough (N) to which the latter is located, q = 1- p and i = 5 %. A total of 160 households out of the 2853 households in the borough were selected for the survey, a percentage of 5.60%.

The main tools and materials used during the survey itself are: questionnaires that were sent to the main water users (household and restorer). An interview guide was used as a support for the interview of the identified resource persons (wise, village chief, the head of the National Water Society of Benin, agent of the Ouémé/Plateau water service, health worker) and a camera for shooting. Thus, three techniques are used: questionnaire survey with households, interview with resource people and direct observation in the field.

2.2.2. Data processing

As a result of various researches, qualitative and quantitative data were collected: both questionnaires and maintenance guides were manually stripped and the various qualitative data obtained were used as support for analyses following a thematic grouping. Quantitative data has been systematically processed under Microsoft Excel software, which allowed a few tables, graphs, and curves; thanks to MapInfo 8.0 software the maps have been made.

S. Nicholson method (2000, p. 131) made it possible to redeem surplus, loss-making and average years. According to this method, surplus years are those with annual rainfall above 120% of the series average; those with annual rainfall below 80% of the series average are said to be in

deficit; finally, the average years are those with annual rainfall between 120% and 80% of the average in the series.

- The average of the series is obtained by the following calculation:

$$M = \sum Xi/N$$

M: series average

Xi: average annual rainfall

N: number of years of the period

III. RESULTS

3.1. Forms of water supply, conservation and use in Banigbé district

3.1.1. Forms of water supply

The forms of water supply in our rural areas have evolved over time. Given their different variations over time, two main forms stand out in Banigbé district: this is the direct recovery of rainwater and surface water, and the tap of groundwater.

3.1.1.1. Recovery of rain and surface water

Considering the 20-years period (1989 to 2018), the average M=1208.56mm

- **Precipitations**

One of the climatic factors that determine surface water in intertropical areas is rain. Its rhythm and duration determine the seasons during the year.

The district of Banigbé makes profit of sub-equatorial climate still known as beninien climate (A. A. Logbo, 2020, p. 28). It is characterized by a relatively large rainfall exceeding 1600mm at times. Four seasons are distinguished in the study area as follows:

- A heavy rainy season from mid-March to mid-July;
- A little dry season from mid-July to mid-September;
- A little rainy season from mid-September to mid-November;
- A large dry season from mid-November to mid-March;

In recent years, an oversight of climate events made it possible to make the following remarks:

- it is well known to all that the rains start with more and more delay;

- the beginning of the rainy seasons is marked by a period of early rains that gives way to a relatively long dry period, 20 to 40 days without heavy rains and it is only after that the rainy season actually sets in. Indeed, these climatic fluctuations literally distort farmers' predictions and subject surface water to an irregular regime. Figure 2 shows the rainfall regime of the district of Banigbé.

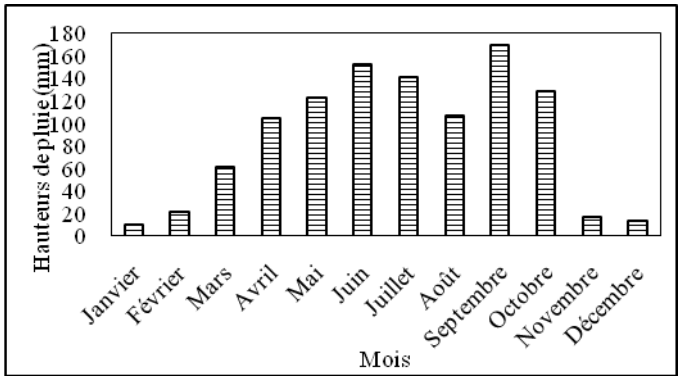

Fig.3: Average rainfall regime in the borough of Banigbé

Source: Weather-Benin, 2019

The rainfall evolution of the borough of Banigbé confirms that we are indeed in a two-mode regime, i.e. two rainy seasons and two dry seasons. Both peaks are in May - July (great rainy season) and September-October (little rainy season).

The various field observations are: regular storage, water tanks, swamp and shallow water.

- **Ordinary storage**

Ordinary storage occurs when cloud clusters condense and rush. Here, the rainwater is of divine origin (from Hêbiosso). During the rainy season, rainwater is a source of water. People are permanently disposed of jars under sheet metal roofs or basins to collect water. This process involves storing water directly as the rain falls.

- **Water cisterns**

In order to collect and store a larger volume of rainwater, some households have installed cisterns in the district of Banigbé.

Water collected by gutters installed under the ledge of the tin roofs is piped to the cistern usually installed in the courtyard of the house. Most of these structures are neglected because of the regular cracking of their cement walls, which causes water loss by infiltration, requiring frequent repairs. The top of some cisterns is carefully closed by a masonry to prevent evaporation and falling of polluting objects into the water; on the other hand, in other households, the cistern is sometimes covered with sheet metal, or simply abandoned in the open air; the most common case in Banigbé district. Plank 1 shows some cisterns.

Plank 1: Partial view of an open-air cistern (1.1) and a tank closed at Dangban Public Primary School (1.2) in the district of Banigbé

Shooting: Yetongnon, March 2019

From this plank 1, the photo (1.1) shows an open-air cistern in a household in Banigbé and the photo (1.2) shows a closed cistern at Dangban Public Primary School. In fact, the storage of rainwater reduces the constraints of the drudgery and helps to conserve water. Households responded that they consume this water until the dry season "Aloun" characterized by the total absence of rain. According to them, the assessment of water quality is based on four parameters: taste, colour, smell, and temperature. Rainwater is "the one with the best quality." Indeed, it is "clear, odourless, fresh and tasteful." It is the most appreciated by the population for consumption and its supply does not require additional displacement. The consumption of water from the first rains would be the source of serious diseases because the water contains a high amount of waste piled on the roofs during the dry season.

- **Waters of the swamps and shallows**

This water is the favourite of the riverside populations. Indeed, the waters of the swamps have received almost the same esteem as the storm water. The swamp waters are odourless, fresh and tasteful. Photo 1 shows a partial view of the river in Dangban.

Photo 1: Partial view of the river in Dangban (Banigbé)

Shooting: Yetongnon, December 2019

Photo 1 shows that the water in this stream, which is used for the consumption by riverside populations, is also used for laundry and swimming. This situation shows the questionable nature of the quality of these waters. According to 86% of the surveys, the swamp waters are used by the population of Banigbé for various activities.

3.1.1.2. Groundwater Capture

Access to groundwater is a tricky process. It is only easy under the conditions of existence of an aquifer closer to the earth's surface. Thus, three aquifer formations can be exploited in this study. Better yet, the Continental Terminal alone contains several localized slicks, but all are unfortunately located at considerable depth (P. Agbo, 2010, p. 17). Nevertheless, people are trying to capture them in order to meet their ever-increasing water needs. Groundwater is exploited through the drilling of traditional wells, the network of the National Water Company of

Benin, the drilling of the Water-Plateau Directorate and the Autonomous/Private Water Points.

3.1.2. Use and conservation of water by people

The results of water from the springs are recorded in Table I.

Table I: Use of spring water by Banigbé Households

Source	Use	
	Anything but drink (%)	All purpose + drink (%)
Wells	2	98
Private PEA	0	100
FPM	0	100
SONEB	0	100
Swamp waters	5	95

Data Source: Field Surveys, October 2019

The analysis of table I reveals that water from private Autonomous Water Points (PEA), Human Motricity Pumps (PMFs), the National Water Society of Benin (SONEB) is used by households for all uses including consumption; while well and swamp water are respectively used 5% and 2% for any use except the drink. What is noticed here is the design of populations on the waters of the Private Autonomous Waters Points (PEA). For the latter, the water of the private Autonomous Water Points (PEA) is drinkable more than that of traditional wells. According to 89% of respondents, they have no idea of the potential risks they face in terms of the consumption of water supplied by these Private Autonomous Water Points (AEPs). Figure 3 shows the water sources preferred by the populations of Banigbé.

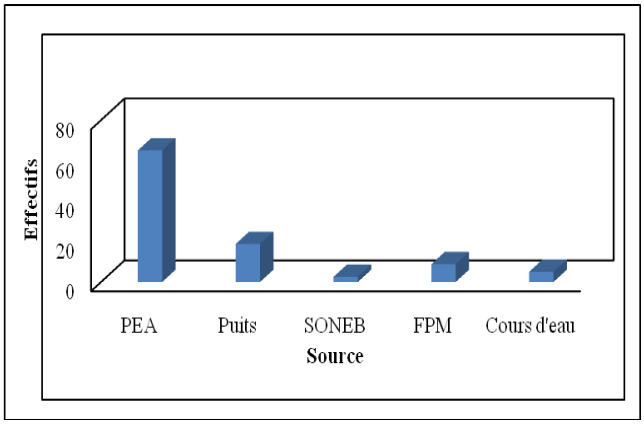

Fig.3: People's preferred water Sources

Source: Field Survey, October 2019

Figure 3 shows that five different water sources are mainly used by the populations of Banigbé for consumption and other uses. Thus, it can be said that private AEPs are the most exploited source by these populations according to 65% of those selected for the survey and that traditional wells are the second source exploited by these populations, a rate of 18.75% of those selected for the survey. Only 2.5%, 5%, and 8.75% of those surveyed said they use SONEB water, streams and PMFs, respectively. People's preference for private AEPs is explained by their closeness to households and also by the ease and speed of its supply. It was also noted that 73.75% of households with a choice between MPFs and private AEPs preferred to source from private AEPs because of the ease and speed of supply.

For some reasons, it had been stated that the water quality of private AEPs, wells and streams of the district of Banigbé was questionable. Indeed, the populations of Banigbé are at obvious risk of frequently contracting waterborne diseases if no prior treatment is done with water before any consumption.

3.1.3. Water conservation by the people of Banigbé

Several means are used by the people of Banigbé to conserve drinking water. Figure 4 shows the different means of conservation.

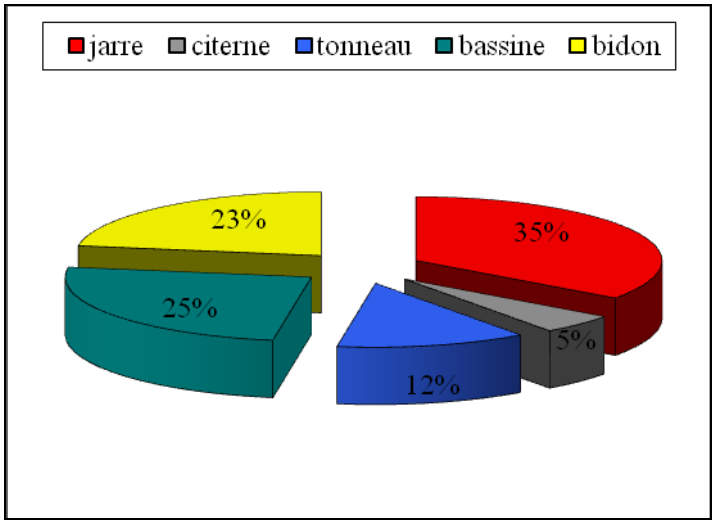

Fig.4: Water conservation methods in Banigbé.

Source: Field Survey, October 2019

Figure 4 shows that jars are the most widely used means of conservation by populations (34% of probes), followed by basins (25%), cans (23%), barrels (13%). Tanks (5%) are also a means of water conservation, so they are not widespread in the borough.

IV. DISCUSSION

This research has investigated the forms of water supply, conservation and use in the district of Banigbé. In fact, the

lack of hydraulic equipment in this district forces people (women and children who return this daily chore) to run through long distances per day before accessing water and often at the level of at-risk sources. This confirms the work of Y. F. Ahehinnou (2016, p. 37) that the problem of scarcity of drinking water and the constant increase in the tap water needed by the populations of the municipality of Abomey, it is questionable. All consumers of drinking water want to urgently meet their need for drinking water. Unfortunately, given its inadequacy and the absence of sanctions that govern the non-compliance with the terms of its management; there are conflicts over the supply of drinking water in some localities in the boroughs. Despite significant efforts and investments made so far, access to water for African populations remains difficult (P. Agbo, 2010, p. 11).

In Banigbé district, the available water resources are generally significant. The average annual rainfall is between 700 mm and 1400 mm. Surface water resources are estimated at 14 billion cubic meters of water and the annual groundwater recharge capacity is estimated at 1.87 billion cubic meters (National Water Partnership of Benin, 2007). But these resources are unequally distributed over the territory and great difficulties are still linked to the supply of drinking water, especially in rural areas. This copes with the research work of M. Guidibi (2010, p. 36) who showed that 56% of the Beninese population have access to drinking water, including 71% in urban areas and 47% in rural areas.

The district of Banigbé is not excluded from this general observation. In fact, the people of the borough cannot easily and fully satisfy their need for water. The surface water resources (courses and water plan) of Banigbé district do not meet expectations and the water tables present are located at high depths. This agrees with the research work of T. Adjakpa (2002, p. 49) who has shown that the poor distribution of water resources is compounded by the chronic insufficiency of hydraulic infrastructure. Most of the existing public works are in total dysfunction. According to LF Videhouenou (2019, p. 43), the service of the National Water Company of Benin (SONEB) only serves a minority of the population because all the inhabitants of the localities served do not have the financial capacity to subscribe. Due to these situations, the populations have no other alternatives than the drilling of traditional wells, cisterns or water holes to collect rainwater. But the water stored in cisterns and water holes cannot meet the needs of the population throughout the year. Also, the water they contain is often unsuitable for consumption because most of them are unprotected or intended to directly collect runoff. This favors the proliferation of water-borne diseases.

V. CONCLUSION

Water is a major economic asset for sustainable development. The district of Banigbé benefits from favorable rainfall distributed according to a bimodal regime. In order to ensure social well-being, its access to all, becomes an inalienable right but unfortunately its access is not always easy and equitable.

The district of Banigbé certainly has a relatively significant hydrological potential; but several factors limit the judicious exploitation of this resource by populations. To address this situation, measures must be taken to strengthen existing hydraulic infrastructure, establish a proper Village Water Network (AEV) and stop the expansion of the phenomenon of private AEPs in the borough. Education and awareness should also be some key actions to be carried out with people on the importance of hygiene at the level of different water sources and possible treatments to be done before any consumption of water from a suspect source such as private AEPs and rivers. This will allow us to combine with the past the various difficulties encountered by people of this district on a daily basis before obtaining drinking water.

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File Conversion Application using Kivy and Tesseract – OCR

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Abstract—*In the fastest developing world education is the most important factor in all over the country. Indian Rural teachers have a great responsibility on their shoulders to educate the students without getting technological support. They face various challenges like network problems, lack of technical skills, the burden of multitasking. In this research, paper researchers try to make an application for Indian rural teachers to fight technical challenges and overcome the burden on them.*

***Keywords*—rural teachers, mobile app, kivy technology, python for android, Tesseract-OCR.**

I. INTRODUCTION

India ranks the second position in the population. Villages are the backbone of India in villages less importance is given to education to encourage people to educate their children for this Indian government introduced various schemes and projects for the students. they look at their health and nutrition for their mental growth. For this Indian government introduced a mid-day meal scheme to feed every student they give their responsibility to teacher who work in rural area . but due to this teachers who work in rural areas get lots of burden of work in challenging situations. Teachers face lots of problems like having to maintain the record of each and every student and keep track of their progress . maintain this data and make a record of every student then to submit this record to the government office. most of the time user stay in no network zone so this app ensure to work smoothly in offline mode also.In the next section of the paper, researchers discuss and try to develop a mobile application for teachers who face the loss of challenge to manage student records with the help of kivy technology and python for android which able to work online as well as offline without getting any disturbance.

II. LITERATURE REVIEW

kivy technology is kind of new technology to the world which world with the advantage of python programming language , kivy is evolution of PYMT (Hansen et. al 2009) project[12] . In their paper, "Developing App for Android and Other Platforms with Kivy and Python" Andreas Schreiber give a demonstration of Kivy- based application and sum-maries Kivy framework[11]

kivy is most well known android supporting python toolkit has been since around 1012. kivy dose not specifically designed for mobile support but it focus on cross platform and supporting novel user interface this properties made it support android , IOS as well as desktop use[8]. it draw its GUI using openGL which working essentially same at all platform.kivy android support originally based on Renpy's Android build tool. it help to Create multi touch user interface and python UI framework for rapid development of mobile application[6] .

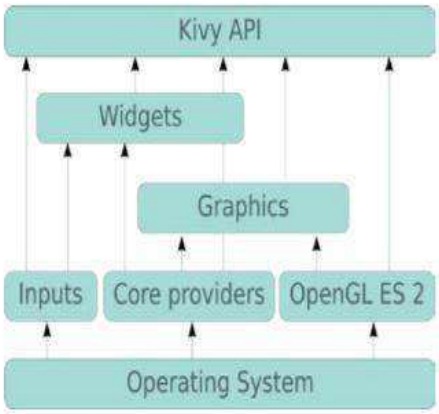

Fig 1. general architecture of Kivy [2] .

III. METHODOLOGY

researchers use secondary data and previous studies, research articles. researchers use observation methods to study challenges that are faced by Indian rural teachers. in order to create system that able to scan and classifies data and manages the record. In our study, we tried to create a mobile application which able to scan and upload and maintain a record of students

The proposed methodology involves :

1. Python Programming Language :-

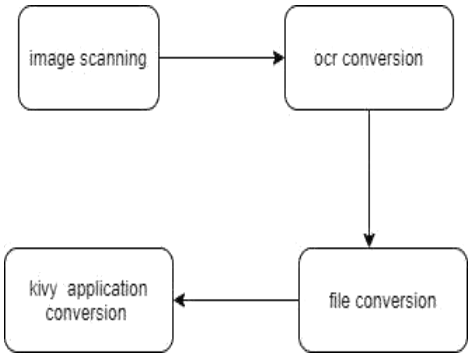

Fig 2. General Methodology

To make the Model and Write the algorithm to implement the File conversion[9].

2. Kivy technology:-

We use the Kivy because its framework which support the python language and its very easy to integrate with python library[2][11].

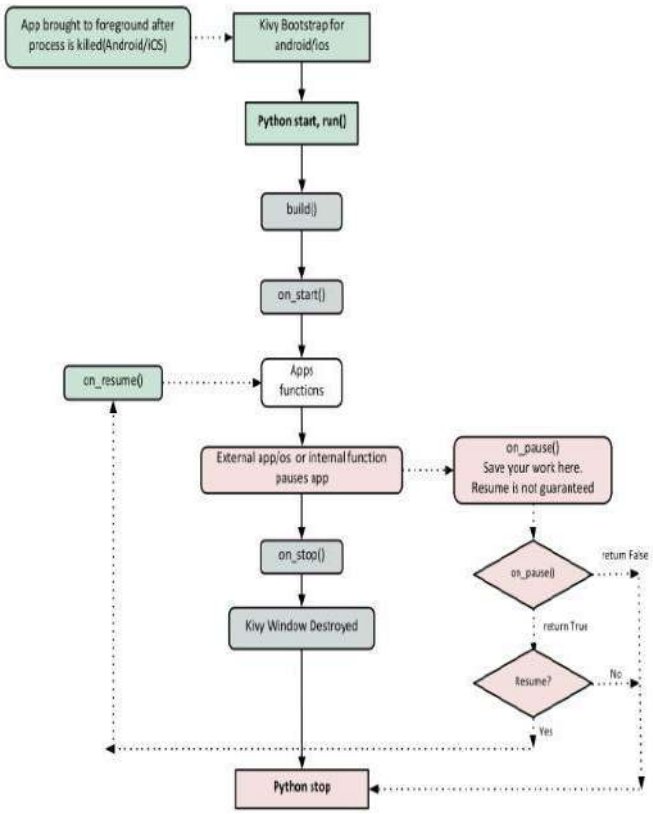

Fig 3. Kivy application life cycle .

A. image Scanning

The research aim to help teachers to minimize paperwork by scanning.the data collection by scanning implement as follows:- we provide image which present in gallery or click new image using camera researchers use:- opencv-contrib-python to get acces to extra modules scikit-image for handling image processing stuff

numpy to handle matrix

imutils to make image processing easier

we convert image form colour to gray scale and then applied bilateral filter for smoothing image

B. Optical Character Recognition

conversion of text into digital format where camera cap-ture photograph and OCR bring them into document format Python tesseract is optical character recognition tool which help to convert chararcters to digital format[4] , tesseract has implemented long short term memory based recognition engine which makes things more faster so researchers took pytesseract for imprt and Scan image[3]. the json responce the ocr image function processimage().json . Aim of Tesseract was to recognizes white on black which help to analysis and recognizes a particular character[10].

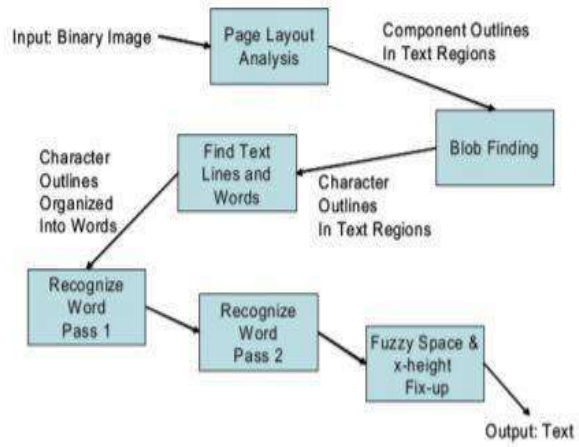

Fig 4. Block diagram of Tesseract

C. Data cleaning And File conversion with help of NLP

The data cleaning process get more complex when data come from some heterogeneous source, these problem has been solved by data cleaning and data transformation, data cleaning modules such as removing columns with less data removing unnecessary rows identifying some valuing and feeling it is done by Python code with the help of machine learning algorithm , most of the data got missing after cleaning then to overcome this used pyspellchecker , Text-blob and Auto-correct[1], this all are open source packages that allow to correct and check spelling , meanwhile by using Text-blob allows us to use custom database it provide simple api for divining into natural language processing(NLP) job

D. kivy application development

We take here a simple example of a minimal application[5][7] :

```
import kivy
kivy.require('1.0.6') # replace with your current kivy version !

from kivy.app import App
from kivy.uix.label import Label


class MyApp(App):

    def build(self):
        return Label(text='Hello world')


if __name__ == '__main__':
    MyApp().run()
```

Fig 5. Sample App

IV. RESULTS

The first test done by developers by using their application, they run test on image which contain some text . the appli-cation identify the document and as output create document from the scan image

Croatian Text Summarizer (CROSUM)

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Abstract. *The paper describes automatic summarization of the scientific papers in Croatian language. The goal of the CROSUM is to generate extracts with high percent of extract-worthiness and about the same size as the author's abstract. This preliminary research shows that extracts generated using the lemmatized wordforms dictionary are not quite different from extracts that are given on the base of the non-lemmatized wordforms dictionary. The research brought us to conclusion that we should develop a technique for identifying use phrases from training corpus or some linguistic technique in order to improve the text summarization for Croatian language.*

Keywords. Text summarizer, Croatian language, extract, inflected language, tfidf words

1. Introduction

Text summarization is the process of distilling the most important information from a source in order to produce an abridged version of a text for a particular user and a task. Given a document, text summarization is concerned with the generation of a shorter version which preserves the meaning of the original text.

The word *summary* is used in a variety of contexts: depending on the input, one can have *single or multiple-document* summaries, while depending on the output one can have *extract or abstract-like* summaries.

So, one of the goals of the automatic text summarization is to automatically generate extracts by selecting salient sentences from the original text. An extract is therefore a summary consisting entirely of the material copied from the input, but the sentences selected are those sentences of a text that are the most representative of pertinent information. The success of such summarization system relies on the use of appropriate features to select the salient sentences.

It is a custom to speak of an extract of n% condensation of input text. More precisely, n% of the input's words may appear in the extract, or n% of the input's sentences may appear in the extract, or even n% of the input paragraphs may appear in the extract.

Unlike an extract, an *abstract* is a summary which re-phrases content coherently and also contains at least some of the material that is not present in the input. In general, abstracts offer the possibility of higher degrees of condensation: a short abstract may offer more information than a longer extract.

Furthermore, depending on the usage, a summary can be *indicative* or *informative*. An *indicative summary* can provide only an indication of the main topics in the input text. Thus, an indicative abstract aims at helping the user to decide whether to read the information source, or not. By contrast, an *informative* abstract covers all the salient information in the source at some level of detail, i.e., it can reflect to a certain extent the semantic content of the input text as well.

Also, depending on the purpose, a summary can be *generic*, i.e., it can reflect the author's point of view with respect to all important topics in the input text, or it can be *query oriented* (also, *user-focused* or *topic-focused*), in other words, it can reflect only the topics in the input text that are specific to a given query.

2. The system for CROatian text SUMmarization - CROSUM

Summarization system can have a lot of different parameters, such as: *compression rate* (summary length vs. source length), *audience* (user focused vs. generic), *relation to source* (extract vs. abstract), *function* (indicative vs. informative), *coherence* (coherent vs. incoherent), *span* (single- vs. multi- document summarization), *language* (monolingual, multilingual or cross-lingual), *genre* (special

27th Int. Conf. *Information Technology Interfaces ITI 2005*, June 20-23, 2005, Cavtat, Croatia

Fig 6. Generated Document

V. CONCLUSION

In this paper, developer tried to provide some information about kivy technology for building an android application for creating and maintaining a record. after application develop-ment developer were able to conduct the following:-

click the image from mobile

Scan and extract the data from image using character Recognition

Generate document and create record of that document Uploaded record

Previously uploaded data is reusable for mentoring and recalling

Offline access of previously uploaded data

VI. FUTURES SCOPE

This Work on the application can be extended upon how it impacts in day to day life as well as with some recommen-dations. On the basis of requirements and technical changes, future changes will be done. the project

can be updated in near future as requirement for the same arises some of the fallowing are the future scope for it

Document conversation without any format limitation . For getting more accuracy AI and ML implementation work is required.

Creation for master database so it can be used for further requirement.

Changes according to Organization requirement.

VII. ACKNOWLEDGMENT

This Paper and research supported by Sardar Patel Institute Of Technology. We thank Prof. Harshil kanakia for comments that greatly improve the menu-script also we thank our faculty who provided insight and expertise that greatly assisted the research.

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