Technological Innovation In Digital Workplaces Across Continents

Dr. Namita Dixit

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By:

Dr Namita Dixit
Assistant Professor
Fortune Institute of International Business
New Delhi

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PREFACE

The technology is ruling us. It is ruling our workplaces. It is ruling our day to day life. The more adaptive we are, the better is it for us to grow and develop not only in our professional accomplishments but by this we will be called as the citizen of 21st century.

In all the disciplines of management, engineering, medicine, transportation, communication….technological disruptions are the buzz word. It is transforming and transiting our lives in numerous ways than we think it is. It is a Global world. The way see the earth from moon. No borders…no inhibitions no countries…no rules…It is just one world.

Technological Innovations in Digital Workplaces across continent is primarily focussing on these few of our task. The way people conduct business have transformed in the last two decades. This has led to increased efficiency and productivity.

The business have gained in this competitive world through increase profitability. Innovative solutions will always keep the business in a highly curve and will help keep the competitors in outpacing. Hence business leaders see it as an 'essential Growth Strategy". Digital Innovation is primarily implementing the latest developments to accomplish day to day task. New way to doing the same thing. The improvisation is continuous. The successful strategy covers the areas such as switching from analog to digital platforms and processes, Implementing new software's and hardware's and wearables, development of new technology, Cloud migration, automation, connectivity and data analytics. Every organisation needs continuous change in practices to improve operational efficiencies. Bring out new products, and customer engagements. With the right people, process and platforms in place, the organisations can drive to create portfolio of disruptive processes, products and services for high value initiatives.

The global workplaces are giving in to these inventions and innovations in a timely phased manner to reap the best of opportunity to their advantages. The absolutely right thing to do…and to be done and much faster rate than one can conceive. "Early bird catches the worm"

ACKNOWLEDGEMENT

The very thought on conceiving this book was exciting. Every now and then many ideas had be worked in a systematic manner to give shape in this form. In every sphere of my life and in every phase I could see technological innovation and interventions It feels like a real accomplishment. I express my heartfelt gratitude to Goddess Saraswati for lighting our path during the entire journey of the book.

I am most gratefully acknowledging the help of many sources in the preparation of this book. It is impossible to mention all of them, as every book on the subject that we have read has left its impression upon our memory. My deepest gratitude to Dr. Tazyn Rehman, my dearest friend, who has always stood by my side, even if it meant working off the track and in dire of the circumstances. That is true friendship. I express our gratitude to all our colleagues, friends and students who inspired us to bring this book and for their valuable encouragement. In this book, various researchers, academicians, teachers and scholars have written their papers/articles during the crucial time. I also appreciate all the contributors from different parts of the globe for their scholarly contribution in giving the shape to this book. I am truly indebted to The Almighty for blessing me with the love and devotion of my family members – Anoop Dixit (Husband) Arushiy Dixit and Aashi Dixit (Daughters) and Ayush Adiraj Dixit (Son) who stood by me during preparation of this book and all the invaluable advices. I am always thankful to blessings of my parents who have made immense contribution to whatever I am today. Their hard work and perseverance has always made be to believe in myself and accomplish the impossible.

Last but not the least express our immense gratitude to Nex Gen Publications for giving the present shape to the book in time. I appreciate your commitment and fast response in publishing this book.

Dr. Namita Dixit

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METHODOLOGY FOR THE FIRE SAFETY CONDITIONS ASSESSMENT AT THE ELECTRIC POWER ENTERPRISE

Evgeniy Vladimirovich Gvozdev
Moscow State University of Civil Engineering (NRU MGSU)
Orcid id: https://orcid.org/0000-0002-3679-1065

ABSTRACT

The article presents a methodologically described, sequential algorithm for obtaining an assessment of the fire safety conditions carried out at a large power enterprise in Russia. The article validates the choice of an analytic hierarchy process, which, by applying a pairwise comparison of factors and alternatives, makes it possible to determine the local priority indicator for each investigated element. The algorithm of sequential actions presented in the article, in the form of a detailed description, allows the quantifiable indicator for each event to be established. The formulation of the problem and its solution based on the established relationships between factors and indicators are presented. The final formula for obtaining quantitative values of the level directly related to the studied factors is presented.

Keywords: Fire safety, factor, appraisal ratio, conformity relation, expert.

1 INTRODUCTION

Research in the area of fire safety (FS) is a scientific area that requires continuous improvement and development due to the human desire to minimize (eliminate) the conditions for the occurrence of fires not only in the facilities of the technosphere, but also in the natural environment. This desire is justified by the occurrence of various hazards in the technosphere, such as fires, resulting in enormous damage annually, not only through material, physical and economic losses, but also through the death and injury of people, suffer of the natural environment around us. It is clear that the current state of affairs associated with the occurrence of fires should be considered as a priority area requiring further research [1-5].

Although the processing of fire statistics at industrial enterprises shows a positive trend towards their gradual decrease, the solution of the tasks related to the identification of factors creating conditions for the occurrence of fires at present and further perspective will be a relevant and necessary aspect. In the analysis of fire statistics at industrial enterprises, a significant share of fires is related to the use of electric power (production, conversion, transformation, transmission, distribution, etc.), making up about 30% of the total indicator [6].

Mosenergo Public Joint-Stock Company (PJSC), one of the major generators of electricity in Russia and fire hazardous enterprise, served as an example for this study. The structure of the Mosenergo, PJSC is represented by power and heating plants (PHP), affiliated to the enterprises of the branch level of subordination.

The heads of any production enterprises of the Russian Federation, when planning measures aimed at improving the management and stable working processes, face the need to solve the following tasks of the enterprise operation safety:

1. Are the fire safety conditions at the enterprise acceptable and compliant?
2. What are the priority measures in solving security problems, what breakthrough modern approaches are effective (best) and what methods and techniques are available to assess the fire safety conditions at the enterprise?

3. Will the results of the assessment be able to develop a forward-looking program that will form a sustainable system of the enterprise operation, which will meet the fire prevention tasks?

In fire safety management of the enterprises, many proven methods aimed at minimizing (excluding) fire occurrence conditions are applied. However, in this direction, further studies are required to assess the state of the existing enterprise fire safety system operation.

2 CHOICE OF RESEARCH METHOD

It has long been known that not only intuitive considerations should guide the choice of research method, it is necessary to focus on the choice of a directional vector in the researcher's a priori ideas of the physical essence and regularities of the studied object. The purpose of the performed paper is to present a methodological approach to the assessment of the fire safety conditions at the Mosenergo, PJSC for its further improvement.

Given the fact that the analyzed system is a complex mechanism, involving the electric power enterprise resources (personnel, financial, material, technical, etc.) with its links and relationships in the management hierarchy, it is proposed to use the analytic hierarchy process (AHP) developed by the American scientist Thomas Saaty [7].

The proposed method makes it possible:

1. To analyze the task to be solved. It is performed using the construction of data ordered hierarchically, which will represent the indicators and their relationship:

a) To achieve the main target indicator (main criterion) when assessing the fire safety rating,

b) To determine the factors affecting the rating,

c) To determine the characteristics of the ties between the elements under consideration, which affect the output characteristics of the studied indicators.

2. The AHP allows to determine the deviation values in the results obtained from experts, which requires a revision of judgments between experts.

3. The AHP solves the tasks of synthesizing the results, which significantly strengthens the results of the summary criteria indicator.

4. Through the AHP application, it is possible to organize a problem discussion and choose various options to reach a consensus.

5. The chosen method makes it possible to assess the importance of each decision and factor affecting the decision priority.

6. The AHP makes it possible to assess the sustainability of a decision as a characteristic of a promising development of the criteria target indicator.

Such immense potential of the proposed method allows to give specific numerical characteristics to the considered characteristic descriptions of the used factors.

3 RESEARCH OBJECTIVE

In mathematical terms, it can be formulated as follows. It is necessary to find an output parameter in the form of an analytical expression (y) based on its determinants $(x_1, x_2, ...x_j, ..., x_n)$, that is, to find a function

$$y = f(x_1, x_2, ..., x_n) \qquad (1)$$

With the help of which the data between the output and input indicators will be reproduced in the form of dependencies, where it will be possible to define and consider the characteristics of the influence of the arguments on the investigated function. To obtain the results of the influence, it is necessary to collect fire occurrence statistics for a certain period of time, for example, for several years. Then, on the basis of the data set for the study, it is necessary to form the enlarged blocks related to the causes of fire, approved in Appendix 2 of the Order of Ministry of Emergency Situations of Russia No. 625 dated 24 December 2018 "On the formation of electronic databases of fires and their consequences". Next, it took a characteristic description of the blocks and their reduction to an unambiguous mutual correspondence in the form of a matrix denoted by A painted element by element, which looks like this:

$$A = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_n \end{array} \begin{bmatrix} A_1 & A_2 & \cdots & A_n \\ w_1/w_1 & w_1/w_2 & \cdots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \cdots & w_2/w_n \\ \vdots & \vdots & \vdots & \vdots \\ w_n/w_1 & w_n/w_2 & \cdots & w_n/w_n \end{bmatrix} \quad \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{bmatrix} = n \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{bmatrix}, \text{ where (2)}$$

$w_1, \ \cdots, \ w_n$ – they are related to weights calculated in the form of natural numbers (from 1 to 9) representing the exact numerical value;

n – - the total number of alternatives considered in the sample related to the rank of the matrix.

The importance of influencing the achievement of the objective by each element in the matrix sample is determined by solving the equation:

$$\left|A - \lambda E\right| = 0 \qquad (3)$$

It is required to determine the maximum number and vector q

$$\lambda = \lambda_{\max} \qquad (4)$$

$$\left|A - \lambda_{\max} E\right| \bar{q} = 0 \qquad (5)$$

The represented (3-5) is solved by Newton's method, and the zero approximation is found as the geometric mean

$$\bar{q} = (q_1, q_2, q_3, ..., q_n) \qquad (6)$$

$$q_1 = (q_{11}, q_{12}, q_{13}, ..., q_{1n}) \qquad (7)$$

$$q_2 = (q_{21}, q_{22}, q_{23}, ..., q_{2n})$$

.....

$$q_n = (q_{n1}, q_{n2}, q_{n3}, ..., q_{nn})$$

The AHP application algorithm includes the following operations that are meaningful and step-related to the stages described below:

- an operation to form a hierarchy of key target indicators, where the main target criterion indicator is set at the top and key factor indicators are subordinated to it;
- an operation to determine the local and global priorities of the questionnaires analyzed and calculated in the content;

- an operation to check the obtained expert assessment results for consistency (i.e., the determination of the consistency index), which confirm the adequacy of the use of the obtained results;
- The final operation includes the calculation of criteria-factor indicators for the hierarchical top and peaks of the intermediate factor values based on the synthesis of local priorities.

To solve the given problem it is required to carry out a systematic analysis and synthesis of measures of requirements to ensure the required level of fire safety at each PHP separately and the Mosenergo, PJSC as a whole [8].

4 PROBLEM SOLUTION OF THE FIRE SAFETY CONDITIONS ASSESSMENT AT THE ENTERPRISE

Through the application of MAI, it is possible to solve the problems of finding local and global priorities of the studied factors, practically the solution of the problem is realized in a series of following stages. At the initial first stage, the formulated problem statement should provide for the interconnection of the data set in a network or hierarchical form. The main purpose of the object under investigation, which is related to the obtaining of the result of the criterion indicator is placed at the top of the network hierarchical structure. The relationship to the main purpose and the subordinate, mutually related, downstream factors is built through the corresponding levels of factors presented as interim data. Such actions are conducted from the highest to the lowest levels.

At the second stage, there is a need for expert review and prioritization for each level of factors, taking into account the impact of each considered element on the intermediate target. The elements are compared in pairs, taking into account he peculiarities of the influence (more or less) on the higher target indicator. In this case, it is recommended to compare between the elements of the data set in matrix form. The consideration of elements as a symmetric matrix allows to provide a comparative analysis of the influence of the selected target factor on factors-arguments, resulting in a matrix of the following type:

$$A = \begin{pmatrix} a_{11}a_{12}a_{13}\cdots a_{1n} \\ a_{21}a_{22}a_{23}\cdots a_{2n} \\ a_{31}a_{32}a_{33}\cdots a_{3n} \\ \cdots\cdots\cdots\cdots\cdots \\ a_{n1}a_{n2}a_{n3}\cdots a_{nn} \end{pmatrix} \quad (8)$$

The matrix presented above relates to an inverse of symmetry category, thus satisfying the fulfillment of the property

$$a_{ij} = 1/a_{ij} \quad (9)$$

where indices i is the row number and j is the column number associated with the intersection points. In this case, the pairwise comparison matrix takes the form

$$A = \begin{pmatrix} 1 & a_{12} & a_{13} & \cdots & a_{1n} \\ 1/a_{12} & 1 & 1/a_{13} & \cdots & 1/a_{1n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{n1} & a_{n2} & a_{n3} & \cdots & 1 \end{pmatrix} \quad (10)$$

The work of experts on filling in the data of a set of indicators displayed in a matrix form is carried out as follows. At the top, it is written a target indicator that is relevant to all studied data in the matrix and with which the comparative analysis will be carried out in pairs. The names of the elements are written sequentially in both horizontal rows and vertical columns. The matrix blocks are filled only diagonally, where at the intersection of the blocks with the same name of the studied element horizontally and vertically the unit will be placed. The rest of the matrix set blocks are left blank and will contain the results of an expert who justifies them in terms of the features of the influence (more or less) of each considered element on the target indicator recorded for the matrix.

For the expertise, a scale of objective comparisons was developed, in the content of which the characteristics of the influence of the compared elements are considered as a numerical indicator of assessment. In terms of the characteristic description of the influence on the target indicator of the pairwise compared elements, it is possible to establish the following levels of importance of the inter-element influence from the lowest to the highest (equal importance; moderate superiority; substantial or strong superiority; significant superiority; very significant superiority), for which the superiority values are expressed as following indicators (1; 3; 5; 7; 9).

The above levels of importance between the compared elements are represented as odd numbers 1;3;5;7;9, but they can also be expressed as level indicators of the number series 2;4;6;8, which indicates values falling within the interval between the odd importance indicators defined above.

At the third stage, there is a need to verify the adequacy of experts' use of a scale of preferences (relative importance). At this stage, the following condition needs to be taken into account, requiring the agreement of the obtained results from several experts due to possible errors expressed as substantial deviations. Given the fact that, in practice, there is no perfect consistency between several people on the same complex issue, the application of the AHP allows to calculate the assessment of the degree of consistency between experts. To this end, the following consistency characteristics should be taken into account:

- conformity ratio (CR);
- conformity index (CI);
- Random index (RI).

The expression of the presented characteristics is written as:

$$CR = \frac{CI}{RI} \qquad (11)$$

(CI) is expressed using the expression

$$s_j = a_{1j} + a_{2j} + a_{3j} + ... + a_{nj}, j = 1,2,3,...n \qquad (12)$$

The result using formula (12) is then multiplied by the jth exponent of the q_{ij} vector, and so on for subsequent columns

$$p_j = s_j \cdot q_{2j}, j = 1,2,3,...,n \qquad (13)$$

The set of numbers as a sum of p_j reflects the proportionality of expert preferences

$$\lambda_{\max} = p_1 + p_2 + p_3 + ... + p_n, j = 1,2,3,...,n \qquad (14)$$

The deviation from conformity results is expressed by conformity index

$$CI = \frac{\lambda_{\max} - n}{n-1} \quad (15)$$

The conformity ratio (CI) to the mean of the random conformity index (RI) is called the conformity relation (CR), and a value less than or equal to 0.10 is considered acceptable [9].

5 Problem Solution Result of the Fire Safety Conditions Assessment at the Enterprise

As a result of the systems analysis and synthesis, the main factors and their indicators were identified in the assessment of the fire safety level of the enterprise.

Factors (F) to assess the fire safety level include:

F1 - assessment of the organizational and management activities of the enterprise in the field of fire safety;

F2 - assessment of the condition and functioning of physical facilities (structures);

F3 - assessment of the protection systems conditions during the operation of physical facilities;

F4 - assessment of the fire-fighting subsystem;

F5 - assessment of the condition and maintenance of the territory.

The evaluation factor - F1 includes the first-level influencing indicators:

P11 (F1) - execution of fire safety management and reporting documents, provision of the enterprise personnel with information materials;

P12 (F1) - training of the enterprise personnel in the field of fire safety.

The indicator P11(F1) content includes the following lower level indicators P111-P11(F1); P112-P11(F1); P113-P11(F1); P114-P11(F1); P115-P11(F1); P116-P11(F1); P117-P11(F1); P118-P11(F1); P119-P11(F1) with their assigned numbers corresponding to the sequential list of activities presented in the checklist.

The indicator P12 (F1) content includes the following lower level indicators (P121-P12(F1); P122-P12(F1); P123-P12(F1); P124-P12(F1); P125-P12(F1); P126-P12(F1); P127-P12(F1) with their assigned numbers corresponding to the sequential list of activities presented in the checklist.

The factor - F2 includes the first-level influencing indicators:

P21 (F2) – the presence of signs for access to the safe zone;

P22 (F2) – in the area of fire safety, activities related to the space-planning solutions of buildings (structures).

The indicator P21(F2) content includes the following lower level indicators P211-P21(F2); P212-P21(F2); P213-P21(F2); P214-P21(F2); P215-P21(F2); P216-P21(F2), with their assigned numbers corresponding to the sequential list of activities presented in the checklist.

The indicator P22(F2) content includes the following lower level indicators P221-P22(F2); P222-P22(F2); P223-P22(F2); P224-P22(F2); P225-P22(F2); P226-P22(F2); P227-P22(F2), with their assigned numbers corresponding to the sequential list of activities presented in the checklist.

The factor - F3 includes the following indicators P31 (F3); P32(F3); P33(F3); P34(F3); P35(F3);

P36 (F3); P37 (F3); P38 (F3); P39 (F3); P310 (F3); P311 (F3).

The factor - F4 includes the following indicators

P41 (F4); P42 (F4); P43 (F4); P44 (F4); P45 (F4).

The factor - F5 includes the following indicators

P51 (F5); P52 (F5); P53 (F5).

Further, the data were compiled in tabular form (Table 1):

Table 1: Pairwise element comparisons

	F1	**F2**	**F3**	**F4**	**F5**	**Priority vector**
F1	1	A_{12}	A_{13}	A_{14}	A_{15}	q_1
F2	$1/A_{12}$	1	A_{23}	A_{24}	A_{25}	q_2
F3	$1/A_{13}$	$1/A_{23}$	1	A_{34}	A_{35}	q_3
F4	$1/A_{14}$	$1/A_{24}$	$1/A_{34}$	1	A_{45}	q_4
F5	$1/A_{15}$	$1/A_{25}$	$1/A_{35}$	$1/A_{45}$	1	q_5

Where A_{ij} – the values set by experts when completing the table, q_i – the priority vector value, calculated as geometric mean:

$$q_1 = \sqrt[5]{1 \cdot A_{12} \cdot A_{13} \cdot A_{14} \cdot A_{15}},$$

$$q_2 = \sqrt[5]{1/A_{12} \cdot 1 \cdot A_{23} \cdot A_{24} \cdot A_{25}},$$

$$q_3 = \sqrt[5]{1/A_{13} \cdot 1/A_{23} \cdot 1 \cdot A_{34} \cdot A_{35}},$$

$$q_4 = \sqrt[5]{1/A_{14} \cdot 1/A_{24} \cdot 1/A_{34} \cdot 1 \cdot A_{45}},$$

$$q_5 = \sqrt[5]{1/A_{15} \cdot 1/A_{25} \cdot 1/A_{35} \cdot 1/A_{45} \cdot 1}$$

After the local priority indicator is found, the CR represented by the formulas (11-15) is then determined.

The priority vector values for the first and second level indicators are calculated in the same way. To assess the fire safety level of the i th division, each expert completes a table of current indicator values with a numerical value in the range from 0 to 1.

As an example, we shall give the calculation fragments presented in Tables 2 and 3.

To obtain assessments of the first factor - F1.

Table 2: Assessments received from experts

No. of the analyzed influencing indicator	Rating value from expert
*P*111	r_{111}
*P*112	r_{112}
*P*113	r_{113}
*P*114	r_{114}
*P*115	r_{115}
*P*116	r_{116}
*P*117	r_{117}
*P*118	r_{118}
*P*119	r_{119}
*P*121	r_{121}
*P*122	r_{122}
*P*123	r_{123}
*P*124	r_{124}
*P*125	r_{125}
*P*126	r_{126}
*P*127	r_{127}

To obtain assessments of the second factor - F2.

Table 3: Assessments received from experts

No. of the analyzed influencing indicator	Rating value from expert
*P*31	r_{31}
*P*32	r_{32}
*P*33	r_{33}
*P*34	r_{34}
*P*35	r_{35}
*P*36	r_{36}
*P*37	r_{37}
*P*38	r_{38}
*P*39	r_{39}

The fire safety assessment of the i th division (K_{PB_i}) of the Mosenergo, PJSC was determined using the formula:

$$K_{PB_i} = F_1 \cdot P_1 + F_2 \cdot P_2 + F_3 \cdot P_3 + F_4 \cdot P_4 + F_5 \cdot P_5 \qquad (16)$$

Where F_1, F_2, F_3, F_4, F_5 - numerical values of the assessed factors determined by experts using the AHP.

The results of the global priority values obtained as P_1, P_2, P_3, P_4, P_5 indicators were determined by the following formulas:

1. The assessment of the global priority P_1 was determined by the formula

$$P_1 = P_{11}(P_{111} \cdot r_{111} + P_{112} \cdot r_{112} + P_{113} \cdot r_{113} + \\ + P_{114} \cdot r_{114} + P_{115} \cdot r_{115} + P_{116} \cdot r_{116} + P_{117} \cdot r_{117}) + \\ + P_{12}(P_{121} \cdot r_{121} + P_{122} \cdot r_{122} + P_{123} \cdot r_{123} + P_{124} \cdot r_{124} + \\ + P_{125} \cdot r_{125} + P_{126} \cdot r_{126} + P_{127} \cdot r_{127})$$

2. The assessment of the global priority P_2 was determined by the formula

$$P_2 = P_{21}(P_{211} \cdot r_{211} + П_{212} \cdot r_{212} + P_{213} \cdot r_{213} + \\ + P_{214} \cdot r_{214} + P_{215} \cdot r_{215} + P_{216} \cdot r_{216}) + \\ + P_{22}(P_{221} \cdot r_{221} + P_{222} \cdot r_{222} + P_{223} \cdot r_{223} + P_{224} \cdot r_{224} + \\ + P_{225} \cdot r_{225} + P_{226} \cdot r_{226} + P_{227} \cdot r_{227})$$

3. The assessment of the global priority P_3 was determined by the formula

$$P_3 = P_{31} \cdot r_{31} + P_{32} \cdot r_{32} + P_{33} \cdot r_{33} + \\ + P_{34} \cdot r_{34} + P_{35} \cdot r_{35} + P_{36} \cdot r_{36} + P_{37} \cdot r_{37} + \\ + P_{38} \cdot r_{38} + P_{39} \cdot r_{39} + P_{310} \cdot r_{310} + P_{311} \cdot r_{311}$$

4. The assessment of the global priority P_4 was determined by the formula

$$P_4 = P_{41} \cdot r_{41} + P_{42} \cdot r_{42} + P_{43} \cdot r_{43} + \\ + P_{44} \cdot r_{44} + P_{45} \cdot r_{45}$$

5. The assessment of the global priority P_5 was determined by the formula

$$P_5 = P_{51} \cdot r_{51} + P_{52} \cdot r_{52} + P_{53} \cdot r_{53}$$

6 CONCLUSIONS

The relevance of further research in the field of fire safety at Russian enterprises is presented. A reasonable option for choosing the AHP, the research method aimed at obtaining an assessment of the existing system conditions with the aim of its further improvement and development is presented. A sequence of calculations to obtain an assessment of indicators directly related to the ongoing fire safety measures at the Mosenergo, PJSC are formed.

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IMPROVING THE DYNAMIC COMPETITIVENESS OF ENTERPRISES: RESEARCH IN THE FIELD OF TOURISM

Ai Huu Tran
Văn Hien University, Vietnam

ABSTRACT

Enterprises are now facing fierce competition under the pressure of global economic integration. For sustainable development, businesses must improve their competitiveness. In that context, identifying, nurturing, and developing resources to increase competitiveness is an urgent requirement of enterprises. The article focuses on determining factors affecting dynamic competitiveness. Empirical research in the field of tourism has shown that absorptive capacity, adaptive capacity, creative capacity, connectivity capacity, cognitive capacity, and market orientation are the basic components of tourism competence dynamic competition. The article suggests implications for building and improving the dynamic competitiveness of enterprises.

Keyword: competition, tourism, dynamic capacity, resources

1. INTRODUCE

In the context of economic globalization, competition is no longer confined within the country but extends beyond international borders. Vietnamese businesses are facing stiff competition from companies and corporations in the world. Reality has proven that there are many successful companies but also many failed businesses (Terziovski, 2010). To survive and develop, enterprises must improve their competitiveness. Discovering, nurturing, and developing resources to create a sustainable competitive advantage is a prerequisite for any business to improve its competitiveness. Discovering, nurturing, and developing resources to create a sustainable competitive advantage is a prerequisite for any business traditional competitive theory (Porter, 1985) derived from organizational economics argues that industry structure is an important factor in creating competitive advantage. On the other hand, a firm's competitiveness in an industry based on differentiation will not traditional competitive theory (Porter, 1985) derived from organizational economics argues that industry structure is an important factor in creating competitive advantage. On the other hand, a firm's competitiveness in an industry based on differentiation will not last long because it is easy for competitors to imitate (Barney, 1991). However, most of the classical theories of competition have not deeply analyzed the factors that create sustainable competitive advantage. The resource theory developed by Wernerfelt (1984) has overcome the above disadvantage because it focuses on analyzing competition and the difference between enterprises mainly based on the resources of the enterprise. Furthermore, the traditional competitive theory ignores the differences between firms and the dynamic nature of the environment. Resource theory has partially solved the weakness of Porter's (1985) model when looking for sustainable competitive advantage, but is still not aware of environmental fluctuations. Therefore, a dynamic capacity theory is a new approach to help enterprises create and maintain profits as well as competitive advantages in a rapidly changing environment (Ambrosini & Bowman, 2009).

Although dynamic capacity has received attention not only for researchers, but also from managers and policy makers (Nguyen Dinh Tho & Nguyen Thi Mai Trang, 2009; Nguyen Tran Sy, 2013), the majority of Research on dynamic capacity stops at concepts and theories, but there are few empirical studies on this content (Nguyen Tran Sy, 2013). Therefore, the article focuses on synthesizing and building the components of the dynamic capacity of an enterprise. Empirical research in tourism enterprises in the south region will verify the basic components of dynamic capacity in enterprises. The article also proposes a method to build and develop

dynamic capacity in order to improve competitiveness and better respond to the changing environment.

2. Problems with Dynamic Capacity

Traditional competitive theory (the IO model) holds that differentiation is a major determinant of the strategy pursued by a firm. Furthermore, both the IO theoretical model and Porter's theory of competition see industries in equilibrium so competitive advantage is sustainable. This leads to confusion and passivity for businesses in building strategies to cope with the rapidly changing environment. Thus, Wernerfelt's resource theory (1984) was born and then Barney (1991, 2001a) developed through his research. Resource theory states that resources are the main factors that bring competitive advantages as well as business efficiency to enterprises. Resources can be a source of competitive advantage when they meet the following characteristics: valuable, rare, difficult to imitate, and non-substitutable (VRIN). However, in a dynamic environment, VRIN does not last long and therefore cannot be a source of sustainable competitive advantage. Capability is of the essence, and when companies demonstrate the ability to deploy resources to achieve the desired goal, performance improves (Leonard, 1992). At this time, core competencies are the sum of the company's resources and capabilities, which is the company's competitive advantage at a given time. Resource theory has overcome the limitations of traditional competitive theory and is the premise for dynamic capacity theory.

2.1. Dynamic Capacity Definition

Dynamic Capability is a special type of capability, demonstrating "the ability to integrate, build and reorganize the internal and external capabilities of the enterprise while facing changes related to business environment" (Teece, Pisano, and Shuen, 1997). Dynamic capabilities reflect the firm's ability to gain a competitive advantage in a new and more innovative form under historical conditions and current market position (Leonard-Barton, 1992). Dynamic capacity is determined to include 3 basic components: creative capacity, adaptive capacity, and cognitive capacity. Later studies have expanded and identified dynamic capacity with six main components: cognitive capacity, creative capacity, adaptive capacity, cognitive capacity, connectivity capacity, and integration capacity. According to Teece et al. (1997), dynamic competence is "the ability to integrate, build and redefine the internal and external potentials of an enterprise in response to environmental changes". Dynamic capacity is the basis for creating competitive advantages and bringing business efficiency to enterprises. Barney (1991, 2001b) argues that firms can differentiate themselves through dynamic capabilities. Besides, Wang (2007) states that: "Dynamic competencies guide a company's behavior in reconfiguring, innovating and regenerating resources, and most importantly, upgrading and rebuilding core competencies core in response to the environment". Wang (2007) argues that dynamic capacity is not only the process, but it is the agent that creates the process.

Thus, a company's capabilities are often built and developed over time through the interactions between the company's resources. However, most of these definitions do not clearly state the nature and difference of dynamic capabilities from core competencies or capabilities of enterprises in a volatile environment. In this study, we use the definition of dynamic capacity of Barreto (2010, 271): "Dynamic capacity is the potential of enterprises to solve problems systematically formed by trends. Identify opportunities and risks, make market-oriented decisions at the right time, and change its resource base" by this definition, dynamic capacity is a multi-dimensional concept based on environmental analysis, timely decision making, and fundamental changes in enterprise resources

2.2. CHARACTERISTICS OF DYNAMIC CAPACITY

Dynamic Competence is a Specific Identification Process

Ambrosini & Bowman (2009) argue that dynamic competence is built rather than bought and sold in the market, it is composed of components and develops over time. Dynamic competencies emphasize the continual pursuit of reconfiguration, renewal, and regeneration of core resources, capabilities, and competencies in response to environmental changes (Leonard, 1992). Collis (1994) suggested that dynamic capacity is proportional to the change of capabilities. It is the basis for creating competitive advantages and bringing business efficiency to enterprises. Therefore, dynamic capabilities will integrate resources as well as focus on the allocation of resources in the enterprise (Eisenhart & Martin, 2000). One of the main sources of competitive advantage is cognitive competence, i.e., the ability to quickly understand competitors, customers, and the business environment. Cognitive competence is understood as the ability of organizations to learn and manage knowledge. From there, businesses have the ability to recognize and use external knowledge to create valuable new knowledge. Cognitive competence is an important basis for forming competitive advantages for enterprises by effectively applying new knowledge and improving business strategies (Easterby-Smith et al., 2008). Basically, with cognitive capacity, businesses can rely on market information to judge market changes, especially customer reactions (Zhou and Li, 2010).

Dynamic Capabilities Have Universal Properties and Properties

The resources of a business come in two forms: tangible and intangible. Tangible resources such as technology or production processes, factories, etc. Intangible resources such as intellectuals, the art of leadership... Intangible resources are difficult to detect and evaluate, but they often create benefits and sustainable competitive positions. In this article, the author focuses on studying intangible resources in building dynamic capacity.

Dynamic capabilities are composed of resources that fulfill VRIN requirements, such as new product development processes (Eisenhart & Martin, 2000). Wang (2007) suggested that the ability to use abilities "early, quickly and unexpectedly" is the soul that creates a dynamic energy. If a business is viewed as a combination of resources and capabilities, dynamic capabilities emphasize the process of transforming resources and capabilities into outputs in products or services that provide superior value for customers. Barney et al., (2001) argue that the ability to change quickly and to react unexpectedly to changes in the market is a source of sustainable competitive advantage because it is difficult for other businesses to imitate. However, this does not imply that any particular dynamic capability is the same across all firms. For each different business, dynamic capacity can be different in terms of content.

- **Adaptability Ability**

Adaptive capacity is an enterprise's ability to configure and coordinate resources in response to a changing environment (Gibson & Birkinshaw, 2004; Zhou & Li, 2010). With this capacity, businesses can take advantage of opportunities outside as well as a chance to respond to the market quickly on the basis of product innovation (Oktemgil & Gordon, 1997). With the volatility of the economic market in recent years, it is inevitable that companies change direction. Therefore, adaptability has been always the top criterion of employers when evaluating their employees. They believe that employees with these skills will be more creative and flexible in all situations and problems. Possessing this ability, you have gained a lot of advantages over other candidates. On the basis of restructuring and developing assets, the business will improve its ability to meet customer needs in the future changing environment. Moreover, the renovation of the management system, and marketing ability..., will help enterprises maintain and increase their competitiveness (Nguyen Phuc Nguyen & Vu Quynh Anh, 2015). Different businesses will show different adaptability. The research hypothesis put forward is:

H1. Adaptability has a positive relationship with the competitiveness of enterprises.

- **Creative Ability**

Creativity is an important resource in creating competitive advantages for enterprises. The ability to innovate is one of the factors that determine the existence and success of an organization (Nguyen Tran Sy, 2013). A firm's sustainable competitive advantage depends largely on its ability to develop knowledge, create processes, and exploit this knowledge effectively (Fabrizio, 2009). Wang (2007) argues that product innovation, market innovation, process innovation, and behavior improvement are the four factors that affect creative capacity. Moreover, innovative capacity helps businesses create value for products and services better than competitors (Terziovski, 2010) and thereby increases the competitiveness of enterprises. Investment in research and development will be an important launching pad to develop the creative capacity of enterprises. The ability to be creative based on the orientation of learning, applying knowledge, and creating new values is a unique feature of each business when owning it. This is an element that cannot be easily imitated or replaced. The research hypothesis put forward is:

H2. Creativity has a positive relationship with the competitiveness of enterprises.

- **Absorption Capacity**

Absorbability highlights the importance of absorbing external knowledge, combined with internal knowledge to create a sustainable competitive advantage for the company. Cohen & Levinthal (1990), as well as Fabrizio (2009), argue that absorptive capacity is the ability of a company to recognize the value of external information, combined with internal knowledge to create products unique. The public companies with high absorptive capacity demonstrate the learning partners, integrating external information and turning it into their higher knowledge. According to Zahra & George (2002), absorptive capacity is a multidimensional structure consisting of four elements: knowledge acquisition, knowledge assimilation, knowledge transformation, and knowledge exploitation. While these elements are the same for all organizations, owning and developing them is unique to each organization. Moreover, not every organization has this capability, especially in the short term which requires all members of the organization to constantly innovate and collaborate in a learning organization. On the basis of absorptive capacity, enterprises can apply the necessary knowledge to create new knowledge, and fundamentally and comprehensively change the shape of the organization's resources in order to gain technological advantages better technology and competition (Zhou & Li, 2010). The research hypothesis put forward is:

H3. Absorption capacity increases the competitiveness of enterprises.

- **Connection Capacity**

According to Walter et al. (2006), the ability to connect is the ability to create, maintain and use a system of relationships with organizations to take advantage of scarce resources. As the environment changes, membership in an organization becomes essential in both resource mobilization and economies of scale (Adobor, 2006). To increase the competitiveness of enterprises in the value chain, enterprises must not only promote their creative capacity in providing differentiated products and services but also connect to other enterprises in the chain. Nguyen Phuc Nguyen & Le Gioi, 2013). Businesses can combine with suppliers and even competitors in the chain to build a strong network to seek benefits for the whole system (Nguyen Phuc Nguyen, 2012). This combination not only increases resources for enterprises, but also enhances creativity and strengthens the capacity and competitive position of enterprises in the network. This requires businesses themselves and especially administrators to have the ability to cooperate and connect not only in the business field but also to strive to become a factor in the social network. Under the characteristics of Vietnam, this trend is very different

among managers (Nguyen Phuc Nguyen, 2015), it requires managers to be able to take risks, create change, and engage with the net. The research hypothesis put forward is:

H4. Connectivity increases the competitiveness of enterprises.

- **Market Awareness and Orientation**

The capacity of perception and market orientation is the ability of enterprises to receive and process information to predict market changes, thereby giving orientations for businesses (Narver & Slater, 1990); Day, 1994). This capability helps businesses detect business opportunities and barriers based on understanding customers, competitors and environmental factors (Keh et al., 2007). On the basis of building a market-oriented culture, enterprises will create a sustainable competitive advantage (Martin & Martin, 2005). Moreover, through this capacity will increase the marketing ability of the business (Nguyen Thi Mai Trang & Nguyen Dinh Tho, 2004). However, market awareness and orientation are factors in the values and culture of an enterprise that cannot be imitated by one enterprise. The research hypothesis put forward is:

H5. Market awareness and orientation have a positive impact on the competitiveness of enterprises.

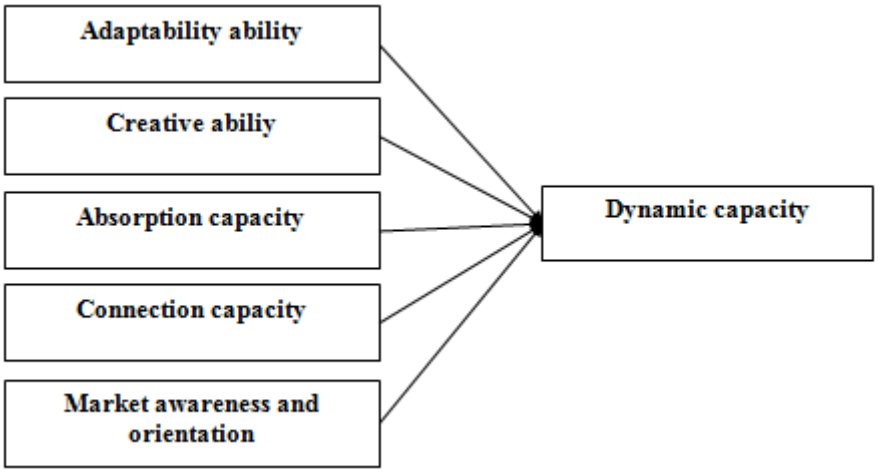

Figure 1: Research model

3. RESEARCH METHODS

3.1. Information Collection and Scale

The study used a survey method to collect data. With the characteristics of the Central region, the study focuses on analyzing the tourism sector in this region. The questions were constructed from previous studies. The questionnaire was pre-tested with 30 managers (who are studying MBA programs at regional universities). Then, based on feedback and suggestions, the questionnaire was revised. The final questionnaire was sent to managers in the tourist area on the basis of random selection from the "yellow pages of Vietnam" with a sample size of 600. Of the 276 questions collected, 14 questionnaires were collected incomplete and a total of 262 questionnaires will be used for analysis. The study uses questions about the type of enterprise (public, private, foreign investment). The study uses the Likert scale for all variables. Especially, for the scale of dynamic capacity, based on the suggestion of Buckley et al. (1998) about competitiveness, the study applies 3 scales of Li & Liu (2014) to measure the capacity, and dynamic the ability to strategically direct, the ability to make timely decisions, and the ability to implement change. The composition, the number of variables, and the origin of the scale are specified in Table 1.

The regression model has the form

DCI = b+a1CCi+a2ACi+a3OCi+a4NCi+a5PCi+ei

2. RESULT

2.1. Check the Reliability Value

The quantification of factors affecting dynamic competitiveness is carried out in 3 steps. First, to confirm the reliability of the scales, the study uses Cronbach's alpha analysis and EFA discovery factor for 6 variables in the proposed model. Next, the author uses the technique of determining factor analysis (CFA) to evaluate the convergence, and discriminant and to check the appropriateness of the structures in the model. Finally, the study uses regression to test the relationship between the variables in the model.

According to Sekaran (1992), if Cronbach's Alpha coefficient is less than 0.6, the scale is said to be unreliable, if it is between 0.6 and 0.8, it is acceptable and if this coefficient is from 0.8 or more to close to 1 is considered a good reliable test.

Table 1: Research variables and scale origin

Element	Number of variables	Scale origin
Creative Capacity (CC))	5	Nguyen Dinh Tho & Nguyen Thi Mai Trang (2009); Deshpandé et al (1993); Huynh Thanh Nha & La Hong Lien (2015)
Adaptive Capacity (AC)	4	Zhou & Li (2010); Homburg & associates (2007)
Absorption Capacity (OC)	4	Nguyen Dinh Tho & Nguyen Thi Mai Trang (2009); Narver & Slater (1990)
Connection Capacity (NC)	4	Adobor (2006); Walter & co (2006)
Market awareness and orientation (PC)	5	Nguyen Dinh Tho & Nguyen Thi Mai Trang (2009); Zhou & Li (2010)
Dynamic ability (DC)	3	Buckley & associates (1988); Li & Liu (2014)

2.2. REGRESSION MODEL

The author uses the regression model using SPSS 23.0 software to analyze the impact of variables on the dynamic capacity of enterprises. The study uses the type of ownership as the control variable. The model results reflect the statistical significance of the model and data. All hypotheses in the model are accepted based on the analysis results. This proves that: creative capacity, adaptive capacity, absorptive capacity, connectivity capacity, cognitive capacity, and market orientation are important components of dynamic competitiveness. This is completely consistent with the suggestions of Nguyen Dinh Tho & Nguyen Thi Mai Trang (2009) as well as Nguyen Tran Sy (2013) in the Vietnam context. With this result, we can see that the dynamic capacity of an enterprise is affected by both internal and external factors, including both tangible and intangible content. Creativity and innovation ability; The ability to adapt to the environment combined with the ability to connect and apply knowledge from the network will form the dynamic capacity of the business. Thus, enterprises can build, maintain and develop this capability through analyzing and reconfiguring resources to create capabilities. When we look closely at the beta coefficient, we find that cognitive capacity, market orientation, and connectivity have the strongest influence on the dynamic capacity of enterprises. With the characteristics of businesses in the field of tourism where businesses must interact with each other in the value chain to provide the highest value to customers, the ability to connect is extremely important. Moreover, under the impact of globalization and deep integration into the

regional economy, the ability to grasp market changes and be sensitive to customers' tastes are decisive factors affecting the competitiveness of business and contributing to sustainable growth. The analysis results also show that the dynamic capacity of foreign-invested enterprises and the private sector is much more dynamic than that of the state sector.

The linear regression results show that the coefficient of determination R^2 is 0.694 and the adjusted R^2 is 0.689. This model explains that 68.9% of the change in the dynamic capacity of enterprises is caused by independent variables in the model, and the remaining 31.1% of the variation is explained by variables other than the paradigm. Therefore, the independent variables all have a positive influence on the dynamic capacity of enterprises at a 95% confidence level.

Table 1: Regression analysis

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	**0.833[a]**	**0.694**	**0.689**	**0.26682**	**0.694**	**129.953**	**5**	**286**	**0.000**	**1.462**
a. Predictors: (Constant), MAO, DC, CC, NC, AC										
b. Dependent Variable: OC										

Coefficients								
Model 0.765		Unstandardized Coefficients		Standardized Coefficients	t		Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.048	0.159		0.299			
	CC	0.097	0.024	0.146	4.082	0.000	0.836	1.197
	AC	0.406	0.033	0.474	12.229	0.000	0.710	1.407
	NC	0.214	0.033	0.244	6.521	0.000	0.762	1.312
	DC	0.114	0.025	0.149	4.486	0.000	0.968	1.034
	MAO	0.203	0.032	0.231	6.344	0.000	0.807	1.239

The preliminary assessment is performed using a scale with Cronbach's alpha reliability coefficient and exploratory factor analysis method, presenting indicators to check the appropriateness of the research model such as F-value, R2, correlation coefficient, variance inflation factor (VIF), and hypothesis testing. Then, we tested the fit of the model, built multiple regression equations, and tested the hypotheses. Finally, we tested the reliability of the scale using Cronbach's Alpha, EFA, CFA, linear regression analysis, and SEM.

- **Confirmatory Factor Analysis (CFA)**

Regarding the overall relevance, factor analysis confirmed that this model has a chi-squared statistical value of 152.215 with 75 degrees of freedom (p = 0.000). The relative chi-squared for degrees of freedom CMIN/def is 2.030 (<0.2). Other indicators are: GLI = 0.937 (> 0.9), TLI = 0.963 (> 0.9), CFI = 0.973 (> 0.9) and RMSEA = 0.059 (< 0.08). Therefore, this model is suitable for market data. This also allows us to say that there is a disorientation of the observed variables. Convergence values and standard weights of all scales are > 0.5 and statistically significant at p < 0.5. Therefore, the scales achieve convergent values.

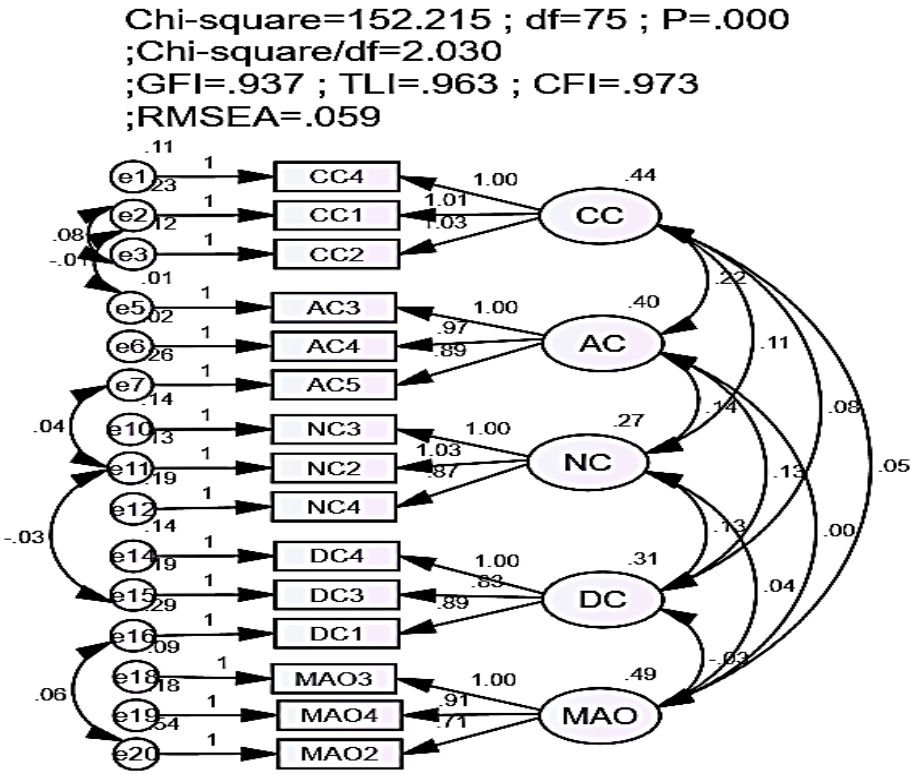

Figure 2: CFA analysis results
(**Source:** Authors' own calculations)

Table 2: Results of estimating the correlations between improving the dynamic competitiveness of enterprises (Source: authors' own calculations)

Correlations			Estimate	S.E.	C.R.	P	
CC	<-->	AC	0.223	0.031	7.257	***	
CC	<-->	NC	0.111	0.025	4.419	***	
CC	<-->	DC	0.080	0.026	3.012	0.003	
CC	<-->	MAO	0.050	0.031	1.631	0.103	
AC	<-->	NC	0.145	0.024	6.107	***	
AC	<-->	DC	0.125	0.025	5.034	***	
AC	<-->	MAO	0.001	0.028	.027	0.978	
NC	<-->	DC	0.135	0.023	5.741	***	
NC	<-->	MAO	0.038	0.025	1.533	0.125	
DC	<-->	MAO	-0.028	0.027	-1.041	0.298	

- **Structural Equation Model Results**

The research model includes 5 concepts, after CFA and SEM testing, there are 5 satisfactory concepts, including 5 independent concepts: (1) Capacity creative (CC), (2) Capacity adaptive (AC), (3) Capacity Absorption (OC), (4) Capacity Connection (NC), (5) Market awareness and orientation (PC). In contrast, a Dynamic ability (DC) is a dependent concept. The results show that this model has a chi-squared value of 226.792 with 114 degrees of freedom (p = 0.000). The relative squared value of degrees of freedom CMIN/def is 1.989 (<2). Other indicators include: GFI = 0.922 (> 0.9), TLI = 0.954 (> 0.9), CFI = 0.966 (> 0.9), and RMSEA = 0.058 (< 0.08).

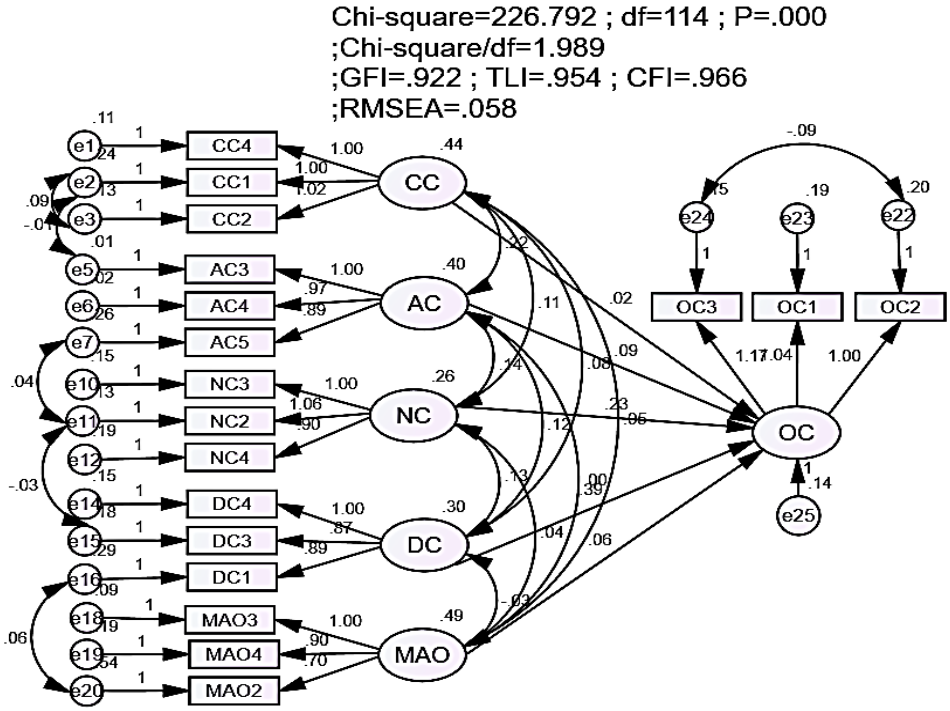

Figure 3: The model structure after final calibration in SEM

Table 3: Results of estimating the causal relationship between improving the dynamic competitiveness of enterprises (Source: authors' own calculations)

	Relationship		**Estimate**	**S.E.**	**C.R.**	**P**	**Label**
OC	<---	CC	0.023	0.050	0.457	0.047	Yes
OC	<---	AC	0.091	0.053	1.702	0.039	Yes
OC	<---	NC	0.229	0.073	3.137	0.002	Yes
OC	<---	DC	0.386	0.071	5.441	***	Yes
OC	<---	MAO	0.064	0.040	1.599	0.010	Yes

The bootstrap method is usually used to test the model estimates, with the pattern repeatedly being N =1000. The estimation results for 1000 samples averaged together with the deviations are presented in Tab. 4. CR has a very small absolute value, thus, it can be stated that the deviation is very low, while also being not statistically significant at the 95% confidence level. Thus, we can conclude that the model estimates can be trusted

Table 4: Results estimated by means of bootstrap, N = 1000
(**Source:** authors' own calculations)

	Parameter		SE	SE-SE	Mean	Bias	SE-Bias	CR
OC	<---	CC	0.059	0.001	0.017	-0.006	0.002	-0.33
OC	<---	AC	0.065	0.001	0.09	-0.001	0.002	-2.00
OC	<---	NC	0.106	0.002	0.229	0.001	0.003	3.00
OC	<---	DC	0.11	0.002	0.385	-0.001	0.003	-3.00
OC	<---	MAO	0.05	0.001	0.062	-0.002	0.002	-1.00

3. CONCLUSION

From a theoretical perspective, the research has clarified the intrinsic factors of dynamic capacity. The research helps us to better understand the competitive nature by analyzing the scarce resources of the organization. How to move the organization's resources on the basis of

maximizing the core competencies of the business is the direction that businesses are looking for. Based on the survey results of businesses in the tourism sector, the research has proven that enterprises can build and develop their dynamic capabilities on the basis of a thorough analysis of its constituent elements: creative capacity, adaptive capacity, absorptive capacity, connectivity capacity, cognitive capacity and market orientation. From there, businesses can plan programs to discover, nurture and develop dynamic capabilities to create competitive advantages for businesses.

From a practical perspective, the research results also imply some contents in increasing the company's competitiveness. Market awareness and orientation become important, especially in the context of fierce industry competition. With the purpose of monitoring competitors' activities and predicting their upcoming actions, businesses can be proactive in building a plan to retain and attract customers from competitors. . Moreover, in the era of economic integration, linking and cooperating with suppliers and customers in the value chain has become increasingly important (Nguyen Phuc Nguyen, 2012; Nguyen Phuc Nguyen, 2015). Through this, businesses can improve and enhance their creative capacity to better meet customer requirements (Nguyen Phuc Nguyen & Le Gioi, 2013). Besides, the training and business orientation in entrepreneurship is quite important for absorption. With the entrepreneurial spirit of the leaders, the company tends to expand its business activities through the path of learning knowledge.

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TRANSLATION IN THE GLOBALIZATION ERA

Riccardo Minasi
University for Foreigners "Dante Alighieri" 89125 Reggio Calabria, Italy

ABSTRACT
The globalisation process, which has resulted in major changes in the global economy, has had a wide-ranging impact on contemporary translation. In Translation and Globalisation, Michael Cronin (2003) writes, "If modern reality is inextricably multicultural and multinational, then it seems logical to look at a discipline that has mediation between cultures and languages as a major focus to assist us in comprehending globalisation." In this context, the purpose of this study is to demonstrate how, as a result of globalisation, translation is influenced by the rise of e-commerce and localisation, as well as automation, the rise of supra-national organisations, time restrictions, and the importance of specific languages. The paper's methodology is primarily descriptive. Indeed, the historical circumstances that gave rise to globalisation are briefly recalled, and the relationship between translation and globalisation is described along the lines proposed by several authors, including Denis Thouard, Michael Oustinoff and Joanna Nowicki, Louis-Jean Calvet, and Michel Rochard. The research's main finding is that how translation is done in the ICT era differs from how it was done using pen and paper. In certain institutions, machine translation is highly successful, but in most cases, it is inadequate and needs to be changed. Translation memories are used by large corporations to save money and time. Translation is still an important means of disseminating knowledge. The importance of a few languages in the global translation system puts peripheral languages at risk.

***Keywords**: Automation, globalisation, ICT, localization, translation.*

INTRODUCTION
The process of globalisation has had an impact on many aspects of economic activity, including translation. Cronin (2003: 11) quotes Castells as saying, "The dramatic slump in Western economies in the 1970s, with record unemployment and high inflation caused by oil price increases in 1974 and 1979, led to a fundamental restructuring of economies in the developed world, with a strong emphasis on privatisation and deregulation" (see Castells 1980). The century also saw the arrival of the information technology revolution, which would drastically alter labour habits on a local and international scale. (Castells, 1996, pp. 40–6)

The economy that has arisen during the previous three decades, according to Castells, is informational and global. Because the ability of enterprises, regions, and nations to efficiently develop, process, and utilise knowledge-based information determines their productivity and competitiveness, the economy is informational. The primary activities of production, consumption, and circulation, as well as their components (capital, labour, raw materials, management, information, technology, and markets), are organised on a global scale, either directly or through a network of linkages between diverse economic players.

The IT solutions made available to translators have radically changed their profession's practise because they can now use sophisticated tools to complete their work faster, satisfy market demands, and connect not only to one another but also to large organisations and firms all over the world. From the mid-1980s forward, computers increasingly functioned in networks rather than in isolation. (Castells, 1996, p. 45)

Because of numerous variables, including localisation, translation has become a huge business in the global era. Indeed, one component of e-commerce that is influenced by the globalised economy is localization. Multinationals and significant firms sell their products all over the world and constantly customise them to meet the needs and desires of their clients. The amount

of content to translate, as well as the number of languages involved in the translation process, are significant.

A variety of challenges arise against the backdrop of global market demands and the imperatives of localisation, which will be described in the following paragraphs. One of these concerns is the goal of translation. To put it another way, why do we translate? Is translation merely about translating product documentation quickly in order to meet market logic? Are we content to live in a society defined by translation frenzy, or do we want that this activity remain a human activity with professional standards and ethics?

Other difficulties arise, such as the significance of some languages in the global era and the marginalisation of others. Another point to consider is the difficulty in translating concepts. The problem of communicating medical concepts in the European Union is emphasised by Joanna Nowicki and Michal Oustinoff (2007).

The availability of computers and software designed to align words and sentences between a source language text and a target language text is good news for terminological investigation nowadays.

Cronin asserts in Translation and Globalisation that translation should not be seen solely in terms of quality or instruments used to expedite the process. It should be promoted to the status of a scientific discipline. To support his point of view on this matter, he says:

Languages are defined by their differences, hence translation as a process involving two or more languages has significant bisociative potential. It may be argued that more time should be spent in translation studies classes emphasising the epistemic peculiarity of translation as reflected by the ideas of distance, nomadicity, and bisociation. [...] Such a perspective leads to a re-centering of translation studies as a contemporary discipline that is both a field of study with distinct professional concerns and a discipline whose potential value for other areas of human inquiry is startling, albeit often underestimated. (Cronin 2003, p. 127)

The nomadic nature of translation stems from translators' repeated forays into the culture of the target language before returning to the source language. There is always a back and forth movement.

Translators are people who translate ideas from one language to another. This is a difficult activity since concepts are not universal and meaning is not isomorphic across languages. The two languages involved contribute to translation's bisociative nature. Every language is a cultural artefact in and of itself. When translating a term, you correlate it with one or more terms in the target language and ensure that the conceptual areas of the term are carried over in the translation. Finding the exact match of a word or concept in the target language is not always easy.

Cronin compares translation to pilgrimage when it comes to the concept of distance. According to him, pilgrimage is the movement of people toward relics, whereas translation is the movement of relics toward people. It is simpler to bring the relics to the believers rather than the relics to the believers. This notion is illustrated through a story given by Norwich:

Two merchants arrived in Venice with a corpse in AD 828. The body, however, was not just any old body, but that of St Mark the Evangelist. They had removed the saint's mortal remains from his tomb in Alexandria [...] (Norwich 1983: 28–9). After all, it was preferable to transport the relics to believers rather than have vast numbers of believers journey great, unpredictable distances to the relics, or, as Brown puts it, "to the relics."

In late antique and early mediaeval piety, translations – the transport of relics to people – rather than pilgrimages – the movement of people to relics – take centre stage.' (Op. cit., p. 90)

Globalisation is another notion that is involved in the topic and has to be defined. What exactly is globalisation?

DEFINITION AND SCOPE OF THE TERM "GLOBALISATION"

According to Roland Robertson, "globalisation" refers to "both the compression of the planet and the amplification of global consciousness." (Robertson 1992, p. 8)

According to Jonathan Friedman, "globalisation is about processes of attribution of meaning that are global in nature" (Friedman 1995: 73).

According to Cronin, globalised institutional structures are one manifestation of globalisation. As such, they constitute a subset of the global system or global process that describes, in a global setting, the construction of center/periphery structures, their expansion, contraction, fragmentation, and re-establishment across cycles of shifting hegemony (Cronin, 2003: 74).

Cronin asserts that, in order to avoid confusion in the face of a plethora of meanings, A proliferation of terminology can lead to discrimination in debate, but it can also lead to misunderstanding. We shall use the term "globalisation" to refer to a critical theory of globalisation that includes global movements and exchanges of people, commodities, and ideas, as well as a political-historical approach to changes in global processes. (Ibid)

Cronin examines the conditions that should be put in place to attract global investors in his book. A favourable fiscal environment, for example, is required. There is a favourable fiscal environment [...] as well as a commitment to neoliberal ideological beliefs (Brooks 2000: 50).

The implementation of neoliberal economic policies is important to international investors. According to Cronin, Ireland pursued neoliberal economic policies in the late 1980s, attracting a large number of overseas investors. From the late 1980s through the early 1990s, successive Irish administrations pursued an aggressive privatisation and deregulation programme, particularly in the transportation and telecommunications industries. (Op. cit., p. 84) Another feature of globalisation is the decentralisation of capital accumulation from the centre, as well as the formation of new tiny centres.

The transition from what Scott Lash and John Urry (1994: 2) refer to as "organised" to "disorganised" capitalism involves a dispersion of capital accumulation from the centre, where manufacturing is judged to be too expensive, to various sectors of the global system. As a result, according to Friedman, "new, small, and rapidly increasing centres emerge." Thus far, definitions and/or scopes of translation studies and globalisation have been provided. Now is the time to demonstrate in further detail the key challenges arising from translation in the global era.

The most pressing concerns arising from translation in the age of globalisation

E-COMMERCE AND LOCALIZATION

Localisation is defined by the Localisation Industry Standards Association (LISA) as the process of altering products or services to account for differences in different markets. As a result, adapting, translating, and customising a product for a certain market would be required. This would entail dealing with distinct geographical or cultural norms. We mean conventions such as sort order, keyboard layout, date, time, number, and currency format when we say "local." Localisation may appear to be the same as or similar to translation. Hyde et al., 2009, p. 22. However, the process of localisation encompasses far more than just translation.

Localisation should ensure that the product gives the correct local "look-and-feel" to the local user when they engage with the product. (1) Translation of the product's interface and documentation is one aspect of localization. (2) Colors, images, graphics, and icons: cultural and legal considerations. (3) Rendering (can the text be displayed correctly), fonts (do we have fonts and characters for the language), and bi-directional text in Arabic and other languages are

all required. (4) Locale data: how to show dates, times, numbers, currencies, and other regional information. (Ibid)

The localization industry is distinguished by its ability to respond quickly to market demands. In an interview, Damien Scattergood, Symantec's Localisation Technology Group Manager, stated: "Symantec's Localisation Tools package is Earthworks." It's a moniker we came up with as a result of making our products work globally. 'The Earth is our marketplace' (Localisation Ireland, 2000: 10).

The Norton Anti-Virus programme is Symantec's most well-known product, and rapid response to emerging threats is critical. The answer is not simply technical, but also linguistic. Same-day shipping of products from the United States and Germany is a standard requirement. As Scattergood points out, "we're constantly pushing back obstacles." Time to market is a major consideration. Our tools are heavily focused on automation. I'm constantly on the lookout for edges. If our engineer repeats himself, I want to know why and how our tools can eliminate the repetition.' (ibid:10)

In this discussion of localisation, two factors should be noted: the increasing volume of translation into numerous languages and the necessity to speed up the process to fulfil market deadlines that are extremely tight. Another prominent issue developing from translation in the global period is automation, which will be examined next.

AUTOMATION

As previously stated, the informational economy emerged at the end of the twentieth century as a result of the information technology revolution, which provided the tools or material foundation for this new economy characterised by the use of IT tools and products in virtually all spheres of activity. It is worthwhile to explore how the globalisation movement has affected translation. Cronin emphasises in the following remark that it is impossible to discuss translation in this global day without mentioning information and communication technologies. It is not conceivable nor desirable to discuss modern translation without taking into account the shifting interaction between translators and things, between translation and the technosphere in the informational economy. (2003, page 23)

What does Cronin mean when he refers about the relationship between translators and things? 'By things, we mean all the instruments or components of the object world that translators use or have been influenced by throughout the centuries.' (Ibid., p. 10)

This remark suggests that there has always been a relationship between translation and instruments. In other words, translators have always employed instruments, which include not only ink and parchment, word lists, lexicons, and translation products, but also modern computers and modems. One of the ramifications is that translators, regardless of the realm of translation work, are engaged with a technosphere, whether it is the chirographic technosphere of pen and parchment or the digital technosphere of terminal and Internet connection. According to Cronin (Ibid: 28-29), "the point here is not to promote a purely instrumentalist view of translation and language or a naive form of technological determinism, but to see current developments in the context of a long translatorial involvement with technologies external to the human body." If this is the case, we can understand the relationship between translators and new technology in the informational society as a further stage in the development of an exosomatic dimension to human engagement with translation rather than a schismatic split with a venerable craft tradition.

The goal of this section is not to list all of the IT technologies now available to translators. Suffice it to say that most multinational organisations and enterprises now employ translation software such as Systran, Trados, Lantra, Linguee, and Microsoftranslator. Translation

memories are being used as well. The latter are technologies that reuse already translated text from documents that are being translated. Indeed, in most businesses and organisations, there are ideas and paragraphs that occur in multiple documents. Translation memory recognise these sections and replace them with previously translated texts. Terminology databases such as IMFTERM, ILOTERM, and UNTERM are also available. Multitrans, for example, is a resource for translators. Some software is designed to extract terms from text and match them with their equivalents in target languages. Terminologists utilise this programme because it is their job to give terms and their equivalents in target languages. There are various translators' forums on the internet that allow them to communicate and share ideas and experiences.

Technical documentation for huge systems is created in three different languages (French, German, and English) at three different sites separated by thousands of kilometres in the case of a German corporation like Schneider. The utilisation of IT systems enables both the coordination and translation of distributed information (HofmannandMehnert, 2000: 66).

Cronin reports that in an article on adapting Time magazine for Latin America, Robert Sprung and Alberto Vourvoulias-Bush note how the availability of a high-speed data network and Quark Publishing System software (QPS) allows not only space but time to be manipulated in the global translation industry: "The high-speed network meant that anyone with access to QPS could work in the same virtual office." This enabled for quick file transfers between Time and translators.' Sprung and Vourvoulias-Bush (2000): 25

Calvet has also contributed to the discussion of the difficulties that have arisen as a result of globalisation. In the next lines, we will look at his ideas.

THE GRAVITATIONAL MODEL

Calvet (2007: 45-46) explains what he means by le modèle gravitationnel by stating that there are between 6,000 and 7,000 languages spoken around the world, but only English is "hypercentral." In addition to English, there are approximately 10 "super central" languages, which include Spanish, French, Arabic, Malaysian, and Hindi. When speakers of these super central languages are required to learn a second language, they choose between English and another supercentral language. With regard to about two languages, these supercentral languages play a key role.

Another key point raised by Calvet is that bilinguals, translators, and interpreters are the ones who keep these languages together. He emphasises the importance of bilingualism as the glue that ties languages together. Calvet examines the global condition of translation within this pyramidal frame of world languages and concludes as follows:

In this broad context, one can examine the global translation situation: which languages are being translated and to which languages are they being translated? Using the notions of centre, Johan Heilbron (1999) & de périphérie empruntées à Wallerstein, a therefore studied the flow of book translations as a global system based on the premise that the more one translates from a specific language, the more central that language becomes. He also points out that roughly 40% of all books translated in the world are from English [...] Followed by the French, the German, and the Russian, each accounting for 10% to 12% of all translations... According to Heilbron, less than 5% of books published in the United States and Great Britain are translations, whereas between 10% and 12% are in Germany and France, between 12% and 20% in Spain and Italy, and around 25% in Sweden and the rest of the world (Ibid : 46-47)

Calvet has recreated Unesco's lndex Translationum, a database dedicated to books translated and published in one hundred member nations since 1979. There are a total of 1,500,000 references (note that these figures are constantly updated). The top 50 target languages, or languages into which translations are performed, are noted. (Ibid., pp. 52-53)

THE CHALLENGE OF TRANSLATING CONCEPTS

Nowicki and Oustinoff handle a tricky issue in translation studies, namely the translation of concepts, in a section titled Traduction, conceptualisation, communication. Concepts are difficult to translate because they are unique to the languages in which they are found. How do you translate a term like pueblo, which in Spanish denotes both city and people? Goldman's paper has been mentioned by these two authors.

Noemi Goldman's article, "A Cross-Cultural Dictionary: The Iberconceptos Project,"» We present a project whose title speaks for itself: "The Atlantic as a Conceptual Laboratory" (1750-1850). The foundations of a historical dictionary of political and social language in the Iberian-American region. [...] The analysis of key socio-political categories such as América/Americanos, ciudadano (citoyen), constitución, nación, public opinion, and so on, demonstrates their variability depending on the country or political-linguistic bloc under consideration. (Ibid., p. 12)

Iberconceptos, a terminological effort for nine Ibero-American countries, indicates that notions such as America, American, citizen, constitution, nation, and public opinion differ from one country to the next. This is a known terminological issue among translators. It is difficult to transmit concepts from one language to another. Because there are no readily available equivalents in the target language, you may not be able to convey the entirety of some notions. Peter Stockinger is another author highlighted by Nowicki and Oustinoff in their work who questions the translatability and adaptation of monolingual text messages and audio-visual resources on the Internet for a multilingual and multicultural knowledge-based market.

The report includes examples of medical phrases to highlight the difficulty in translating them into other European languages. Translation in this context is heavily influenced by the cultural reality of each European country. The globalisation of the English language presents difficulties for researchers who are not fluent in the lingua franca.

ANOTHER LINGUA FRANCA IS REQUIRED

Astrid von Busekist has a contrasting perspective on the usage of English as a lingua franca in Europe in his book "Pourquoi traduire? Les enjeux politiques d'une lingua franca européenne, in which he seeks to challenge the widely held belief that adopting English as the sole language franca would be the most cost-effective and democratic answer. This is not correct: from an economic standpoint, it means shifting the entire weight of language expenditure on non-English-speaking countries; it is also inequitable to the 50 percent of Europeans who do not speak English. Several communication languages are required in Europe, and the author advises drawing inspiration from India's experience. (Ibid., p. 13).

According to this viewpoint, the usage of English as a lingua franca in Europe requires non-English speaking countries to shoulder the costs of language operations. As a result, there are requests throughout Europe for different languages to be used in order to correct this unfairness.

The discussion in the following paragraphs will centre on translation as a feature of global citizenship.

TRANSLATION AS A CHARACTERISTIC OF GLOBAL CITIZENSHIP

Translation is regarded as a feature of global citizenship in Translation and Globalisation since it is only via translation can people grasp the cultural and aesthetic productions of other linguistic communities. Cronin cites Delanty (2000), who claims that citizenship is no longer defined just by nationality or the nation-state. However, how do speakers of minority languages keep their identity in a world dominated by homogenising forces?

If minority language speakers are major consumers of translation products (even if only to make sense of the world in their own language), how do they maintain their identity in a world subject to a variety of homogenising forces? (Cronin 2003, p. 6)

Several difficulties have been identified so far in the context of the interaction between translation and globalisation. We will make some recommendations in the following section.

DISCUSSION AND SUGGESTIONS

Redefining translation's goals and ethics

Cronin is correct in raising concerns regarding the purposes of translation, stating that "we may be producing (and translating) more and larger quantities of knowledge, but we may not know what to do with it." (2003, pp. 65-66) He claims that traditionally, translation training has been focused on the means, with the ends manifesting themselves primarily in terms of functional appropriateness. In other words, trainee translators are shown what they need to translate (meaning) and who they are translating for (what is the aim, purpose, target, skopos or end of the translation). It is arguable that in a global and informational age, what has to be equally stressed in translator education is a characterization of the aims of translation – but in a manner that goes beyond the simple enunciation of the functional objectives of texts." (Ibid) Ends are to be interpreted broadly in terms of the role of translation in modern world culture, economy, and body politic.

Cronin also makes an essential point: "Translation studies cannot be taken seriously as a science if all it has to offer is an expanding number of fast-track methods to maximise translation productivity and quality." They are more likely to listen if those outside the discipline (and those within it) see translation engaging with questions that are truly important for humanity's past, present, and future. (Ibid., pp. 2-3)

Cronin's point of view on translation endings is right. People must understand that translation is more than just a mechanical procedure in which the quantity of pages translated in a given amount of time is all that matters. Translation should be regarded as a scientific profession at the crossroads of many others. For

In the context of translation studies, for example, there is a need to teach terminology, translation history, corpus linguistics, and other sub-disciplines. Some of these sub-disciplines' importance or relevance to translation studies will be examined further below.

THE EVOLUTION OF TRANSLATION

In a study titled «Problématiques de traduction à l'heure de la mondialisation», Joanna Nowicki and Michal Oustinoff also examined the relationship between translation studies and globalisation. The authors of that paper emphasise that while the term traductologie was coined in the Francophone world by Canadian national Brian Harris in the early 1970s, the internationalisation of the discipline coincided with the development of translation studies in the Anglophone world beginning in the 1980s (Venuti, 1995).

The term "transtology" (which is attributed to Canadian Brian Harris) dates back to the early 1970s in the francophone world, but its internationalisation coincided with the spectacular growth of Translation Studies beginning in the 1980s (Venuti, 1995) in the anglophone world. Their significance should not be underestimated, as the title of Michail Oustinoff's paper suggests: "Translation Studies and the Translator's Tournant," but only if they are considered alongside other viable approaches. Nowicki and Oustinoff (2007)

Nowicki and Oustinoff also cited a paper by Denis Thouard in which he describes translation as a major issue and a bridge between languages. This viewpoint was originally voiced by Romantic Movement supporters in Germany, particularly Wilhelm von Humboldt.

Globalisation, in their perspective, only emphasises the importance of taking into account the diversity of languages in intercultural conversation and the necessity to build bridges.

Denis Thouard's article, "Points of departure: Language Diversity, Translation, and Understanding," fits into the hermeneutic and translational worldview developed by German romantics (see Berman, 1984), particularly Wilhelm von Humboldt. In this context, where language is more than just a tool for thought, translation becomes a critical issue. The globalisation only emphasises the importance of taking into account language diversity in intercultural dialogue and, as a result, the need to find "points of passage." Nowicki and Oustinoff (2007)

Naturally, Joanna Nowicki and Michael Oustinoff have taught us about the history of translation studies and Traductologie. Translators should be familiar with this information about their profession. The history of translation may teach us a lot of things. Another historical lesson is the significance of translation in Arab countries in the ninth century.

Calvet recalls the function of translation in the introduction of science to Arab countries. Science texts were translated into Arabic from Greek, Persian, Syriac, and Sanscrit, according to Ahmed Djebbar, who was reported by Calvet. Hippocrates, Euclide, Archimede, Appolonius, Heron, and other authors had their works translated. Princes paid translators to translate works by Aristotle, Euclid, and Ptolemy into Arabic.

When reading Ahmed Djebbar's (2001) book on science in Arabic, one is struck by the fact that the translation accompanies the story of this science, both before and after its splendour, or, if one prefers, before and after its disappearance. Let us use medicine as an example. It is obvious that the Arabs did not originate it, but that it arose from earlier research, such as that of Hippocrate and Galien, as well as Persian and Indian physicians who were its forefathers. Djebbar writes: "In Mesopotamia, medical instruction was given in Syriac, [...] it was based primarily on six books by Galien and twelve books by Hippocrate, which had been translated into Syriac in the fifth century [...]." Throughout the eighth century, new works of medicine were written in syriac. (Djebbar, 2001, pp. 304-305).

The first medicine books were produced in Arabic in the 9th century, thanks to a legacy of translations from Greek, Sanskrit, and Syriac into Arabic.

When the first medical texts were written in Arabic in the ninth century, their authors relied on a strong tradition established through translations from Greek, Syriac, and Sanscrit; primarily from Syriac, but also from Greek texts translated between the sixth and seventh centuries and then retranslated into Arabic.

[…] The same is true for geometry: Euclid, Archimède, and Appolonius are translated from Greek to Arabic, as are Euclid, Archimède, and Héron's physical texts. […] These translations are first and foremost the work of the prince: Al-Mansour (754-775), Haroun al-Rachid (786-809) and Al-Ma'moun (813-833) translate Aristotle, Euclide, and Ptolémée, as well as Indian astronomers and physicians. Calvet (op. cit., p. 49)

After introducing science to Arab countries in the ninth century, translators went on to translate scientific books from Arabic into Hebrew and Latin in the 12th and 13th centuries. «There have been several translations of Arabic works into Latin, sometimes via Hebrew. Professors in European universities founded at the end of the 18th and beginning of the 19th centuries not only taught Hippocrate and Galien, but also Arab physicians. (Djebbar, 2001, p. 329)

Calvet's conclusion from the history of translation and science in Arab countries, and later in European colleges, offers a lesson for us. Translation is a mode of knowledge and information

transmission. Translation was crucial in introducing science to Arab countries in the ninth century and in exporting it to European countries beginning in the 12th century.

LINGUISTICS OF CORPORA

Corpus linguistics is another area of study that should be highlighted in translation studies. It is possible to do terminology research in this topic. The availability of computers and enormous amounts of text in digital form allows for terminological investigation to be conducted as part of translation research. This is a branch of linguistics known as corpus linguistics. What exactly does this concept entail?

According to Kennedy, a corpus is "a collection of texts in an electronic database" (Kennedy, 1998:3). And corpus linguistics is a combination of technology and linguistics, since it is described as "the study of language based on text corpora" (Aijmer & Altenberg, 1991:1).

Corpus linguistics has recently emerged as a reliable source of real linguistics data and language statistics. It also provides rapid data processing, sorting, and searching, direct access, time and procedure reduction, and the capacity to govern a large number of language data (Kennedy, 1998:5).

According to Johansson, when used correctly, corpus becomes one of the most crucial tools for professional translators (1991:313). Indeed, many technical and scientific terminology are encountered by translators in various publications, yet they are difficult to translate. What should you do in these circumstances? The best thing to do is to look up the concept in the original language text. Indeed, there are two issues: gathering information on the notion and determining a valid designation for the term in the target language. Translators should avoid the temptation to hunt for an equivalent of the term under consideration in a terminology database rather than looking for information on the concept that the phrase indicates. It is pointless to use a proper denomination if you do not understand the concept to which it refers.

Another source of concern for Joanna Nowicki and Michal Oustinoff is the issue of terminology and corpora, as well as the way translation is done mechanically on the Internet. They cited Peter Stockinger in this way.

In his paper "Des archives audiovisuelles monolingues sur un site multilingue," Peter Stockinger emphasises the fact that a reductive, mechanical view of translation cannot be satisfied. At a time when we are witnessing the creation and dissemination of increasingly large corpora of textual and audiovisual content on the Internet, the question of adaptation (both linguistic and cultural) of monolingues intellectual works to a "knowledge market" that has become massively multilingual and multicultural through the use of TIC is becoming increasingly urgent. (2007, pp. 11-12)

ECOLOGY OF TRANSLATION

According to Cronin, language pressures should not be considered solely in macro terms. Though a language like English clearly has its own hegemony in late modernity, with special translation effects, the issues experienced by many minority languages stem from national rather than international languages. As Herman Batibo observes of Africa, the world's linguistically richest continent, "the largest threat to minority languages in Africa is not the presence of colonial languages, but the domination of the powerful indigenous lingua francas" (Batibo2001: 312).

That is the current state of affairs in the world. As a result, decisions must be made in the political, academic, scientific, and cultural realms to prevent language loss and irrelevance.

CONCLUSION

In a nutshell, the globalisation process has a significant impact on translation. Some of the topics covered are e-commerce, localization, automation, English globalisation, terminological challenges, speed, and market time.

As previously said, in the age of globalisation, translation is performed utilising IT tools that speed up the process. A large number of texts can be translated quickly, especially with software and translation memories. However, English is the most widely used language in the modern era. As a result, a large number of documents are translated from English into a variety of other languages. This predicament jeopardises the survival and usefulness of thousands of languages around the world. It also depletes English because there isn't much translation from other languages into English.

Translation is a significant means of transmitting and disseminating information and knowledge. As a result, it is a profession that must be practised by qualified individuals. To avoid the simplicity and haste with which translation is done for commercial purposes in the age of globalisation, we are tempted to suggest a return to the fundamentals of translation. One question that comes to me is, "Can we translate the Bible or medical documentation at the same rate that commercial materials are translated today?"

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NEXT LEVEL OF LABORATORIES FOR JOINING TECHNOLOGY

Shahram Sheikhi Konstantin Bronstein, Eduard Mayer and Azadeh Reise
HAW Hamburg, Department for mechanical engineering, Research and transfer center 3i;
Berliner Tor 13; 20099 Hamburg

ABSTRACT

Joining technology is an interdisciplinary module that based on competencies from subjects such as materials science, electrical engineering and construction. Due to the number of students and the limited resources, practical knowledge was not imparted to the same quality for all participants. Along the laboratory exercises, students and instructors are confronted with challenges due to smoke gases, sparks, noise, obstructed vision, noise and acoustics etc. In the summer semester of 2020, the pandemic situation led to a fundamental redesign of the concept of the laboratories for joining technology. Different formats such as explanatory videos, virtual tours, augmented reality and digital live presentations developed into an overall concept for the laboratories. The redesigned laboratories consist of three interlinked pillars in which students will be supported by online video tutorials explaining different welding technologies. They succeed the online tutorials by passing an online test. The next pillar is A live demonstration laboratory in which students do interact with instructors and is ended by an online test too. Finally, students have the possibility to do participate at on-site presence laboratories, doing virtual and real welding. The concept showed a balanced mixture of digital events and laboratories in presence may lead to a better outcome in comparison with classical laboratories prior to the summer semester 2020.

Keywords: Online Laboratories, Welding, Augmented Reality, Robotic Welding

1. INTRODUCTION

Studying at universities for applied sciences is generally appreciated due to their more emphasize on practical orientations. Particularly because of the laboratories which transfer the theoretical background of the lectures into the practical exercises. However, this image of teaching cannot always be maintained, due to the huge number of students and limited available machines and staffs. Joining technology is an interdisciplinary module that based on competencies from subjects such as materials science, electrical engineering and construction. The laboratory units contribute to the application and deepening of the theory with practical exercises in order to provide a better understanding about different processes of joining. Due to the number of students and the limited resources, practical knowledge is not imparted to the same quality for all participants. As shown in figure 1 a laboratory group consists of up to 15 students who were expected to observe, listen and understand the interaction between process, handling and types of errors within practical demonstrations.

Figure 1: Typical laboratory for welding

During the laboratory exercises, students and instructors are confronted with challenges due to smoke gases, sparks, noise, obstructed vision, noise and acoustics etc. In particular, the visual impairment and the poor acoustics were identified as the main parameters for the inadequate transfer of knowledge from instructors to students. Due to the size of the group, the students cannot fully experience the practical demonstration. Only the few students who have a clear view by being at the very front line while welding are able to follow the exercise. A welding mirror or a welding helmet must be worn during welding to protect the eyes. As a result, the arc can be observed without endangering the eyes, however phenomena such as the distance between the torch and the torch guidance are not sufficiently recognizable. The Environment would be blurred by the evaporated smoke gas during welding. This means that important explanations can only be partially observed by the students. To carry out the laboratory exercises, the ventilation system must be switched on to evacuate the smoke gases. The resulting background noise and the noises that occur during welding make it difficult to understand the explanations and made the instructor stressful. The instructor explains the important aspects while welding. He wears a welding helmet to protect his eyes. His Voice may muffle by the helmet and overlaid by the background noise. Accordingly, only the very attentive students in the immediate vicinity of the instructor can pick up all the important information. Despite the difficulties in the practical transfer of knowledge, the laboratories are elementary components of applied instructing and are highly valued by students. The outcome of these laboratories will be magnified by the intelligent integration of digital tools. The pandemic situation in the summer semester of 2020 accelerated the need to develop and integrate digital tools as a part of the laboratories.

2. STATE OF THE ART

Laboratory events are an essential part of many scientific programs. By them, the students should become experienced in handling devices, machines and chemicals. Abilities in analysis, creativity and teamwork skills are also learned in the laboratory (Mohammed, et al., 2020). Due to the corona pandemic, universities and colleges are forced to hold all courses online, including laboratories. While lectures can be held as online events without major changes, the switch from face-to-face to online laboratories is proving to be very difficult. The students do not have the opportunity to carry out physical experiments on the real test stand themselves. In a survey by the HMT Rostock, 80% of the predominantly scientific lecturers stated that they perceive "practical tests and experiments" to be particularly limited by online teaching (Figure 1). In addition, 17% of them fear that most students will be significantly behind in learning (Krämer & Hammerich, 2020).

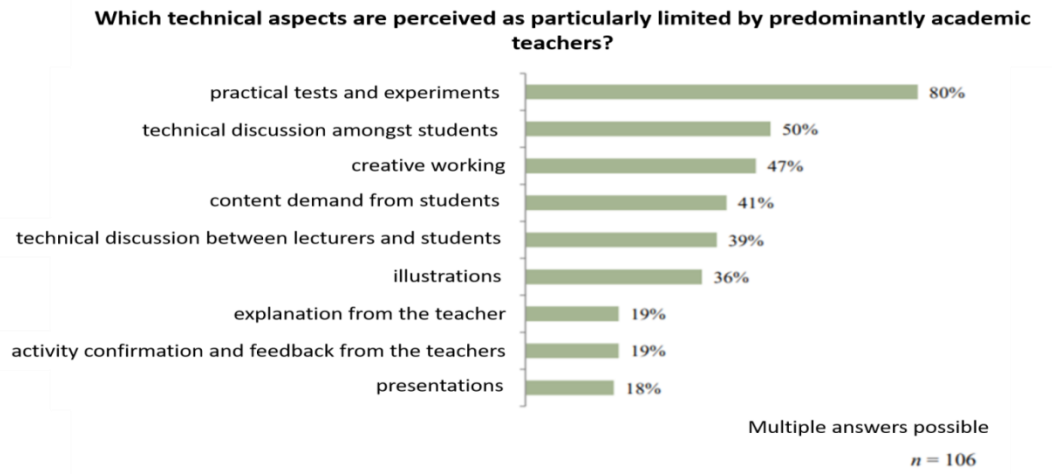

Figure 2: Evaluation of predominantly academic teachers at the HMT Rostock

Remote laboratories, simulations, live streams and videos are offered to replace face-to-face laboratories, but in some cases, the laboratories are canceled entirely and must be made up for in the next face-to-face semester. The latter can even lead to an extension of the entire course. In the interests of the students, online laboratories are of course better than no laboratories at all, even if they cannot experiment themselves. Although skills imparted in practical use of the laboratory equipment must deliver to the students in a very precise way, such as videos or simulations. In the following, various types of online laboratories are presented which have already been integrated into universities and colleges. Then a concept for the implementation of welding laboratories is developed.

FLIPPED LAB

To support the learning process, the flipped lab concept was used even before the Corona period. A large part of the follow-up work is postponed till the preparation in order to impart more prior knowledge to the students and to strengthen the learning effectiveness (Figure 2) (Burdinski, 2018).

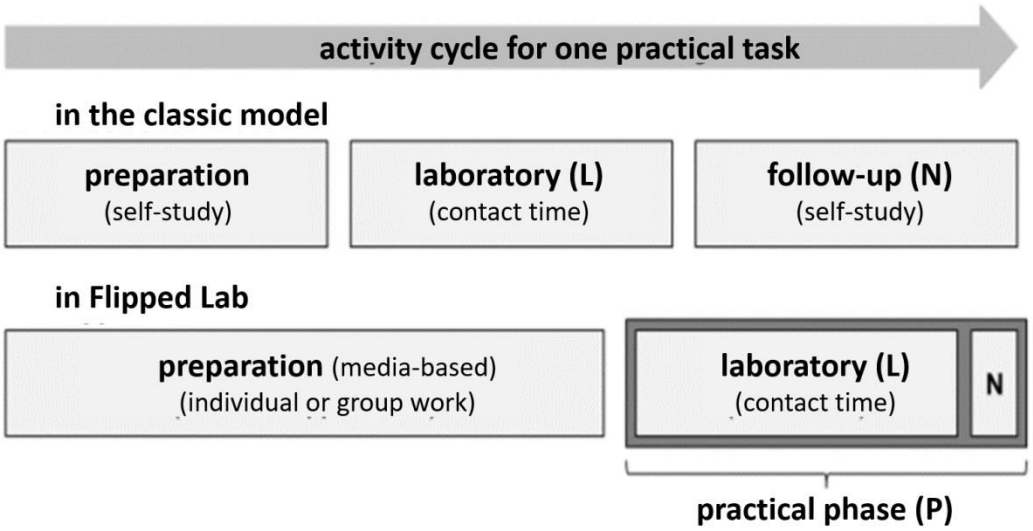

Figure 3: Laboratories in the classic model compared to the Flipped Labs

While classical laboratory preparation usually only consists of studying written experiment instructions, various media are used in the flipped lab. In addition to detailed test instructions, learning videos, self-developed operating instructions, online forums and electronic tests are used to prepare the students in detail. The shortened follow-up phase is connected directly to the end of the laboratory session (Burdinski, 2018). For this purpose, debriefings can easily be carried out online (Burdinski & Schifftler-Weinle, 2020). However, this leaves open to find out how the laboratory itself will be carried out. A combination of different methods of remote laboratory, simulations, live streams and videos would be ideal. The Flipped Lab was implemented in several courses at the TH Köln a few years ago. Burdinski, (2018) find out an increase in learning motivation that resulted to subjective gain in competence through the extensive and varied preparation phases.

SIMULATION

Simulated laboratory experiments are another method that enables students to do experiment for themselves. With the virtual representation of the experiments, the laboratory comes home, so to speak. This concept also has the advantage that the students can repeat the experiment independently and at anytime of the day. At the same time, however, it is only a model representation of the real experiment (Burdinski & Schifftler-Weinle, 2020). The students do

not have the experience of experimenting on real machines and the measured values can also differ greatly from real values. Sources of error from the real laboratory are eliminated and the students do not learn how to deal with incorrect measured values. In addition, special software usually have to be installed in order to carry out the experiments. Doing so, there would be an assumption of having an applicable computer or a comparable device.

LIVESTREAM

If the laboratory is to be carried out on real devices, a live stream is ideal. The students cannot carry out the experiment by themselves, but they can observe the real one. In contrast to pre-produced videos, the advantage of live stream would be that the students can ask questions directly and, if necessary, even affect the experiment. For the staffs, a live stream is associated with comparatively little adjustment effort. They can carry out the laboratory test as usual. It is advantageous to install several cameras in order to offer the students the best possible picture. In addition to the experimenter, some of staff should be present to monitor the chat. He can forward questions and requests from the students to the researcher (Burdinski & Schifftler-Weinle, 2020).

VIDEOS

Similar to a live stream, the students can also watch pre-produced laboratory videos. This has the advantage that the videos can be viewed multiple times at any time. Several videos can also be shot on different aspects of the experiment, and the videos can be edited and cut. For example, long waiting times when experimenting can be skipped, machine noise can be muted, slow-motion recordings can be made, etc. For the scientific staff, this is a lot of work at first, but the pre-produced videos can be used over several semesters. The disadvantage of this method is, that the students cannot ask questions during the experiment. Questions will be answered later by the lecturer via email, however, questions can be answered much more clearly through laboratory tests. All students would also receive the same measured values and test results. This can be circumvented by sending individual measured values to each student (Burdinski & Schifftler-Weinle, 2020).

REMOTE LABORATORIES

Students can control laboratory devices from home via internet using predefined gateways.

The experiments can be followed live via video transmission and real measured values would be determined (Burdinski & Schifftler-Weinle, 2020). In electrical engineering remote laboratory VISIR (Virtual Instrument Systems in Reality) is used for several years. Figure 4 shows a virtual breadboard, the circuit of which is transferred to real hardware (Oertelt & Terkowsky, 2021). In addition to the feasibility of conducting real experiments from home, VISIR offers some advantages through them the students can use the virtual switchboard to be prepared for the experiment, based on which they can carry out additional experiments independently at any time of the day (May, et al ., 2020). It is even shown that the interactivity and repeatability of remote laboratories can increase the learning motivation of the students (Mohammed, et al., 2020).

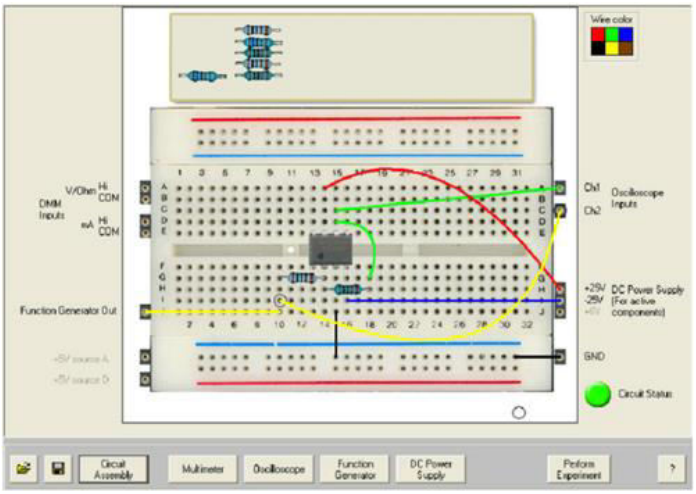

Figure 4: VISIR switchboard

The greatest advantage of a remote laboratory in comparison to video or live stream laboratories is that students can conduct an experiment themselves instead of just watching. However, technology may cause some problems, for example students must be equipped with a computer and servers with sufficient computing power.

3. DESIGNED SOLUTION

The pandemic situation in the summer semester of 2020 required a fundamental redesign of the concept of the laboratories for joining technology. As part of student projects, an overall concept was developed to optimize the transfer of knowledge and overcome the above mentioned challenges and restrictions according to the pandemic situation. Different formats such as explanatory videos, virtual tours, augmented reality and digital live presentations were developed into an overall concept for the laboratories. The redesigned laboratories consist of the following interlinked pillars:

1. Virtual laboratories + learning outcome online tests

2. Online presence laboratories + protocol + learning outcome online tests

3. On-site presence laboratories: Welding using augmented reality and real welding

For the first and second pillar, a trained laboratory staff is needed to use and integrate cameras and microphones. Moreover, the cameras and microphones used must be suitable for the special environment (brightness, noise, smoke, heat, sparks, etc.) of welding. In particular, it is revealed that a self-focusing camera is the most problematic one during welding, as the videos became unusable due to the automatic focusing. On the other hand, fixed focus cameras are not precise enough when close-up shots had to be shown. The brightness of the welding process is another challenge to recode digital laboratory materials (offline or online videos). Using a filter would reduce the brightness and make the welding process watchable, however, the overall view of the welding process is thereby impaired or hindered.

As already explained, welding by-products such as smoke and radiation as well as brightness require the use of a welding helmet. This protects the instructor during the practical demonstration. In addition, the fume extraction must be switched on in order to discharge the welding gases. Both the welding helmet and the smoke evacuation system prevent a sound transmission. In the primary recordings, the instructor's explanations and the characteristic noises during welding were drowned out by the fume extraction system. Also, the type of microphone influences the sound quality of recorded videos. Using a wireless microphone has the advantage of free moving however the disadvantage of sound missing or delay sound

transmission. As a result of the first study there was a need for three cameras and two microphones (both equipped with surrounding noise reduction) to better capture the real welding atmosphere. For the arrangement of the online presence laboratories, a software was necessary to integrate different perspective on one monitor. The freeware software OBS was chosen since it was already used for the theoretical lectures.

The equipment used to produce the videos both for virtual and online presence laboratories are schematically depicted in figure 5. The best quality was produced by having two lecturers (Nr. 1 and 2. in figure 5). The Main lecturer (1) performs the welding and explains issues during welding. Nr. 2 is the assistant lecturer who takes care of the OBS-Software (Nr. 7). He is also responsible for the arrangement of the cameras, their repositioning if necessary, as well as observing the chat monitor. To assure an acceptable video and sound quality there is a need of using three cameras (nr. 4, 5 & 6). The sound is transmitted using a microphone in the helmet of the main lecturer. This way his explanations are clearly understandable. The welding sound was captured by a microphone attached to camera Nr. 4. This microphone with a surrounding noise-canceling eliminated most of the disturbing sound of the fume extraction system.

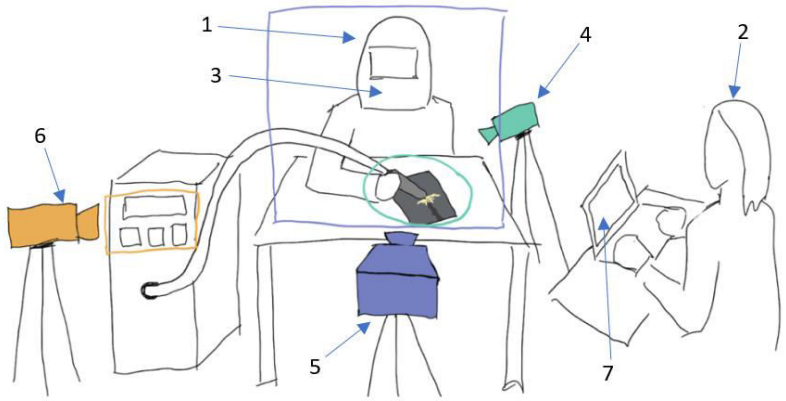

Figure 5: Schematic set up of a welding laboratory

The set up shown in Figure 5 was essential for online presence laboratories, since the students joining the laboratory from home had to clearly see and understand the correlation of the welding appearance and set parameter. Using the chat function enables an interactive laboratory. For the execution of the virtual laboratories the same set up was used.

Within the laboratories, seven main processes of joining are demonstrated and explained. These are as follows:

- Shielded metal arc welding
- Gas metal arc welding
- Tungsten intern gas welding
- Laser welding
- Oxyacetylene welding
- Spot welding
- Soldering

After a certain training of the laboratory staff first digital laboratories presented in June 2020. In the following, the content of the different laboratory types (interlinked pillars) is explained.

3.1 Virtual laboratories

The virtual laboratories have been designed considering parts of flipped lab concept. Especially the preparation part of flipped laboratories has been used for the virtual laboratories. The virtual laboratories are created as self-study and include pre-selected video material, short texts. The basics of each process are explained in five short videos with a length of three to five minutes. The short descriptions enable students a better understanding of the process. For each of the above mentioned processes, explanatory videos has to be produced which is a time consuming step. Therefore, as a first approach, available videos on YouTube had been evaluated. These videos and explanatory texts are presented to the students using a moodle platform of the university. The so-called Emil-Room contains all necessary information for the students for each individual module. Therefore, the necessary files for the virtual laboratories are uploaded in the Emil-Room, available for registered students. The total working load of this part is about two to four hours for the students. The pillar of virtual laboratories is completed with a successfully passed multiple choice test.

3.2 Online presence laboratories

This type of laboratory is designed as a live stream with live interacting students from home. In section 3.1 students got familiar with the basics of joining processes and they theoretically know the correlation of parameter variation on weld quality. The online presence laboratories replace the practical phase of flipped laboratories according to figure 2. Students are asked to suggest the welding parameters and the main lecturer demonstrates the welding and discusses with students visible correlations. He emphasizes certain phenomena of welding such as arc type or formation of silicon nitride, sparks etc. The main aim of this laboratory with a total working hour of 10 is to evaluate meaningful parameters together with the students and demonstrate the result of those parameters. To do so, each semester other/new parameters will be used to produce welds for the live discussion. The live discussion part is moderated by the assistant lecturer as depicted in figure 6.

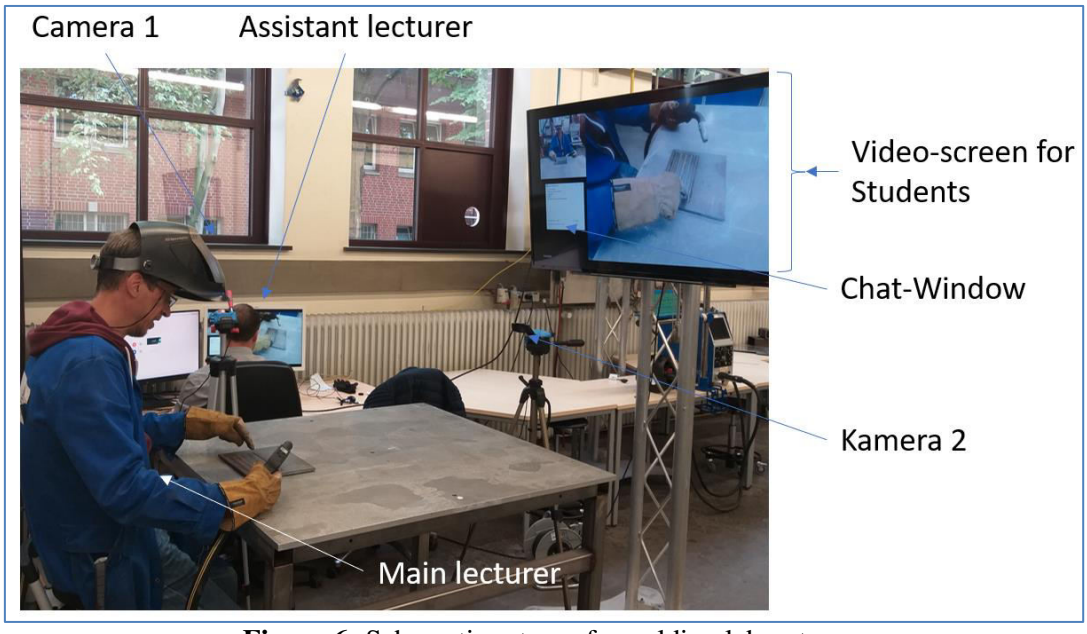

Figure 6: Schematic set up of a welding laboratory

Having the dialogue with students is the essential part of these laboratories. Figure 6 shows the application of the laboratory after performing live welding. The main lecturer asks questions, explains and discusses the results. The assistant lecturer keeps the overview and moderates the

session. This Pillar is successfully passed when students upload their protocols and pass an online test.

3.3 On-site presence laboratories

The on-site presence laboratory is concepted to allow students to do virtual and real welding on their own and experience issues like safety, machinery and handling on their own. It is interesting for them to notice the weight of the torch to understand how to set parameters and to understand that the quality of a weld is very dependent on the mood, fatigue state and so on of the welder. These laboratories represent a further development of the classic laboratories. Since the classic laboratories were appreciated by students it was decided to keep on-site laboratories in a way that students enter and start welding after a short introduction on how to use the machines. This laboratories have a working load of two hours and are only offered if the pandemic situation may allow it.

4. DISCUSSION

The joining technology module consists of 3 hours a week semester lectures and one hours a week semester of the laboratory. Therefore, 15 hours of laboratory work have to be completed by students each semester. The development of the laboratories to the three pillars as above described opened up many advantages for students and for the lecturers.

However, the special condition of welding made it difficult for the lecturer to provide digital content. Creating those contents is a time consuming effort and requires suitable equipment that mostly is not available. Developing the first projects by corporation of students revealed that poor sound and picture quality quickly leads to frustration of the audience (students). The frustration leads to the fact that the videos are not watched to the end. In addition, there is frustration on the part of the instructors, because the administered work is not appreciated. It is therefore important to obtain the applicable equipment (cameras and microphones) beforehand and to carry out appropriate test recordings with smaller groups of students. Another factor to be considered is the fear of the lecturer using “new” media without being trained for. Nonetheless, the development of digital laboratory content for the joining technology module is an existing requirement on the path to the digitization of instructing. However, this requirement could only be implemented when the pandemic situation did not allow the classic laboratories to be carried out. In many modules, homework was given as an alternative to the laboratories and the Internet is the reference of visual material. As a result, the formerly practical course was converted into a theoretical one and led to the frustration of the students. Therefore, it was important to develop the laboratory in a way to cope with pandemic restrictions without compromising contents. The classic laboratories for joining technology were highly appreciated by the students because of the practical demonstrations. However, the students found the theoretical content communicated before the practical demonstrations rather annoying. Since these parts sometimes made up half of the laboratory practice and the students could not make an active contribution. Thus, the virtual laboratories were developed to give the students the opportunity to deal with the theoretical basics of the laboratories in advance according to their own schedule. These basics were supposed as entry requirements for the online presence laboratories. The online presence laboratories are designed as an interactive tool. The laboratory administered based on the active participation of the students.

This resulted in the following advantages:

1. The theoretical content can be practice by the students at their own discretion within the given time (weeks).
2. The online presence laboratories showed individual welding characteristics.

3. The conveyance of the course content was not negatively influenced by the development of smoke gases, the noise level, or the number of group participants.

4. The students have the opportunity to become aware of the laboratory contents retrospectively.

Disadvantages of the new laboratories essentially consist of the following two items:

1. The self-organization of some students is not as advanced as it is necessary.

2. The hoped-for active participation in the online live laboratories did not materialize, as most of students were logged in but did not participate in the chat.

The advantage of the new concept for instructors was that

1. Repetition of course contents was no longer necessary for each group

2. Course content was created in such a way that the laboratory management could be represented more easily.

The disadvantage of the new concept for the instructors is the very inadequate active participation of the students. Activating the students to participate in the chat turns out to be difficult in the laboratory and frustrates the instructors.

The third pillar of the new concept, presence laboratories, is used to ensure that the laboratories could be carried out in smaller groups (5 people) compared to the classic model (up to 15 people). This means that practical instruction content can also be offered in course of pandemic regulations.

5. SUMMARY AND OUTLOOK

Next level laboratories show a way on how to interlink digital contents and classical methods as a concept of one laboratory. During the classical laboratory practice, students and instructors are confronted with challenges due to smoke gases, sparks, noise, obstructed vision, noise and acoustics etc. These challenges are taken with the new concept. It was found that the replacement of laboratories solely with digital content is not expedient for joining technology. Providing the videos or animations does not replace the dialogues with the instructors. In addition, it is important that particularly in the case of dangerous production activities such as welding technology, the students themselves develop a feeling for the dangers (smoke, radiation, noise, combustion, etc.) as well as for the job stress on employees (welders). This experience can only be conveyed through presence laboratories. The concept shows a balanced mixture of digital events and laboratories in presence with a better outcome compared to the situation prior to 2020.

The contents for the virtual laboratories have to be further developed as only for two processes contents have been created. Furthermore, a new method has to be developed to increase the active participation of the students.

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FULLY AUTOMATIC REGENERATION BASED ELECTRIC VEHICLE

L. Baya Reddy [1], Farook SC [2], Vishnu Pavan P [3], Durga Prasad G [4] and Ganga Tejeswar M [5]

[1]Associate Professor, MTech, Ph.D., Department of Electrical & Electronics Engineering, Annamacharya institute of Technology & Sciences, Rajampet,

[2, 3, 4,5]Student, Department of Electrical & Electronics Engineering, Annamacharya institute of technology & Sciences, Rajampet

ABSTRACT

This paper describes the hybrid renewable sources, for instance, the motor-generator set, the chemical tank and the photovoltaic modules utilized to produce power to recharge the electric vehicles (EVs) storage system automatically. The current recharging mechanism of EVs requires recharging stations and it will affect the travelling distance for a long travel. This paper presents a fully automatic regeneration based electric vehicle which automatically recharges the battery packs, therefore, no need to wait for recharging EV's, thereby increases the traveling distance. the output voltage of the motor-generator set is measured for three dissimilar scenarios i.e.; forward, reverse & breaking conditions. The performance of the solar panel had undergone different irradiance levels in the analysis. A series of studies have been carried out for the developed model of EV under different load conditions. The total harmonic distortion (THD) of both the output current and voltage, efficiency, and the coverage distance of the vehicle has been studied. For illustrating the capability of ARM it is compared with commercial charging mechanism including different EV brands. The result indicates that the performance of this EV is satisfactory for recharging the batteries of EVs without involving recharging stations. Automatic recharging of EV increases the usage of EVs thereby immensely reduce the fossil fuel vehicles as a result greatly reduced CO2 and CO-related emissions. Therefore, we strongly believe that the method proposed decreases the complete travel time and as well as in increased EVs usage.

Keywords: Automatic Recharging Mechanism (ARM), Electric Vehicle (EV)

1. INTRODUCTION

The EVs are not familiarly utilized and the market status is not up to the mark because such vehicles are required to be recharged on one occasion in 60–70 km drive and less cost effective. The hybrid vehicles dominated the market by acquiring power from the combustion engine. In an attempt to reduce gasoline usage, the grid power used a vehicle called plug-in hybrid EVs (PHEVs) were introduced in the market. The PHEVs are still under research due to the following reasons:

1) To reduce its cost

2) Increases the life and capacity of the battery packs

3) To increase the flexibility in the grid connection.

Nowadays, EVs are charging their battery packs through roadside units, the standard home outlets, and the park stations, etc. To recharge the battery packs of EVs a couple of hours are required and the time taken for recharging will vary depends on the capacity used. This is an important factor which affects the usage of EVs.

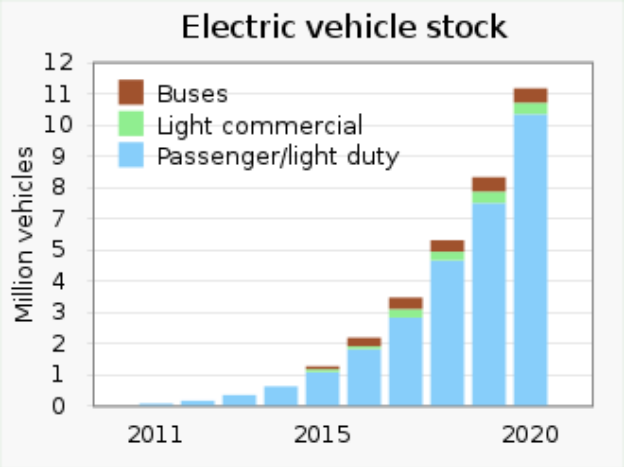

Fig 1: The global stock of electric vehicles has grown steadily through the 2010s

Besides the limited range of electric vehicles in comparison to conventional powered vehicles, one additional drawback is the time consuming and laborious charging process. To enable comfortable and autonomous battery charging a lot of development effort is invested in inductive charging systems. But several challenges like energy losses, electromagnetic radiation, complex vehicle adaption or environmental impacts on humans and animals still have to be solved. Furthermore, long driving ranges together with short charging intervals are essential for a high customer benefit. Due to a significantly lower power transmission performance, high charging capacities are not feasible with inductive systems, but only with conductive systems (DC quick or fast charging). In this comparison, charge and discharge losses are not considered. Battery switch stations provide another option

2. COMPONENTS USED

The list of the components used in this developed model are

1. DC Motors
2. Li – ion Battery Pack
3. Solar Panel
4. Chemical Tank
5. Arduino
6. Charge Controller
7. Boost Converter
8. LCD Display
9. Inter – Integrated Circuit
10. Connectors

3. COMPONENTS DESCRIPTION

3.1 DC Motors

A DC motor is any motor within a class of electrical machines here by direct current electrical power is converted into mechanical power. Most often, this type of motor relies on forces that magnetic fields produce. Regardless of the type, DC motors have some kind of internal mechanism, which is electronic or electromechanical. In both cases, the direction of current flow in part of the motor is changed periodically.

Fig 2: DC Motors used in EV

One characteristic of a 12v DC motor is the operating voltage. When a motor is powered by batteries, low operating voltages are typically preferred since fewer cells are required to obtain the specified voltage. However, at higher voltages, electronics to drive a motor are typically more efficient. Although operation is possible with volts as low as 1.5 that goes up to 100, the most common are the 6v DC motor, 12v DC motor, and 24v DC motor.Other key specifications of a 12v DC motor that can assist the operating current, speed, torque, and power.

3.2 LI – ION BATTERY PACK

A lithium-ion battery or Li-ion battery is a type of rechargeable battery composed of cells in which lithium ions move from the negative electrode through an electrolyte to the positive electrode during discharge and back when charging. Li-ion cells use an intercalated lithium compound as the material at the positive electrode and typically graphite at the negative electrode. Li-ion batteries have a high energy density, no memory effect (other than LFP cells) and low self-discharge.

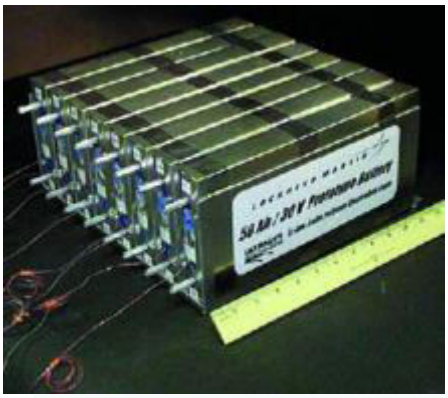

Fig 3: Lithium ion polymer battery prototypes

A battery (also called a battery pack) consists of multiple connected lithium-ion cells. Battery packs for large consumer electronics like laptop computers also contain temperature sensors, voltage regulator circuits, voltage taps, and charge-state monitors. These components minimize safety risks like overheating and short circuiting. To power larger devices, such as electric cars, connecting many small batteries in a parallel circuit is more effective and more efficient than connecting a single large battery.

3.3 SOLAR PANEL

solar cell panel, solar electric panel, photo-voltaic (PV) module or solar panel is an assembly of photo-voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV

panel, and a system of PV panels is called an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

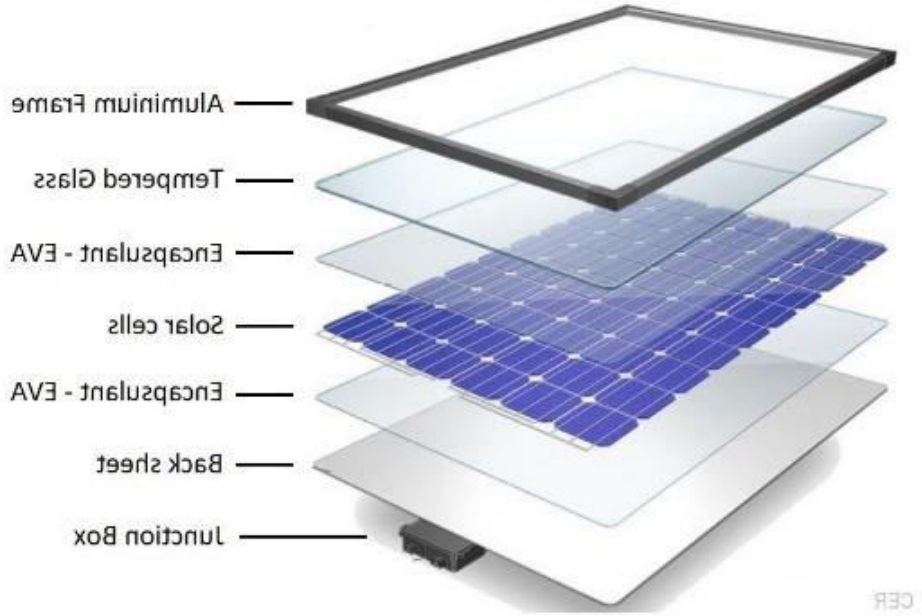

Fig 4: Solar Panel

3.4 ARDUINO

Arduino is an open-source hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (for prototyping) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs. The microcontrollers can be programmed using the C and C++ programming languages, using a standard API which is also known as the Arduino language, inspired by the Processing language and used with a modified version of the Processing IDE. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) and a command line tool developed in Go.

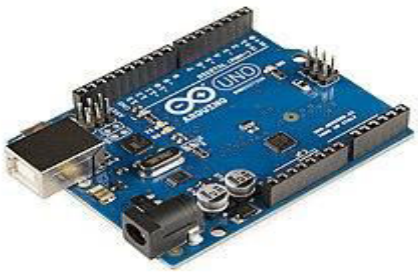

Fig 5: Arduino

4. HARDWARE DESCRIPTION

The block diagram shows the flow of operation of the developed model. The detailed procedural steps to understand the operation of the developed model has given below

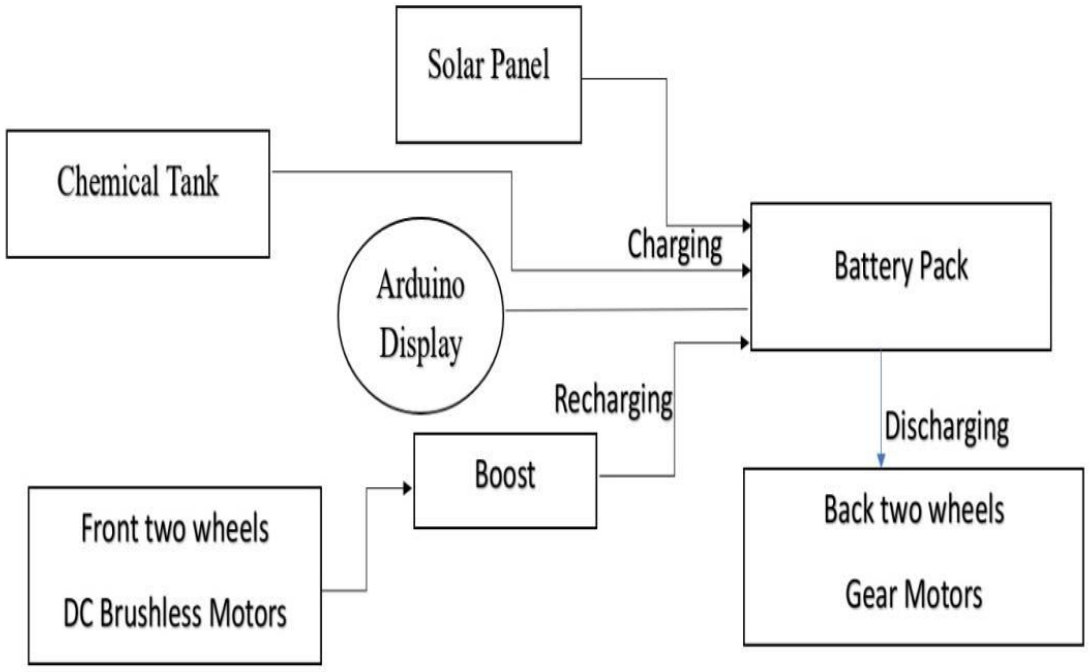

Fig 6: Flow of operation

Mainly, the solar panel produces energy if there is no chance for solar energy production due to weather conditions then we are using the chemical tank as secondary energy production in which the water reacts with the magnesium to produce energy. After the energy was produced, it is stored in the Li – ion battery packs which are rechargeable.

After the energy is stored, the motors of the EV uses that energy to run/move the vehicle. When the vehicle is moving, the back wheels were attached to motors and the front wheels were attached to the generators. Thus, when the vehicle is moving the back wheels automatically push the front wheels to rotate. this creates a rotational pressure on the generators, due to that pressure the generators regenerate the lost energy from 50 – 70%. this is about the flow of operation of the developed EV model.

5. WORKING PROCESS

The developed model can be operated based on based on the three operating processes. They are

1. Electrical energy generation & storage
2. Using the electrical energy for moving the vehicle
3. Regenerating the lost electrical energy upto 50 – 70%

5.1 Energy Generating Methods

The electrical energy generation can be done in two methods. They are

- from solar panel
- from chemical tank

5.1.1 Generating Energy from Solar Panel

Solar power is the conversion of renewable energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Photovoltaic cells convert light into an electric current using the photovoltaic effect.

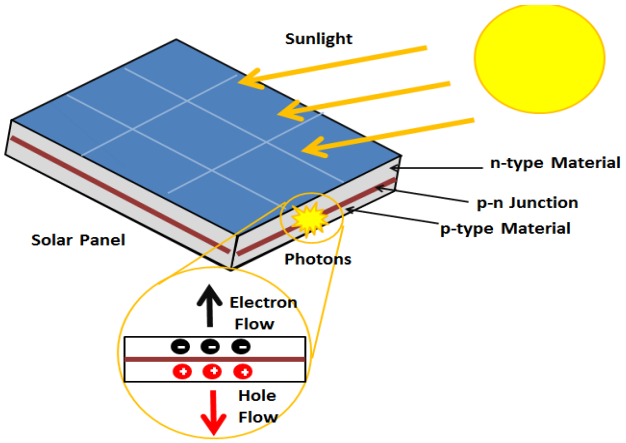

Fig 7: Photovoltaic effect

Solar radiation may be converted directly into electricity by solar cells (photovoltaic cells). In such cells, a small electric voltage is generated when light strikes the junction between a metal and a semiconductor (such as silicon) or the junction between two different semiconductors. (See photovoltaic effect.) The power generated by a single photovoltaic cell is typically only about two watts. By connecting large numbers of individual cells together, however, as in solar-panel arrays, hundreds or even thousands of kilowatts of electric power can be generated in a solar electric plant or in a large household array. The energy efficiency of most present-day photovoltaic cells is only about 15 to 20 percent, and, since the intensity of solar radiation is low to begin with, large and costly assemblies of such cells are required to produce even moderate amounts of power.

Performance Curves of Solar Panel

The solar cell parameters have been analyzed and obtained based on the parameters computed for three different irradiances (600, 800, 1000 W/m2) stages. Comparing the proposed method with all the parameters are almost equal and few have a distinguishable difference. This may happen due to temperature variation of solar cells from low to high.

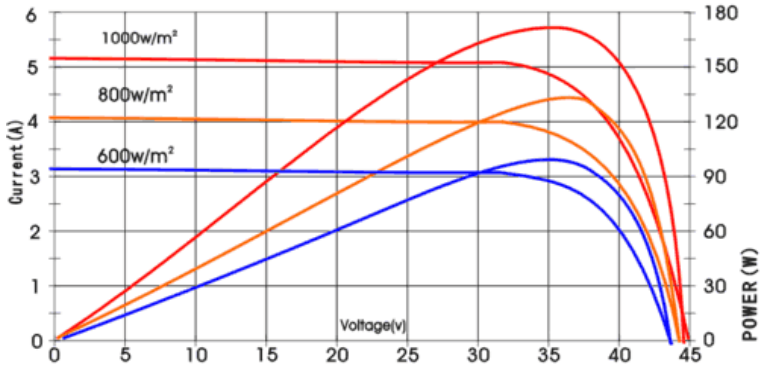

Fig 8: Solar panel I-V & P-V characteristics

Time	Input (Solar panel)		
	Voltage (V)	Current (A)	Power (W)
05:00	0	0	0
06:00	21.5	0.122	2.621
07:00	21.4	0.19	4.066
08:00	18.6	0.27	5.022
09:00	17.6	0.36	6.336

10:00	17.7	0.44	7.338
11:00	17.8	0.48	8.544
12:00	17.9	0.48	8.592
13:00	17.4	0.47	8.187
14:00	17.4	0.41	7.134
15:00	17.7	0.37	6.549
16:00	16.9	0.25	4.225
17:00	16.9	0.12	2.028
18:00	13.9	0.024	0.3336
19:00	3.6	0.011	0.0396

Table 1: Solar Panel Results for each hour

5.1.2 Energy Generation by Chemical Reaction

In this generation method, the water reacts with the magnesium in the chemical tank to produce energy. the chemical can be done as below process.

Magnesium burns in steam to produce magnesium oxide and hydrogen gas. The reaction produces an equivalent 556 KJ/kg of energy at 623 K.

$Mg(s) + H_2O\ (g) = MgO(s) + H_2\ (g)$

In presence of excess water, the reaction yields $Mg\ (OH)_2$ and H_2, the overall reaction releasing an incredible 1921 KJ/mol of energy.

$Mg(s) + 2H_2O\ (l) = Mg\ (OH)_2(s) + H_2\ (g)$

Magnesium powder and water/steam react with one another in the reaction chamber generating large quantities of heat. Being highly volatile, liquid ammonia is used to absorb the heat energy released by the reaction in the reaction chamber. A special turbine located in the vicinity of the engine is driven by the heated ammonia gas, which generates power. The temperature of the hot water put through the inlet can be controlled along with the input of magnesium powder. The base reaction is even more efficient at higher temperature. Hence, the output of the engine also improves with increase in the temperature of reaction.

5.2 Energy Storing

Li-ion batteries have been deployed in a wide range of energy-storage applications, ranging from energy-type batteries of a few kilowatt-hours in residential systems with rooftop photovoltaic arrays to multi-megawatt containerized batteries for the provision of grid ancillary services.

Essentially, all Energy Storage Systems capture energy and store it for use at a later time or date. Examples of these systems include pumped hydro, compressed air storage, mechanical flywheels, and BESS's. These systems complement intermittent sources of energy such as wind, tidal and solar power in an attempt to balance energy production and consumption. Energy storage results in a reduction in peak electrical system demand and ESS owners are often compensated through regional grid market programs. Regulators also offer incentives (and in some cases mandates) to encourage participation

5.3 Energy Usage & Regeneration through M-G Set

in a typical motor generator set, the power is given externally to a motor and as a result the tyres connected to the motor rotates the rotor of the generator when the vehicle is in movement. That means, motor receives electrical energy input from the supply line. Its tyres rotates and since the generator shaft is coupled with it, the generator also receives its mechanical input through tyres.

Thus, generator also creates electrical output power or in other words generator converts the mechanical energy into electrical energy.

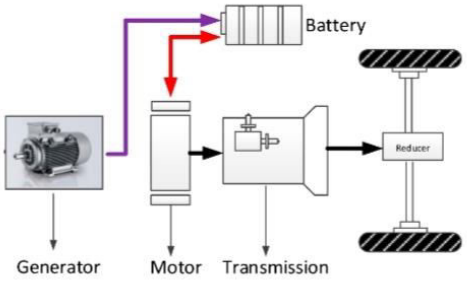

Fig 9: Energy regeneration through Motor – generator set

Thus, while the power at the input as well as output side is electrical in nature, the power flowing between the machines is in the form of mechanical torque. This provides isolation of the electrical system as well as some buffering of power between the two electrical systems.

Table 4. M-G set test results

Parameter	Max Output Power of M-G SET (kW)	Output Voltage (V)	Speed of SCIM (rpm)	Output Current (A)
Output Rating	25	400	1500	15.5
Output Power of M-G set at 0.5 pu of field excitation	15.5	400	1500	20
Output Power of M-G set at 1 pu of field excitation	24	400	1500	25

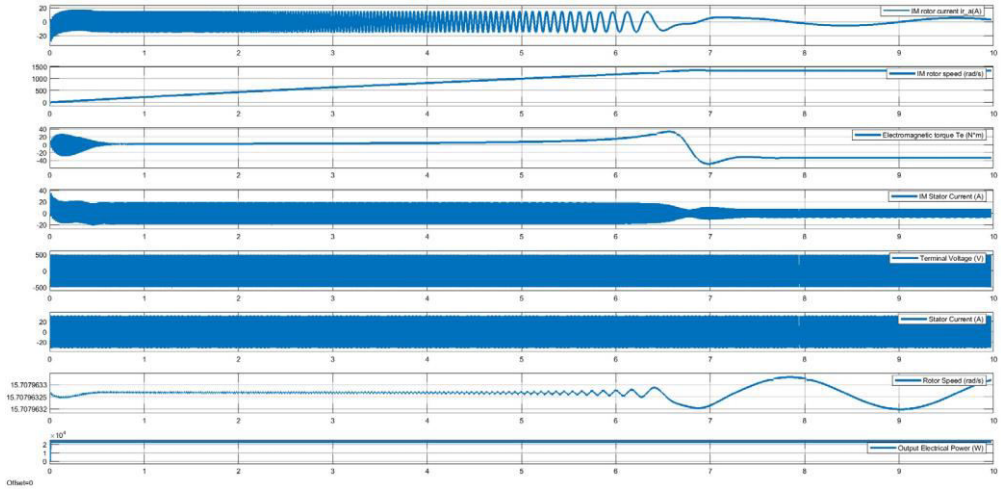

Figure 10: Motor-generator set

Output Performance Curves of the Developed Model

The below fig shows the required hourly load and its total generated power for both renewable sources. In a few cases like hours 8, 12, and 18, the PV modules generate electricity even when thevehicle does not move. The energy storage system will charge the battery in both cases as when the vehicle moves or not moves by means of its generating methods. The complete power produced from renewable sources is adequate for EVs battery modules.

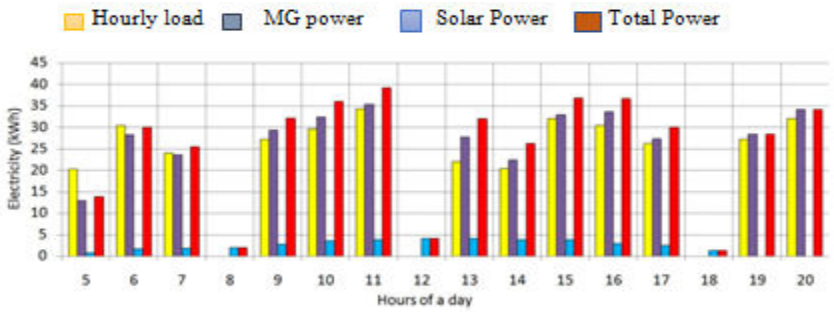

Fig 11: Hourly load of EV versus generated electricity by the proposed method.

6. CONCLUSIONS

In this paper, a hybrid recharging mechanism based on renewable energy sources (both solar and motor-generator set) is proposed for electric vehicles. The current charging mechanism directly affects the wide usage of EVs. For long distance travel, few countries are utilizing recharging stations and the travelling distance depends on the vehicle's energy storage capacity. To overcome this difficulty, in this paper, a new hybrid renewable charging mechanism is proposed for EVs. The performance of the solar PV module is verified for different temperatures and irradiance level. The MG set performance is studied at various loading conditions. Finally, we state that this developed EV model can be used for longer travelling distances with good efficiency. Lastly, we conclude that this system decreases the complete time for travelling and increases the EVs usage thus creates an unpolluted environment. In future research, we plan to improve this automatic regeneration mechanism for greater usage of EV's.

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AN EMPIRICAL STUDY INTO THE PERSONAL CHARACTERISTICS AND MANAGEMENT DEVELOPMENT EFFECTIVENESS IN SELECT PUBLIC ORGANIZATIONS: MEDIATING ROLE OF TOP MANAGEMENT

Prof. A. Suryanarayana
Former Dean, Faculty of Management, Osmania University, Hyderabad

ABSTRACT

Management Development (MD) is one of the popular tools of Human Resource Development (HRD). MD is used as a means to help organizations attain their short and long term HR goals. MD efficacy is assessed by knowing the extent to which MD Programs (MDPs) have yielded desired outcomes. MD is perceived to be effective when managers feel that it contributes to their ability to successfully perform in their management roles. The research question this empirical study primarily addresses is: "In what ways do Personal Characteristics (PCs) of the Trainees affect Management Development Effectiveness (MDE) among managers of Select Public Organizations (SPOs) and whether Top Management Support (TMS) has a mediating influence on the relationship?" A focused attempt is made to study the role of perceived PCs such as Self-efficacy (SE) for Development, Learning Goal Orientation (LGO), and Proactive Personality (PP) as factors that are responsible for MDE and also to understand whether TMS influences such a relationship. The study has examined the efficacy of MDPs in SPOs using PCs as the independent variables and MDE as the dependent variable. MDE is analyzed on the basis of MD Outcomes (MDOs). TMS is perceived as the moderating variable and demographics as the control variables. Results revealed that TMS and PCs influenced independently and collectively the MDOs and as were reported by the employees. Finally, a summary of the findings, implications, and a critique are presented.

Keywords: Management Development; Personal Characteristics; Top Management Support; Management Development Effectiveness; and Management Development Outcomes.

I. INTRODUCTION

Management Development **(MD)** is one of the important means of developing competent managers for organizations. The changing business environment, evolving technology, and change in customer choice have made organizations change their operation thus making a need for caliber, talented, and adaptive managers who can help survive the organization (Garavan, Barnicle, & O' Suilleabhain, 1999). On the other hand, the tight supply and shrinking market of the qualified human resource have made organizations develop retention, motivation, and development strategies (Tansky& Cohen, 2001; Werner & DeSimone, 2011). All these challenges have forced the organization to adopt strategies and intervention methods to develop the managers for better organizational performance.

Despite the importance of Management Development Effectiveness **(MDE),** it remained elusive as it has been neglected by organizations. Evaluating MDE is considered complicated (Smith, 2012) and organizations are still struggling in adopting systematic approaches to develop managers and implement effective MD Programs **(MDPs)** [D' Netto, Bakas, & Bordia, 2008]. MDE refers to the extent to which MD programs have yielded desired outcomes (D' Netto, Bakas, & Bordia, 2008). Scholars differ in opinion regarding the perspective of evaluating the effectiveness, some scholars emphasize on the individual achievement while others opine that organizational outcomes are neglected and effectiveness needs to be evaluated from both individual and organizational perspective rather from anyone's perspectives (Goodge, 1998; Adams & Waddle, 2002). However, effective MD leads to positive outcomes. However, effectiveness depends upon various factors and research has shown that individual

characteristics and their environment influence the learning-related behavior and transfer of learning.

Management Development Characteristics **(MDCs)** are one of the most important variables that are responsible for positive Management Development Outcomes **(MDOs)** (Ardts, van der Velde, & Maurer, 2010). The effectiveness of MD also depends on the MD methods or interventions adopted to develop managers. The federal governments have emphasized and prioritized the need and importance of Training and Development (T&D) for the growth of the organization and the country's economic growth. It has established organizations like Administrative Colleges to provide T&D to the staff of Government. Nowadays, most of the Central Public Organizations **(CPOs)** have their own in-house training centers. However, studies show that the performance of these enterprises is not as expected and one of the reasons stated there for is the low transfer of training (Singh, 2016). By and large, empirical evidence on MDE is limited and most of the researches are focused on training effectiveness. Studies on training effectiveness in various industries have shown that employees and managers are not satisfied with training outcomes and considered them to be ineffective. The reasons mentioned range from training design, support from supervisor and management, organizational culture and climate, and low level of training transfer (Baniya, 2004; & Pokhrel, 2016).

In this backdrop, a focused attempt is made to study the role of perceived personal characteristics such as Self-efficacy (SE) for Development, Learning Goal Orientation (LGO), and Proactive Personality (PP) as factors responsible for Management Development Effectiveness (MDE) and also to understand whether Top Management Support (TMS) influences the relationship. So, the basic question of the study is to examine (i) How personal characteristics impact MDE in Select Public organizations (SPOs) and (ii) whether top management support influences MDE?

- **OBJECTIVES OF THE STUDY**

Given the statement of the problem as mentioned above, the main aim of the study is to find out the factors that are associated with Management Development Effectiveness (MDE) in Select Public Organizations (SPOs) by relating individual characteristics with the outcomes and also assessing the effect of organizational support on the relationship. More specifically, the major aim of the study is to examine:

1. The influence of individual characteristics on Management Development Effectiveness (MDE) among Managers and Officers in Select Public Organizations (SPOs),
2. The moderating effect of Top Management Support (TMS) on MDE, and
3. The effects of trainee's demographic factors on the MDE.

- **SIGNIFICANCE OF THE STUDY**

The study attempts to fill an identified research gap on the present understanding of the low level of MDE in SPOs. Nowadays, MD is not a new concept in developing countries but the studies on the implementation and evaluation of MD are rare and insufficient. Evaluation of MDE is important as one would know how MDs contributed to enhancing the skills and knowledge but current research is scanty and insufficient. It provides an in-depth knowledge of the area. It provides significant information to the organization's stakeholders on the need for MDP and helps in formulating policies and strategies. Most of the available research on MD is based on the MD methods and their relative effectiveness. Organizations invest in T&D programs to enhance the productivity of both the employees and also the ultimate productivity of the organization (Khan, Tayal, & Khalique, 2015). It tries to understand the role of individual and environmental factors on MDE and helps to identify the factors that enhance MDE in the

context of SPOs and provides a new direction for the organizations and guides the future research.

II. REVIEW OF THEORY AND EMPIRICAL LITERATURE

The Section focuses on the theoretical literature and empirical evidence relevant to the relationship on personal characteristics of trainees such as Self-efficacy (SE) for development, Learning Goal Orientation (LGO) and Proactive Personality (PP) as well as Management Development Effectiveness (MDE). First, the concept of Management Development itself was reviewed followed by theories and prior research on MDE. Finally on the basis of empirical and theoretical evidence a "Conceptual Framework" was designed to analyze the present research work.

- **MANAGEMENT DEVELOPMENT (MD):**

Most definitions state that MD is a systematic process through which manager skills and abilities are developed to manage and attain the objectives of the organization. It aims to create a learning organization and continuously engage in developing, preparing and improving managers for present as well as future responsibilities so that ultimately it can have a positive impact on organization performance and productivity. MD is one of the popular tools of Human Resource Development (Werner & DeSimone, 2011). The complex and turbulent business environment requires managers who are adaptive, flexible, high quality and can lead the organization from a strategic perspective (Garavan, Barnicle, & O' Suilleabhain, 1999) and helps to survive (Wexley & Baldwin, 1986). MD is a means to an end helping organizations attain their short and long term goals (Reitsma, 2001).

- **MANAGEMENT DEVELOPMENT OUTCOMES (MDOS)**

Management Development Effectiveness (MDE) is defined as "the extent to which MD programs have yielded desired outcomes" (D'Netto, Bakas, & Bordia, 2008). MD is perceived to be effective "if managers feel that it contributes to their ability to perform successfully in their management roles" (Luoma, 2005).

- **JOB SATISFACTION (JS)**

Job Satisfaction has been defined as "pleasurable or positive emotional state resulting from an appraisal of one's job or job experiences" (Locke, 1976, p. 1300). Employee with high job satisfaction is related with low undesirable organizational outcomes like turnover, intention to leave. JS as a construct is included in the study to understand whether participation in MD programs helps create job satisfaction among the participants. Studies by Riketta, (2002), Laschinger, (2001), and Ardts, E.G.van der Velde, & Maurer, (2010) are also relevant here.

- **AFFECTIVE COMMITMENT (AC)**

Affective Commitment refers to "the employee's emotional attachment to, identification with, and involvement in the organization," (Meyer & Allen, 1991: 67). An employee with strong AC remains in the organization because they want to (Allen & Myer, 1990). Managers who are more satisfied with employee development practices are more committed to the organization (Tansky & Cohen, 2001; Hamori & Cao, 2016). Empirical evidence from studies by Mercurio, (2015), Brown and McCracken, (2009), Hamori & Cao, (2016), Wierenga, (2010), and Birdi, Allan, & Warr (1997) are most relevant in this context.

- **INNOVATIVE BEHAVIOR (IB)**

Innovation Behavior is defined as "intentional generation, promotion and realization of new ideas within a work role, group and organization (Scott and Bruce, 1994)". According to DeJong and Hartog (2007) IB initiates individuals "to explore opportunities, identify performance gaps or produce solutions for problems." Innovative employees are more focus on finding solution, engaged in developing and implementing new ideas (Seibert et.al 2001). MD

characteristics (availability of role model) positively influence IB (Ahmad, 2009; Ardts, E.G.van der Velde, & Maurer, 2010; Seibert et.al, 2001). Studies by Slagter, (2009), Shipton,West, Jeremy Dawson, Birdi and Petterson, (2006); and Edralin, (2007) are important here.

- **CRITICAL OPINION SHARING BEHAVIOR (COSB)**

Critical Opinion Sharing Behavior refers to an examination of social and political "taken-for-granteds" (Reynolds, 1998) in the organization. According to Woerkom & Croon (2004), it is "one of the observable activities caused by reflection. Research findings of Woerkom (2003), Ardts, E.G.van der Velde, & Maurer, (2010) are very much needed to be cited as well.

- **INDIVIDUAL CHARACTERISTICS**

Personal characteristics refer to the personal attitudes and behaviors that are inherent to the individual. Self-efficacy for development, learning goal orientation and proactive personality are included in the present study to characterize the participants.

- **Self-Efficacy (SE) for Development**

Self-efficacy as defined by Bandura (1977) under Social Learning Theory is "an employees' belief that they can cope with challenging situations". Self-efficacy for development can be influenced through master experiences, vicarious modeling, and persuasion strategies in the workplace relevant to development (Maurer, Lippstreu, & Judge, 2008).

An employee with high SE is related to a high level of task performance; the use of new technology takes challenging assignments, and takes responsibility for Personal Development. Findings from studies carried out by Bandura (1982), Bandura & Schunk, (1981), Maurer & Tarulli, (1994), Neo & Wilk, (1993), Maurer& Palmer,(1999); Maurer & Tarulli, (1996) are presented.

- **Learning Goal Orientation (LGO)**

According to Maurer, Lippstrek, & Judge (2008) employees who are 'learning goal orientated' are more interested to understand and try new things and are involved in developing their skills and competencies for challenging jobs. They are positive, confident, and eager to learn and take the opportunity and accept challenges. Individuals with LGO are eager to understand new and work to increase their competencies, and look for challenging tasks (Maurer, Wrenn, Pierce, Tross, & Collins, 2003). Insights from the research works of Vandelle and Cumming, 1997), Maurer, Lippstreu, & Judge, (2008), Locke & Latham, (2002), Ardts, E.G.van der Velde, & Maurer, (2010), Wierenga, (2010) are reviewed.

- **Proactive Personality (PP)**

Bateman & Crant (1993) characterized proactive personality as "someone who is relatively unconstrained by situational force and who effects environmental changes' ' (as cited in Seibert, Kraimer & Crant, 2001). Individuals with a PP are highly involved in constructing positive changes towards people, situation and work environment and organizational improvement (Seibert, Kraimer & Crant, 2001). A longitudinal study on PP and career success shows that people who have high PP are engaged in behaviors that contribute to career success (Seiber et.al 2001). Research evidence gathered by Ahmad, (2009), Ardts, E.G.van der Velde, & Maurer, (2010), believes that a proactive personality will influence Management Development Outcomes.

- **Top Management Support (TMS)**

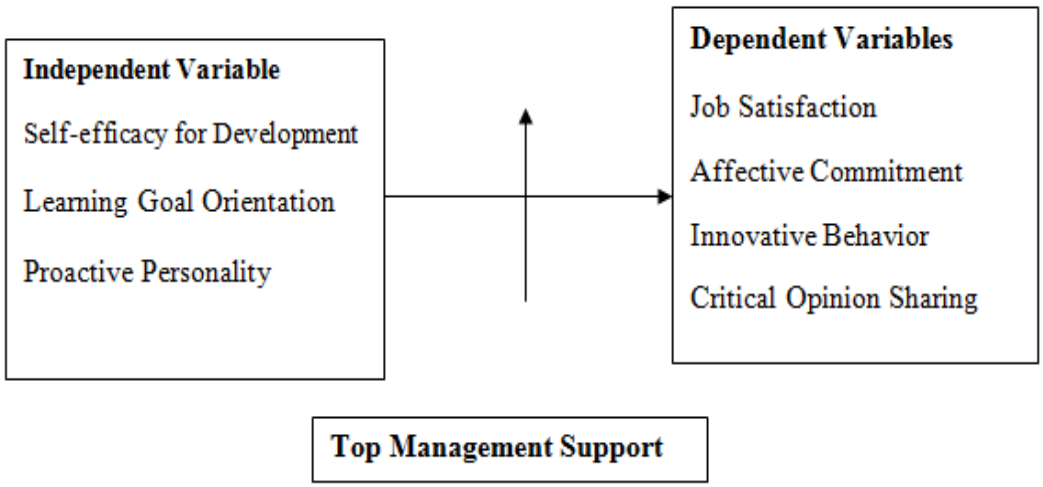
Top Management Support is very essential for the success of any development activities. Studies show that organizational support is very important for proper utilization of the investment and it also results in positive outcomes (Chiaburu & Marinova, 2005; Lim & Johnson, 2002 as cited in D'Netto, Bakas, & Bordia, 2008). This is further corroborated by

researchers like Garavan, Barnicle, & O' Suilleabhain, (1999), Margeison (1991), D'Netto, Bakas, & Bordia, 2008), Dastgeer & Rehman, 2012), and Neo& Schmitt, 1986).

- **Management Development (MD) Approaches**

Management Development is a complex process, where knowledge accumulates through training and education as well as through work and life experiences (Suutari & Viitala, 2008). To develop managerial skills and competencies, organizations adopt different development methods. And different methods have different effectiveness (Goodge, 1998). Studies made by Longenecker & Fink (2001), Gage and Berliner, (1979), Cornwall, (1981), Garavan, Barnicle, & O' Suilleabhain, (1999), Mumford (1993), Woodall and Winstanley, Werner & DeSimonem (2011), Akuratiyagamage, (2006), and Suutari & Viitala, (2008) are important here.

Conceptual Framework



III. RESEARCH METHODOLOGY

- **Variables and Making them Operational**

The variables used in the study are individual characteristics and Management Development Effectiveness (MDE). The independent variable for the study is 'individual characteristics' which include Self Efficacy (SE) for development, Learning Goal Orientation (LGO), Proactive Personality (PP). The dependent variable is MDE.

Here, effectiveness has been analyzed on the basis of the outcomes which consist of Job Satisfaction (JS), Affective Commitment (AC), Innovative Behavior (IB) and Critical Opinion Sharing Behavior (COSB).

- **Unit of Analysis**

The unit of analysis is the entity that is analyzed; in this study the unit of analysis is individual. The individual unit is taken as the study is about individual perception of the MD efforts. The perception of an individual about the individual characteristics, organizational support, and approaches and its impact on MDOs is considered. The data is collected from each individual working in the select organizations consisting of banks and other public organizations. Employees working in the different hierarchy such as officers and managers were the respondents. Individual responses will be entered for the data analysis process.

- **Population and Sample Design**

The population is the total collection of elements from which we make some inferences (Cooper, Schindler and Sharma, 2012). Sampling, therefore, is selecting some of the elements

and making the conclusion of the population (Cooper, Schindler and Sharma, 2012). In this study, the sampling frame of this study was done in two steps. First, the organizations for the sample study were determined out of the overall 28 Commercial Banks operating in the country; for the purpose of the study 12 banks and government organizations were chosen randomly through the lottery method. Only those Banks and Government Organizations that provide managerial level T&D opportunities (especially related to MD) were considered. Secondly, the eligibility of the respondent from the selected organizations was determined as per three criteria viz., (i) Manager and Senior Officer Level, (ii) Minimum of one year of work experience in the same organization, (iii) Participants must have participated in at least one T&D activity (here Management Training can be In House, External, International, or Management Education e.g., EMBA, MBA).

- **Demographics**: Demographic information was sought from the respondents to filter the sample according to the criteria set by the researcher using a questionnaire where in Section A provides the personal information of the respondent such as age, gender, education level, position held, job tenure, training and development activities participated, etc.
- **Instrumentation:** The study has adopted the items and measures that were developed and validated by prior researchers. Here, individual characteristics cover three components. They are Self-efficacy (SE) for development, Learning Goal Orientation, (LGO), and Proactive Personality (PP).
- Four well established scales were used for measuring the Management Development Outcomes (MDOs).

IV. RESEARCH PROCEDURE

The questionnaires administration, data collection and process, as well as data analysis have been discussed under this section.

- **Pre-Test:** Before the administration of the final questionnaire, a pre-test was carried out with five volunteers to ensure that there is less possibility for errors and for immediate and timely identification of mistakes.
- **Administration of the Questionnaire** containing 49 items that cover individual characteristics, organizational support, and MDOs under three sections. It also includes contents and a set of clear instruction to the respondents about the purpose of the study, the target group.

Section-A contains demographic information about the subject. Section-B contains MD activities one has participated in, and Section-C contains items related to the construct. Altogether 650 sets of questionnaires distributed, but only 290 questionnaires were received from the respondents within a period of one month. After thoroughly scrutinizing the information provided under Section-A and having checked the eligibility criteria, 204 of them alone were found to be usable for analysis.

- **Data Processing:** The questionnaires were manually screened to ensure that the information provided is completed and the respondents meet the minimum eligibility. Incomplete and unusable questionnaires were discarded and others that met the criteria were coded. The data were entered into SPSS 25 software for further statistical analysis.
- **Data Analysis:** The data were analyzed using the software SPSS 25. Each variable was entered and cross- checked so as to ensure that there is no error in the data entry. The items that were to be reversed were converted as required. Descriptive and inferential statistics were used to analyze the data. Similarly, hierarchical regression analysis was carried out to confirm the relationships indicated by the correlation coefficients. Moreover, gender, years

of experience, qualification, position, and age are considered as control variables. And t-test was conducted for gender and ANOVA was used to test the relationship between other demographic variables and individual characteristics and MDOs.

- **Research Hypotheses**

To understand the relationship and the relative strengths between the individual characteristics and Management Development Effectiveness (MDE), several hypotheses were formulated and tested. The regression analysis was used to examine the eight hypothesized direct and moderation relationships each. The results supported all the eight direct relationships and one moderate relationship was not supported when hierarchical regression model was used for analysis. Hypotheses H2 is not included in the summary list as correlation result has not supported the correlation of Learning Goal Orientation (LGO) with other variables and hence Hypothesis 2 was not tested. The summary of the results of hypothesis testing is given below.

Summary of Hypothesis Testing Results

Hypotheses	Independent Variables	Dependent Variables	Hypothesized Relationship	Finding
H1a	SE	JS	Positive	Supported
H1b	SE	AC	Positive	Supported
H1c	SE	IB	Positive	Supported
H1d	SE	COSB	Positive	Supported
H3a	PP	JS	Positive	Supported
H3b	PP	AC	Positive	Supported
H3c	PP	IB	Positive	Supported
H3d	PP	CS	Positive	Supported
H4a	TM	SE and JS, AC, IB, CS	Moderating-0	**Not Supported**
H4b	TM	PP and JS, AC IN, CS, MDO	Moderating	**Not Supported**

[**Note: SE**-Self-efficacy; **PP**-Proactive Personality; **JS**-Job Satisfaction; **AC**-Affective Commitment; **IB**-Innovative Behavior; and **COSB**-Critical Opinion Sharing Behavior.]

V. SUMMARY, DISCUSSION, AND IMPLICATIONS

This Section summarizes the major findings followed by a discussion on them and their potential uses. The present study revealed that Top Management Support (TMS) and Personal Characteristics (PCs) influenced independently and collectively the Management Development Outcomes (MDOs) as reported by the employees.

- **Summary of Findings**

The study examined the effect of Personality Characteristics, Self-efficacy (SE), Learning Goal Orientation (LGO), Critical Sharing (CS) and Proactive Personality (PP) on MDOs that consist of Job Satisfaction (JS), AC (AC), IB (IB), and Critical Opinion Sharing Behavior (COSB) of the employees of Select Public Organizations (SPOs). The major findings are summarized below on the basis of correlation and regression analysis:

1. The mean value of SE is 4.15 and IB is 3.55 out of 5, which is considered above average. The mean values are: PP (5.5426), TMS (5.2311), JS (5.5833), and AC (5.5729) out of 7 all of which also are above average. CS mean value is 4.5163 out of 6 which is also average. But that for LGO is 1.9306 which is below average.
2. Skewness and Kurtosis were conducted to test the normality and the results show that all the variables lie between the acceptable range of ±3 and ±10 respectively. Skewness value ranges from 2.301 to -.613 and Kurtosis value ranges from 6.070 to .251.
3. A t-test was conducted for gender and it suggests that Levene's Test for Equality of Variance (EoV) shows that variables do not have any statistically significant difference in variance.

However, the t-test for EoV shows that there is a statistically significant difference between male and female employees on IB (t= 2.670, p>0.05). The mean value for males is 3.6361, which suggests that male has higher IB. But other variables do not have statistically significant difference between male and female employees on SE, LGO, PP, TMS, AC, CSOB, and JS.

4. The descriptive statistics of **position** indicates that Senior Managers have high SE and CSOB followed by Managers.
5. One way ANOVA of **tenure** shows that there is no statistically significant relation between tenure and the variables under study.
6. One way ANOVA results show that **qualification** does have a significant relationship with CS and JS. It shows that those respondents who hold MPhil/Ph.D. degrees have given their critical opinions and are satisfied with their jobs.
7. The descriptive statistics of **age** indicate that there are no statistically significant differences among age and the variables studied.
8. The correlation analysis revealed that there is a positive and significant relationship between (i) SE on one side and (ii) PP, JS, AC, IB, and COSB on the other side individually.
9. However, the correlation analysis of LGO indicated that there is negative and not very significant relationship with PP, JS, AC, IB, and COSB. LGO has a negative but significant relation with SE.
10. The result of hierarchical regression reveals that SE and PP have positive and significant effect on JS, AC, IB, and COSB.
11. The moderated regression analysis result revealed that TMS did not support the relationship between SE, PP, and MDOs.
12. The hierarchical regression result of TMSW and MDOs with MDPS shows that it has a positive and significant relationship.

- **DISCUSSION**

The Research Question: "In what ways do Personal Characteristics of the trainees affect Management Development Effectiveness among managers of Select Public Organizations and whether Top Management Support has a mediating influence on the relationship?" The findings show that there is a positive relationship between Personal Characteristics (PCs), specifically, SE and PP, and MDE. This is partially consistent with the finding of other researchers (Ardts, van der Velde, and Maurer, 2010).

➢ **Self-Efficacy (SE) for Development**

The results indicate that SE has a positive and significant relationship with JS (.220). However, the results about SE with JS are not in alignment with those from the previous research (Ardts, van der Velde, and Maurer, 2010; Wierenga, 2010).

➢ **Proactive Personality (PP)**

The results suggested that PP is positively and significantly related to JS and AC (.326 and .349 respectively). Research shows that PP has led to AC and an employee with a PP is more likely to get involved more in the organization (Gudermann, 2010). PP is positively and strongly associated with IB and COS.

➢ **Top Management Support (TMS)**

PCs and MDOs were not moderated by TMS. The employee may perceive that MDPs do not enjoy TMS and T&D activities are not adequate. As per the study, gender was related to IB

though previous research shows that gender is not related with it (Ardts, van der Velde, and Maurer, 2010). And qualification is related with critical opinion sharing and job satisfaction. It has revealed that those who hold MPhil/Ph.D. are satisfied with their job and is COS.

- **Implications of the Study**

The present study contributes to new knowledge about the causal relationship between personal characteristics and MDOs. This also helps not only in the identification of more important outcomes but also the obvious personal factors that influenced them for taking appropriate decisions while designing MDPs. Self-efficacy is found to be positively and significantly related to outcomes from the MDPs.

- **Critique of the Study**

This study has some methodological limitations that need be discussed.

1. First, the study is about perceptions of the employees based on self-reports that are subject to 'response bias' and it could have been affected by Common Method Variance (Podaskoff et.al, 2003). Hence, qualitative or mixed method studies with multi source (e.g., HR Manager, Supervisor, and Peer) data collection methods may be considered in future research studies.
2. Second, the sample included only banks and two government organizations and the findings of the study cannot be applied to other sectors. Any generalization does require further research in other sectors also.
3. Fifth, the study has included only personal and organizational characteristics. However, for more accurate results on MDE, characteristics of MD also need to be considered.
4. The analysis would have been better if data were collected from employees with three years of experience and those working as Senior Officer and above level. Thus, generalization of the study is further limited and findings need to be considered only as "field-specific". Scope for much wider and stronger generalization would be possible if the same study is done in different places with different people and at different points of time (Trochim, 2008 as cited by Singh, 2016).
5. Finally, as questionnaires were distributed only to employees who attended MDPs or any other training programs related to management, the number of usable samples from among the targeted respondents got further reduced..

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THE EFFECTIVENESS OF HYBRID LEARNING

[1]Ningchuiliu Gangmei and [2]Dr Kennedy Andrew Thomas
[1]Research Scholar, School of Education, Christ (Deemed to be University), Bengaluru
[2]Director, Centre for Education Beyond Curriculum (CEDBEC) & Professor, School of Education, Christ (Deemed to be University), Bengaluru

ABSTRACT
The education system has completely changed from traditional to technological learning during the Covid-19 pandemic. Information and Communication Technologies became one of the essential tools to impart knowledge in the education system during the closure of schools, colleges and universities. The educational institutions introduced online learning to replace physical learning to maintain social distancing and avoid overcrowding. Hybrid learning has become popularised with the improvement during the pandemic and even after the situation turned normal. It is an educational method where students choose to participate online or in person. The present study observes the learning theories and try to find the most relevant views for hybrid learning. Constructivism and Connectivism are the theoretical foundation that supports students' participation which helps students develop constructive learning habits necessary in hybrid learning environments. So, a constructive basis of hybrid learning emphasises learning through active participation, cooperation, critical thinking, analysing, problem-solving skills, knowledge construction, and collaborative working by integrating ICT tools. This paper attempts to discuss how hybrid learning can make effective teaching and benefit the learning process. The study found that hybrid learning remains an effective educational approach for instruction. Its effectiveness depends on how a person is motivated, with proper teacher training, planning, integration of various methodologies and student-centred assessments, and support from university administrators, despite the changes in a learning environment. Hybrid learning modes remain an essential channel to impart knowledge and attend international seminars, conferences and meetings for those who cannot attend physically.

Keywords: Information and Communication Technologies, Education, Covid-19, and Hybrid-learning

INTRODUCTION
The education system of India has completely changed from traditional to technological learning during the Covid-19 pandemic. The educational institutions introduced online learning to replace physical learning to maintain social distancing and avoid overcrowding (Dhawan, 2020). Amid chaos and confusion in education, online learning is a solution to continue the learning process by integrating technology in teaching and learning. The world has never been experiencing such a transformation into a digital world in a short period. Its importance in education became more visible and became aware during the pandemic. As online learning continues to grow, many institutions are looking for alternate delivery approaches to solving some problems from wholly traditional or online environments. The hybrid or blended learning model started to adopt in some of the educational institutions in India, combining the flexibility of online courses with the traditional on-campus courses (Vernadakis, 2013). The University Grant Commission (UGC) also proposed a hybrid or blended learning module for higher education with 40:60 for online and offline teaching modes.

CONCEPT OF HYBRID LEARNING
Hybrid learning is an educational approach in which some students attend class in person or online from their homes. Teachers adopt information and communication technology (ICT) into their teaching to simultaneously teach remote and in-person students (Sumandiyar et al., 2021).

It connects both onsite students and individual remote students during synchronous teaching and learning (Raes, 2022). It goes beyond time, location, and cultural barriers and has created more and better opportunities for learners and instructors (Vernadakis, 2013). Hybrid learning is, therefore, an educational approach where students choose between participating online or in person. It allows individuals to participate in the learning process wherever they may be. In short, hybrid knowledge will enable students to take online and in-person classes (Neelakandan, 2021). Hybrid learning can be defined as a learning approach that combines both online learning and in-person learning for better learning and to ensure learning continuity during school partial reopenings and in preparation for potential virus resurgence (Fullan, M., Quinn, J., Drummy, M., Gardner, 2020).

EDUCATIONAL LEARNING THEORIES

There are educational Learning theories that are linked with hybrid learning. Behaviourism, Cognitivism, Constructivism, and Connectivism are the commonly used learning theories. All the learning theories will be discussed briefly, and try to find the most suitable for hybrid learning.

BEHAVIORAL LEARNING THEORY

Behavioral Learning Theory or Behaviorism is associated with passive learning since learners respond to repetitive stimuli from the trainer (Jarre, 2020). It is based on the idea that all behaviours are acquired through conditioning, and conditioning occurs through interaction with the environment. The teachers who control the environment use a system of rewards and punishments to encourage the desired behaviours in the subject (Cherry, 2022). This teaching method was most successful in areas with a positive response or easily memorised material. This type of learning emphasises rewards and punishments. Behaviourism has been a teacher-centred instructional framework for a long time, dominating educational settings and shaping every aspect of curriculum and instruction (Izham & Ibrahim, 2018). Therefore, this theory gives importance to the behaviour of students in learning and the behaviour is influenced by reward, punishment, and conditioning.

COGNITIVE LEARNING THEORY

This theory focuses on learners' thoughts and feelings to gain information more effectively. It believes that learners can build strategies to use their brains to learn or teach more effectively when they understand how thinking patterns work (Jarre, 2020). Cognitivism believes in the involvement of mental processes in understanding a person's behaviour. Therefore, this theory explains that learners understand and learn from new information and the environment. Constructivism is one of the Cognitive learning theories (Hammad & Ahmed, 2020).

CONSTRUCTIVIST LEARNING THEORY

The theory argues that learners formulate their knowledge, adding to that understanding as they gain information while taking part in learning experiences and reflecting on those experiences (Jarre, 2020). Students use their existing knowledge and prior experience to understand the new information and connect the previous and new knowledge (Alison, 2010). Constructivism directs students to be active in the learning environment, develop social and interpersonal skills, enjoy learning; understand the content being taught; and learn to think efficiently. It is the belief that individuals create their understanding of knowledge and the world by interacting with their environment (Low, 2004). Constructivism is a theoretical foundation that supports a transformation from teacher-centred to learner-centred. Hence, learning is not just about acquiring knowledge but about participating in an active, contextualised process of constructing knowledge. Constructivism focuses on the student building new knowledge based on experience, increasing and improving learning outcomes (Mal & Adhya, 2020). The constructivism-based learning environment can improve students' critical thinking, analysing,

problem-solving skills, knowledge construction, and collaborative working through its various learning strategies and ICT support tools (Koohang et al., 2009). Therefore, it was believed that in the hybrid learning environment deploying a constructivist instructional method, students' knowledge acquisition would be higher than those taught without a constructivist instructional approach (García-Morales et al., 2021). To understand the potential of blended or hybrid learning in enhancing the teaching-learning process, attempts to integrate technology in the classroom are based on a constructivist basis (Nanjappa & Grant, 2002).

CONNECTIVISM LEARNING THEORY

Connectivism is one of the most recent learning theories. The idea of Connectivism accepts the medium of technology as a part of the student's decision-making process. From a connectivism viewpoint, advisors are students' role models and guides (Underwood, 2016). It argues that social connections and technology shape learning and that we must adapt to constantly changing knowledge. According to connectivism, a person's capacity to learn is more important than understanding current information since that information is bound to change in the first place (Siemens, 2005). (Hammad & Ahmed, 2020) stated that Connectivism emerged based on evolving educational technology advancements. Due to the drawbacks of the previous learning theories, Siemens introduced the main principles of connectivism as a new learning theory as follows (1) learning gains from the diversity of views; (2) learning is a process of connecting information; (3) learning may get from non-human applications; (4) learning take place more from critical situation than what is already known; (5) developing connections to facilitate continuous learning; (6) the ability to connect between fields, ideas and concepts is a core skill; (7) up-to-date knowledge is require; and (8) choosing what to learn.

From the theories, Constructivism and Connectivism are found to be the most appropriate theories for hybrid learning. Although Connectivism is a recent theory, it is relevant and developed by Siemens to adapt to the digital age. In this technological age where student-centric learning prevails, it is necessary to integrate digital technology into the education system. For this, the two theories mentioned above are considered.

EFFECTIVENESS OF HYBRID LEARNING

Hybrid learning is a learning approach where an individual can choose to attend class online or onsite. Despite the disruption brought to education by Covid-19, it has also been a catalyst for change in education, making the best use of technology to continue the learning process (UNESCO, 2020). It allows a flexible approach to collaborative learning by the student, the teacher, and the participating experts or institutions. The critical feature of hybrid learning is that it can be adjusted according to the needs of the learner, the course, and the other significant indicators, such as pace, time, and space (Mosa Alnajdi, 2014). For the hybrid learning environment to be truly productive, it needs a specially designed curriculum that involves different strategies from those deployed in a physical classroom and online learners. The role of motivation in learning is significant in hybrid learning because, with motivation, the teaching presented by educators can be understood by learners because of the encouragement in them to be able to understand the information received. If there is no motivation in the learners, no matter how good the material presented, they will not be easily understood. The hybrid learning model can make it easier for teachers to understand their duties and responsibilities as educators. If there is no motivation in the learners, no matter how good the material presented, they will not be easily understood. This approach can make it easier for teachers to understand their educator duties and responsibilities (Aristika et al., 2021). It also helps students and teachers be motivated to learn and act with positive values in both face-to-face and online learning environments. It also gives students independence and curiosity to learn.

The development of generic business competencies such as learning-to-learn competence, digital competencies and global perspectives will aid their employability and adaptability to

change and digitalised learning environments (Pavlidou et al., 2021). While the hybrid-learning domain provides flexibility regarding learners' time management in complying with online tasks and flexible time for the instructor in grading the tasks, the face-to-face environment focuses on productive skills. It gave learners more opportunities to interact with peers, instructors, and course materials. These enable a more interactive and better learning environment. The combination of the Connectivism and Constructivism approaches in the hybrid classroom addresses this type of learners' fluency in multiple media and simulation-based virtual settings. Hybrid learning positively impacts students' academic performance in high thinking skills, integrative learning, and reflective learning. With proper teacher training, planning, integration of various methodologies and student-centred assessments, and support from university administrators, hybrid learning can successfully equip learners with the skills required of the 21st–century graduates (Rodrigo & Platon, 2022).

BENEFITS OF HYBRID LEARNING

Two areas benefit hybrid learning; organisational and pedagogical benefits related to educational access, efficiency in teaching and quality of learning (Raes, 2022). Moreover, synchronous hybrid learning gives students a better sense of control over their learning, improves their higher thinking level, and provides a space for creativity, fun, challenge and becoming familiar with ICT integrated. Furthermore, it allows teachers to use their creativity while teaching using different apps and techniques (Aristika et al., 2021). In hybrid learning, students can choose what style suits them the most. They can select either online or classroom lectures (Neelakandan, 2021). Unlike the traditional learning approach, hybrid learning could offer an array of opportunities for time and space-constrained individuals. It is effective and applicable in different collaborative learning approaches in cross-disciplines, institutional bridging, and non-formal settings (Mosa Alnajdi, 2014). In supportive hybrid learning and teaching, it is crucial to consider pedagogical, social and technical elements as part of a learning and teaching space's epistemic, social and set design (Raes, 2022).

Hybrid learning became popular during the pandemic's teaching and learning process; however, it remains an essential platform in the post-pandemic educational field as it opens up possibilities for more engaging educational activities. Indeed, economic and intellectual benefits can be seen with conferences that cater to a more significant number of participants when not limited by the physical presence (Lee et al., 2022). It is also seen as an effective tool for advancing significant pedagogical processes. It contributed to collaboration, collaborative learning, reflective pedagogical discourse and process knowledge development (Murad et al., 2022).

A hybrid learning environment is found to be suitable for collaboration among students working on the same to work on topics outside classrooms or lecture halls. Students get a chance to deal with complex issues, complete assignments, and other responsibilities, which help students to expose and experience real-life activities. Moreover, it is a student-centred activity integrating ICT resources and other forms of support (Valtonen et al., 2021). Engaging the students in active learning experiences helps them produce new knowledge and allows them to become critical thinkers, creative and able to solve problems so that they can deal effectively with the challenges of the twenty-first century (Alison, 2010). However, in an educational environment where digital has become increasingly used, ICT should not be used merely as a support resource or as something exceptional but should be carried out during pedagogical practices to create a more sustainable model. Teachers must be trained to use appropriate ICTs (Carrión-Martínez et al., 2020).

There are challenges of hybrid learning as well among students and teachers to shift from the physical classroom to a complete e-learning environment, and students reported a drop in

morale, loss of motivation, difficulty focussing on their studies and internet connectivity problems (Azlan et al., 2020).

DISCUSSION

The literature reviews found that using ICT in education played a significant role, especially during the Covid-19 pandemic that led to the closure of educational institutions across the globe. The situation was tackled successfully with the help of technology. Almost all the educational institutions in India started to shift from physical learning to online. After sorting out the problems of fully online and fully online, the importance of hybrid learning emerged. Hybrid learning is a learning approach in which some students attend class in person while others participate online according to their conveniences. It is a platform where teachers use video conferencing hardware and software to simultaneously teach remote and in-person students (Sumandiyar et al., 2021). In India, the hybrid mode of learning is all synchronous. However, the notes and the materials are shared with students so that students can look back and learn if they are not very clear during the class.

Moreover, the hybrid learning model encourages students to participate more actively in future learning activities (Sumandiyar et al., 2021). For the effectiveness of online or hybrid modes, teachers trained themselves to learn how to use ICT in their teaching. A student-centred learning approach became more visible in the hybrid learning mode. It helps a student be active and collaborative, develop high-level thinking, solve problems, and become a digitally literate person in this technological knowledge. In this approach, group or individual activities are conducted and presented later. Teachers become facilitators more than traditional lecturers. The whole learning process is transformed into more active and student-centred learning (Wut et al., 2022). The hybrid learning environment is supported by Constructivism and Connectivism learning theory. The hybrid mode of learning makes it easier for students and academicians to participate in international seminars, conferences and other important meetings with less trouble. A teacher cannot be replaced by anything yet, and a teacher can use or adopt a different method to make their profession more effective and productive. With the changes over time, ICT in education has become more significant. Therefore, to compete with the outside world and even in the schools, the usage of technology in an education setting and the teaching-learning process is essential. The teaching activity interaction strongly correlates positively with learning content interaction, student-student interaction, and teacher-student interaction (Li, 2022). However, in the process, motivation in learning is very significant in hybrid learning while presenting. Without motivation, learning will not be effective, no matter the method or content (Aristika et al., 2021). Sumandiyar (2022) revealed that collaborations between parents and teachers play an essential role in the effectiveness of hybrid learning, apart from stable internet connectivity. Additionally, the Effectiveness of hybrid learning is determined by the willingness of students and parents to monitor their children while studying at home with hybrid learning.

CONCLUSION

Hybrid learning is the combination of online and offline learning modes made for students' convenience. It became popularised after the second phase of the Covid-19 pandemic when several challenges emerged from fully online or fully offline. This approach's effectiveness is determined by the motivation given to students and teachers, proper curriculum, facilities, and most importantly, teachers' proficiency in implementing hybrid learning modes for both online and onsite learners. The present education system is based on student-centred learning where students play a prominent role and teachers as guides or facilitators. Hybrid learning is supported by the learning theory of Constructivism and Connectivism, where learners actively participate in the teaching-learning process, collaborative learning, critical thinking, problem-solving and creativity. Moreover, students are expected to be digital literate in this technological

era. Therefore, hybrid learning provides a platform for students to explore and learn through technologies to adapt to the changing in time.

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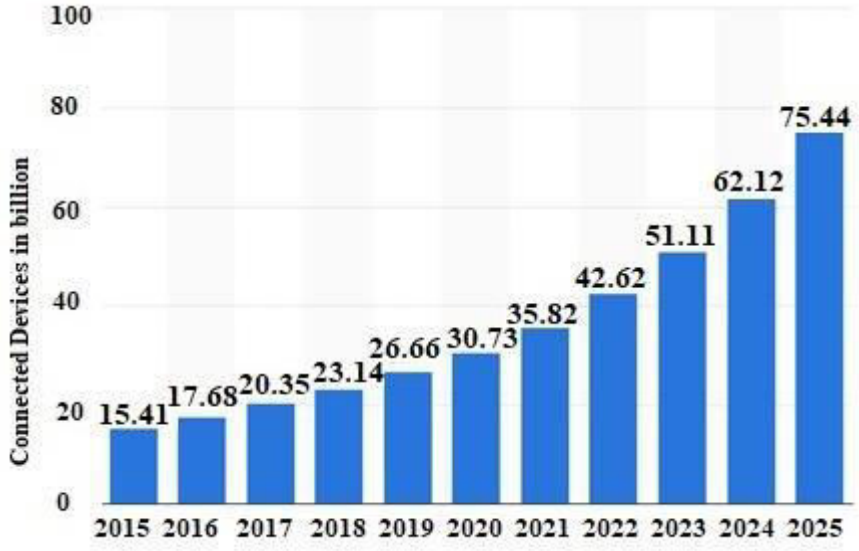
DEVELOPMENT OF SMART CITY USING INTERNET OF THINGS (IOT)

Ms Sarita
Research Scholar, Faculty of Engineering & Technology, Jagannath University, NCR, Haryana, 124507, India

ABSTRACT
India launched its National Smart Cities Mission (SCM) in 2015 with the advancement of technology urban cities dynamics are changing rapidly into smart cities .And there are various kind of sensors with different parameters all around the world . By recent study, 50 billion connected devices will be stationed in smart metropolises by 2020. That will make our cities smart. However, they will also open up risks and privacy issues. We also discuss the interaction between smart cities and IoT and explain some of the characteristics and development of IoT and smart city. The paper puts forward strategies for smart city development and to transform urban India.

Keywords: Smart city, cities, IoT, urban, India, devices.

1 INTRODUCTION
Smart city is all about smart and innovative solutions which are crucial for improving productivity, increasing operational efficiencies, and reducing management costs. It is a network of interconnected devices that can communicate with each other to perform a wide range of actions. Each device in the IoT network is connected to the sensors that sends and receives data from surrounding devices. Smart cities utilize this to achieve sustainable economic development and quality-of-life improvements. IoT refers to devices connected to the internet to transmit data and according to industry experts IoT is essentially a system where the Internet is connected to the physical world via a multitude of sensors. The number of Internet-connected devices are expected to number between26 billion and 50 billion globally by the year 2020. In 2021, the number the number of Internet-connected devices grows 9%, to 12.3 billion active endpoints. By 2025, there will likely be more than 75 billion IoT connections.



2 LITERATURE REVIEW
A Smart city is defined as a city having its own intelligence also known as Urban Intelligence. The framework of the smart cities has been highlighted using the 3-C concept which includes

competence, convenience and cleverness. A brief light has also been thrown on the concept of smart cities in India which defines the eligibility and selection criteria which is a prerequisite for availing the benefits of this plan. Some schemes and policies like Atal Mission for Rejuvenation and Urban Transformation (AMRUT) have also been mentioned.

The census report of India from 2001 to 2011 shows that rapid urbanization is taking place which would continue to increase thereby leading to over urbanization and increase in the socio-economic issues in the country. The metropolitan cities are already facing issues like population growth, shortage of resources like gas and electricity, sanitation and hygiene etc. These problems have increased due to the migration of rural population to cities. This has led to the issue of creating new cities and developing the existing ones to boost the smart city development in India. The six dimensions of Smart cities are smart economy, smart mobility, smart environment, smart people, smart living and smart governance. The Indian government has launched a scheme to develop 100 smart cities in the country. For this a tie up has been made with multi-national companies under the Public Private People Partnership also known as PPPP. This could be done in two ways either by uplifting the existing cities with technology like transportation, healthcare, housing etc. like it has already been done in Bangalore by deploying IP cameras for security of the residents or come up with new Smart cities. Japan has provided financial aid to India to push up the smart city mission.

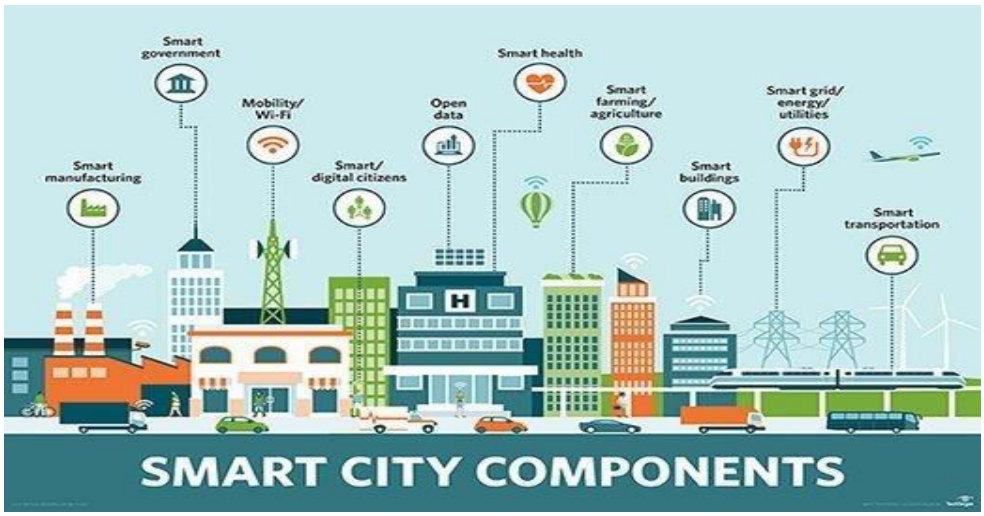
3 SMART CITY

Smart city technology starts with people. Smart city uses information & communication technologies (ICT) to share information between people to increase efficiency, services provided by government for citizen welfare. By the use of smart technology and data analysis, for improving the citizens living style and to optimize city functions. It uses combined internet of things (IoT) devices. Smart city is all about to make smart solutions to provide cheaper services to citizens. Smart city is urban area that is highly advance in infrastructure, transportation system and land utilization etc.

Smart cities are no magic bullet. While their underlying technology does to some degree contribute to sustainability by improving resource use efficiency, it does so in a way that increases the throughput of that to which it is applied.

Several characteristics that make a city smart are:

1. a technological infrastructure;
2. smart environment solution;
3. a high functioning public transportation system;
4. People to live in the city and utilize its resources.

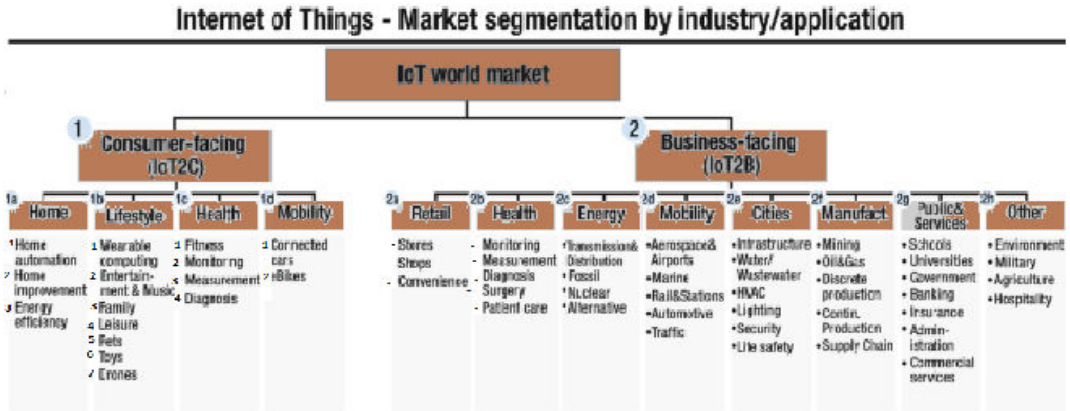


A city can be smart through a large deployment of IoT (especially through machine-to-machine and human-to-machine communications).Wireless Sensor Networks (WSNs), the sensing-actuation arm of the IoT, seamlessly integrate into urban infrastructure forming "digital skin" around it. The information generated is shared across diverse platforms and applications to develop a Common Operating Picture (COP) of the city.

Smart buildings are also part of a smart city project. New buildings constructed with sensors to provide public safety. Sensors can also protect the building from water leaks damage and structural health of building. Sensors can also detect when repairs are needed and help to reduce costs and improve services.

4. INTERNET OF THINGS

The IoT concept leverages several ubiquitous services to enable Smart City deployments all over the world through the use of sensors and actuators based technology. IoT technologies are expected to be part of large scale networks, with the number of devices in the thousands and areas spanning several kilometers. It inform us about the status of everyday items such as vehicles, tools and even living beings with the help of sensors. The analyzed data in this is then used to make decisions As a result, IoT products are changing cities by enhancing infrastructures, creating more effective and cost-efficient municipal services, improving transportation services by decreasing road traffic congestion, and improving citizens' safety. The term was first proposed by Kevin Ashton, a British technologist, in 1999 when he was at MIT.



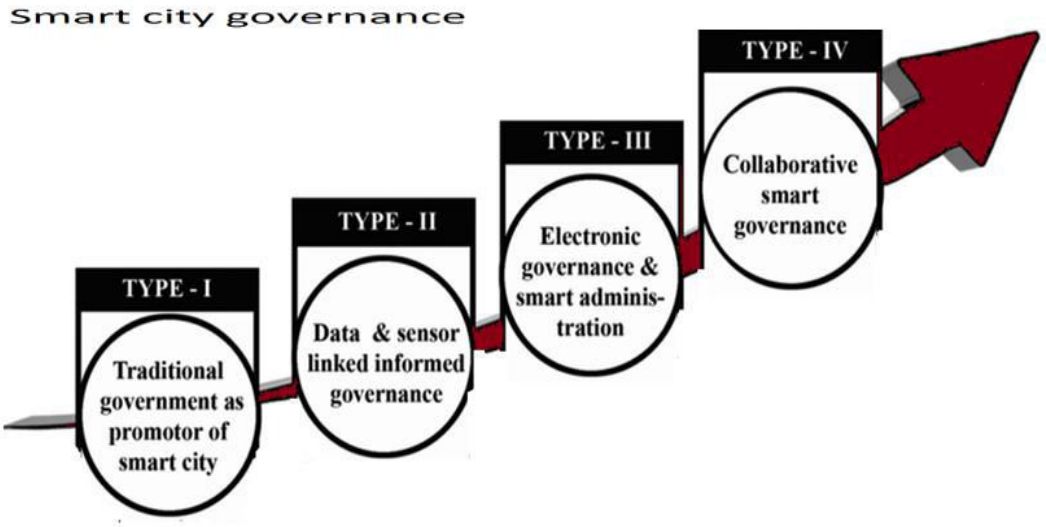
5. IOT AND SMART CITY IN INDIA

The Internet of Things has impacted India's industry. The Indian internet of things (IoT) market is expected to expand at a compound annual growth rate of 13.2% from 2020 to 2025.

IoT is used in (i) public streetlight that's intensity based on weather conditions and time people presence; (ii) smart parking to identify free parking slots ; (iii)giving wastage information about waste containers for the optimization of the collector truck's route; (iv) reduce energy consumption ; (v) noise monitoring with taking adequate measurements in case of abnormal values; (vi) traffic management through the use of sensors, GPS, cameras, and smart phones for navigation and congestion control; (vii) building health monitoring.

Some of the biggest challenges that have to be conquered to make the Smart Cities Mission a success are financing and policy coherence. Towards a New Indian Model of Information and Communications Technology-Led Growth and Development. 174 cities by "smartness," which incorporated indicators for human capital, social cohesion, economic prosperity, governance, environment, mobility, urban planning, international outreach, and technology. Indian cities ranked between 153 for Bengaluru and 169 for Kolkata, with Mumbai and Delhi falling in between. Only Douala, Lagos, Caracas, Lahore, and Karachi ranked lower in the index, demonstrating the continuing challenges Indian cities face not just in becoming the hubs of technological governance envisioned by the SCM, but even in delivering basic services to all their residents.

While the Smart Cities Mission embarks on a large scale urbanization programme integration of the three pillars of sustainable development into national planning and policymaking is a challenging yet unavoidable responsibility to achieve economic growth and social development without compromising on environmental protection to create an India that is truly in harmony with Mother Earth.



6. CONCLUSIONS

IoT has unlimited potential. With large-scale implementation, thoughtful deployment, and careful management, IoT, urban data platforms, big data, and artificial intelligence can transform our urban hubs into smart, sustainable, and efficient spaces. The year 2021 can be expected to be amicable to enterprises adopting an IoT-based enterprise security system while at the same time not being so well received by enterprises that have still chosen to take on a traditional way of managing their operations. The smart cities concept has gained a lot of attention lately and it will most likely continue to do so in the future.

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CYBER SECURITY: ATTACKS, TERRORISM AND SECURITY TESTBEDS

Dr. Neeraj
Assistant Professor, Chandigarh University, Mohali (Punjab)

ABSTRACT

For many years, educational testbeds have been produced. The development of cloud-based storage architectures, as well as the improvement of memory and storage technologies, has enabled the construction of small to medium-sized testbeds at cheap or medium cost in the last ten years. These advancements lay the groundwork for the creation of educational testbeds for cyber security training and exercise for a variety of target groups (e.g., students, IT professionals, engineers) in a variety of domains (e.g., cyber security, IoT, Industry 4.0). Within the information security community, testbeds are well-established (e.g., malware analysis, cyber security experimentation, and so on). However, because these testbeds sometimes necessitate a certain level of upkeep or resources, they were rarely used by non-expert communities.

However, it is critical that testbeds reach a wider audience in order to provide cyber security skills and capabilities to a variety of groups. We examine how an educational testbed could be developed in this study by (1) looking at existing testbeds in research and education and (2) looking at how conventional testbeds are designed. We suggest a design life cycle, or methodology, based on this to make the construction of cyber security testbeds easier. In a case study, we demonstrate our findings. We used open-source technology to create and implement a cyber security testbed for educational purposes. The findings and literature study validate the design life cycle and demonstrate dependencies between the testbed's underlying technology and the planned problems. These findings contribute to the growth of the field as a whole. Testbeds and can be utilised as a starting point for further research. We intend to construct an automated and adaptable cyber security testbed by expanding our testbed.

Keyword: Security, Cyber, Attack

I. INTRODUCTION

Educational testbeds have become an important aspect of cyber security training, exercises, and education. The creation and installation of testbeds, as well as the capacity to scale up or down resources, were made possible by new technologies such as cloud computing.

Testbeds are used to support the objectives of training and exercises, particularly in cyber security education and exercises. For example, to create a testbed for SCADA systems [1], [2], to teach and train cyber security incidents [3], or to experiment with and test cyber security [4], [5].

Testbeds can also be used to improve skills and competences in the use and understanding of standard operational images [6]. Despite the fact that testbeds have been well-developed, there is little information available online about the design and implementation of testbeds for cyber security education, training, and exercise, making it difficult to understand the architectural decisions and requirements that go into creating these testbeds. Academic and research developments frequently release source code, but documentation and setup are frequently difficult to comprehend (e.g., for beginners).

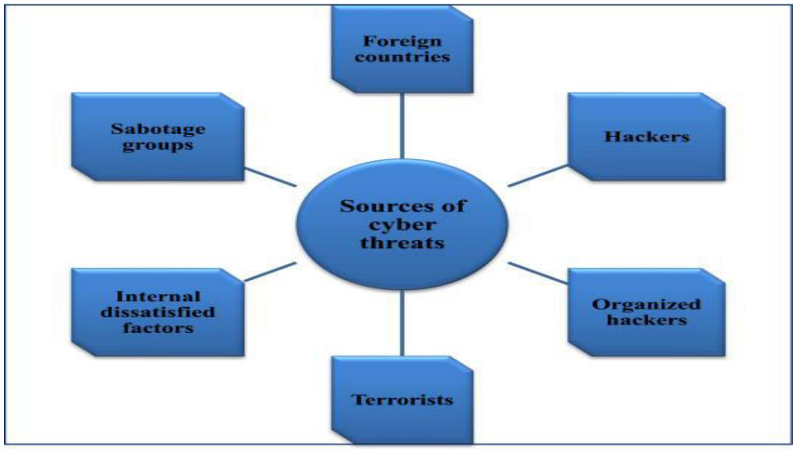

Fig1. **Sources** of Cyber Threats

Furthermore, for non-experts, setting up these systems can be time consuming and inconvenient.

Another reason is that numerous cyber security testbeds have been built in the military arena (for example, [8], [9]), which are often referred to as cyber range or national range.

We want to analyse typical functionality and development processes for cyber security testbeds in order to address this gap and discuss more design considerations for cyber security testbeds. We assume in this work that cyber security challenges, i.e. a task or activity that a participant must complete, can be deployed within a testbed.

CYBER SECURITY TRENDS

In the field of data technology, cyber security plays a crucial role. In today's world, data security has become the most difficult task. The key item that strikes a chord in cybersecurity is cybercrime, which is steadily expanding (Samuel, & Osman, 2014). Various governments and groups are adopting a variety of steps to combat cybercrime. In addition to the many safeguards, many people are still concerned about cybersecurity.

ENCRYPTION

It is a method of encoding messages that is impenetrable to programmers. The message is encoded via encryption, which transforms it into a jumbled-up figure content. It usually ends with the use of a "encryption key," which shows how the message will be encoded. Information protection and respectability are ensured by encryption at the earliest reference point level (Sharma, 2012). Increased encryption use leads to additional cybersecurity issues. Encryption is used to ensure the security of information in travel, such as information transferred across systems (such as the Internet, online commerce), mobile phones, and wireless radios.

TERRORISM ON THE INTERNET

The term "terrorism" can refer to the illegal use of force or violence against people in order to threaten a government, its population, and organisations in order to achieve a political or malevolent goal [10]. Terrorism has evolved from a traditional structure to a computer-based, innovation-supported kind of terrorism known as cyber terrorism. It continues to be important issues in today's culture. Not only is the fight against terrorism lagging, but cybercrime attacks are becoming increasingly strong and combative (Sharma, 2012). This terrorism is the use of cyberspace to launch an attack against the critical foundations on which the existence of organisations and governments is fully reliant, which can result in their shutdown.

II. CYBER TERRORISM PREVENTION

The ability to safely verify cyberspace is critical to preventing cyber terrorism. Terrorism and cybersecurity have a fascinating relationship. Both of them are lopsided. Information, data, and

correspondence security is far more difficult to ensure than getting into a system. In both traditional terrorism and cyber-attacks, the attacker enjoys an intrinsic advantage. The obstacles are much greater as a result of state-sponsored attacks (Cabaj, Kotulski, Ksiopolski, & Mazurczyk, 2018). Governments should ensure that their rules apply to cybercrime and are fully implemented and adhered to; it is critical that biosphere countries take steps to ensure that their penal and technological laws are adequate to face the challenges posed by cybercrime (Kumar, & Somani, 2018).

III. FUTURE RESEARCH AND ITS SCOPE

This study will contribute to the advancement of scientific interests in cybersecurity research, particularly in response to procedural queries about the prediction of future data and behaviours that are relevant to security patterns. This research lays the groundwork for starting to implement rules for all intentions as suggested by the typical security issues and responses for data systems. This document brings together a number of methods that can help with cybersecurity by predicting the operational legitimacy of assessment benchmark methodologies. Finally, the essential, fundamental patterns and reactions to the constant growing progress are the emphasis on controlling, recouping, and disposing of weakness (Panchanatham, 2015).

NETWORKS FOR MOBILE DEVICES

Attacks on web apps to segregate data or spread malicious code are still a possibility. Cybercriminals send their code through good web servers that they have swapped. In any case, information-gathering attacks, of which a significant number reach the media, pose a significant threat. Individuals must now place a greater emphasis on safeguarding web servers and web applications (Bendovschi, 2015). The most important stage for these thieves to obtain information is through web servers. As a result, one should consistently use an additional secure software, particularly during critical transactions, to avoid being a target for these defilements.

CYBERCRIMINAL ACTIVITY

Any illicit conduct that uses a computer as its principal means of commission and theft is referred to as cyber crime. The United States Department of Justice has broadened the definition of cybercrime to include any illegal behaviour that involves the storing of evidence on a computer. Cyber crimes encompass crimes made possible by computers, such as network intrusions and the spread of computer viruses, as well as computer-based variants of existing crimes, such as identity theft, stalking, bullying, and terrorism, which have become a major problem for individuals and governments. Typically, cyber crime is described as a crime done with the use of a computer and the internet to steal a person's identity, sell contraband, stalk victims, or disrupt operations using malicious software.

IV. TYPICAL CYBER SECURITY TESTBEDS DESIGN CONSIDERATIONS

Based on prior work and existing research projects, this section covers typical design considerations for testbeds. Figure 1 depicts a schematic diagram of a cyber security testbed configuration. Security difficulties of various types are given on top of virtual ICT infrastructure. Depending on the curriculum or course aims, the challenges can have varied topics (e.g., web, stego, or crypto, see Section III-A1). Administrative staff and trainers (for example, lecturers in a university or professional trainers in a cooperation or training centre) collaborate to define and implement challenges. Security challenges may be conducted by challengers. In a self-assessment case study, challengers would be able to initiate and perform security challenges on their own (as illustrated in Figure 1), but in supervised trainings, trainers would initiate and execute security challenges on behalf of challengers.

V. THREATS TO SECURITY

A big element of cyber security is the investigation of software systems for security flaws, as well as the examination of data or programmes (or IT security). Security challenges attempt to

put portions of these activities into a gamified framework and turn them into a puzzle. These puzzles are designed to explain specific security ideas or issues in a fun and useful way. The purpose of most challenges is for a challenger to uncover a secret flag.

For security experts, this is a really useful learning tool. They can learn about typical issues by experimenting with them and gaining a better grasp of how and why they arise. Without the need to put a real system in jeopardy or investigate its complexity.

1. **Challenge Sorts**: Because IT security encompasses so many diverse sectors, there are many different types of security challenges. The most prevalent varieties are listed below.

Web: Web challenges are all about websites and webapps, as the name implies. A challenger must uncover vulnerabilities on or in a particular website or webapp in order to obtain access to a secret flag or the server hosting the service itself in these challenges. This aids in the comprehension of web-based security principles and procedures.

Forensics: This is a data-driven task. A challenger is tasked with locating certain information in a data set such as log files, network traffic, or memory dumps. This category's skills can be applied in incident response scenarios.

2. **Cryptography:** It is a crucial component of IT security. A challenger learns important cryptographic principles and protocols through crypto challenges. This type of challenge frequently necessitates the use of a challenger to decrypt secret messages by breaking basic cryptography protocols or erroneous implementations. This provides a challenger with insight into and a deeper knowledge of cryptography's intricate environment.

Reversing: For many security analysts, reverse engineering is a crucial skill that can be highly beneficial when evaluating harmful programmes. To uncover a secret flag, reversing challenges need the challenger to figure out what a binary file is doing.

Exploitation: This type is similar to reversing, but the emphasis is on actively exploiting flaws in a certain binary or application, which are commonly found in known code. "Set user id"-binaries with buffer overflows are a frequent sort of exploitation challenge in which the challenger must execute everything.

3. **Stenography:** It is the art of concealing information. In some cases, the sheer presence of data, even if encrypted, might be hazardous to a person's safety. For example, activists in oppressive regimes may have material on their electronics that their government considers illegal. Encrypting such data would not shield them from prosecution because the government would very certainly require them to decrypt all encrypted data.

As a result, they must conceal it so that it appears as if there is no data at all. A challenger must find such data in order to complete a Stego challenge. Because well-designed stenography demands considerable resources to break, challenges frequently use weak or badly executed stenography approaches.

CONCLUSION

The paper discusses cyber security as well as cyber terrorism. In its subsections, it covers a wide range of information on these issues. This study defines cybersecurity trends and the importance of social media in cybersecurity. The document contains important information regarding cyber terrorism. This paper also explains the components of "cyber terrorism" as well as the effects of this terrorism. There are a few case studies related to cybersecurity that you can look at. The report also offers various cyber security and cyber terrorism remedies. It outlines various methods for combating cyber terrorism. It defines the future study and scope of cybersecurity. A life cycle for the design of educational testbeds was given in this research. There are seven steps in the life cycle:

(1) Create an environment, (2) deploy it, (3) define challenges, (4) deploy challenges, (5) perform challenges, (6) maintain the environment, and (7) maintain the challenges.

We exhibited stages (1) through (5) in a case study in the paper to explain the numerous factors that are required to set up cyber security problems.

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A STUDY ON E-TRAINING PROCESS IN SELECTED IT AND ITES COMPANIES WITH SPECIAL REFERENCE TO CHENNAI

[1]M. M. Shanmugapriya and [2]Dr. D. Venkatramaju
[1]Research Scholar, [2]Research Supervisor, Department of Management Studies, Bharath Institute of Higher Education and Research

ABSTRACT
Employee E-Training is a cycle where individuals master expertise, information, disposition, and conduct required to proficiently play out the gig. It is a specialty of expanding the information and abilities of a representative for making a specific showing. The intention is to foster the capacities of the individual and fulfill the current and future labor supply need. Preparing need must be coordinate with the need of the individual and assist him with filling toward the path which drives him to progress. To adapt to the adjustment of inward and outside climate the representative should be prepared. Preparing abbreviates the time expected for representatives to arrive at their productivity level. They increment the quality and the amount handled and lessens the inactive time. A powerful arranged very much oversaw preparing program increment and efficiency, cost control, lower worker turnover and better human relations inside the firm. In this study it is to figure out the preparation viability among ITES area. An example size of 70 was gathered from an organized poll. This study was determined by utilizing factual devices like chi-square, one-way Anova, Correlation.

Keywords: E E-Training, online E-Training, organization, recruitment.

INTRODUCTION
The word "E-Training" is an enveloping term, which is many times utilized, in portraying changes happening in our ways of behaving in view of an encounter we have experienced eventually in our lives. This study is to recommend that there is a hole between the representative's degree of capability and execution level and how the preparation is liable for the viability of work of the representatives at the work place. The majority of the businesses are stressed the way that representative answers the preparation program and their post preparing work mentality. In the current Scenario, preparing is viewed as one of the main Human Resource practice in the association.

REVIEW OF LITERATURE
Winfred Arthur Jr et.al(2003) led a review to look at the connection between determined preparing plans and assessment highlights and the viability of preparing in associations. As per him E-Training is one of the most inescapable strategies for improving the efficiency of people and conveying authoritative objectives to new faculty. The outcomes propose that the preparation technique utilized, the undertaking trademark prepared, and the inclination of preparing assessment rules are connected with the noticed viability of preparing programs. Mehrdad Alipour et.al(2009) has enunciated that preparing is a significant hierarchical speculation getting a good profit from venture implies connecting the preparation capability and exercises to the organization's general business action. Compelling preparation works on the data, mentalities, abilities and conduct of individuals and subsequently their exhibition If an association needs very inspired, state-of-the-art, inventive and useful labor force, they need to begin and fabricate a Strategy for what's in store .This system needs to perceive that corporate presentation is absolutely reliant upon the presentation of the association's kin. Shakila.P(2014) thinks that numerous specialists have communicated extraordinary worry about the absence of ideal use of the executives preparing and improvement assets; they have put forth barely any attempt in tracking down available resources of further developing it. Preparing programs are a lot of fundamental for workers for additional improvement of their profession. Numerous

scientists has focused on the subjects of different angles like preparation viability, consumer loyalty, the executives preparing and improvement, preparing perspectives and objective direction. Shefali Verma, et.al(2011) verbalized that preparing assumes a vital part in the outcome of any association in light of the fact that straightforwardly or by implication it influences the presentation of the representatives. Through preparing open doors, representatives can improve and keep up with abilities that are expected for work in a constantly evolving working environment. The outcome showed that there is no distinction in the impression of the representatives based on orientation, Educational capability, and assignment. Mohammed Rejaul Karim, et.al(2012)says that Skills, Knowledge and demeanor are the most fundamental basis of a worker for proficiently playing out the tasks in any undertaking. These models' are the main resource in accomplishing upper hand for an association. Preparing assists representatives with getting an unmistakable perspective on their work. Because of changing situation of business environment preparing ought not be thought of as the main key to foster representatives and in this way search for choices like instructing, advising, work based learning and mentoring.Kim Tan, et.al(2012) said that preparing endeavors should actually change the ways of behaving and execution viability of sales reps in manners that help the deals force in gathering the essential goals of the firm. Association should assess their deals preparing endeavors in these three expansive regions. Some should explain their goals and figure out which preparing is generally appropriate, and they should assess the effect of preparing on salesmen, zeroing in fair and square of conduct change those outcomes. Anam Amin in his article said that preparing prompts fundamental advantages for people, groups, associations and society. These different advantages range from individual and group execution to the monetary thriving of a country. These variables incorporate focusing on needs evaluation and relating conditions of preparing plan and conveyance

Objectives

- To find the E-Training program has any relation with the employee job.
- To find E-Training is effective for the productivity in the organization

Research Methodology

Descriptive research was considered for this study. The key idea of descriptive research of the state of affairs, as it exists as of now. Descriptive research design is concerned with describing the characteristics of a particular individual or a group.

Data Collection

This study was based on primary data, which was collected through structured questionnaire from different IT and ITES companies in Chennai.

Sample Size:

The sample size taken for the study was from 70 employees.

Sampling Method

A simple random sampling technique was used to collect the samples from the employee. The study is conducted in various departments in the organizations which relates to the employees interest, behavior and attitude towards the E-Training.

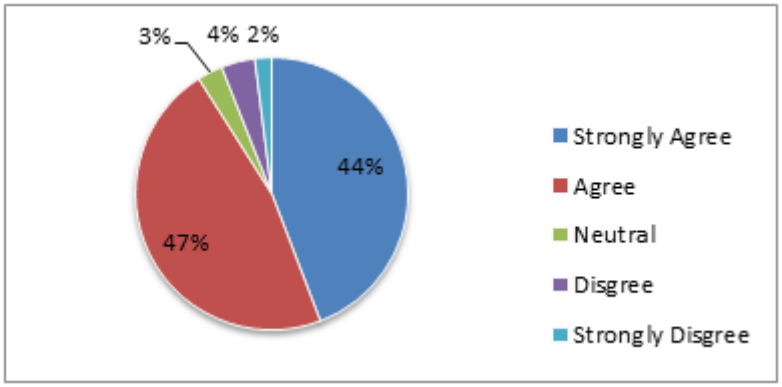
Statistical Tools

The statistical tools used to analyze the data are Chi-square, One way Anova , correlation etc.

Data analysis and interpretation

1. E-Training has a positive impact on employee motivation and learning.

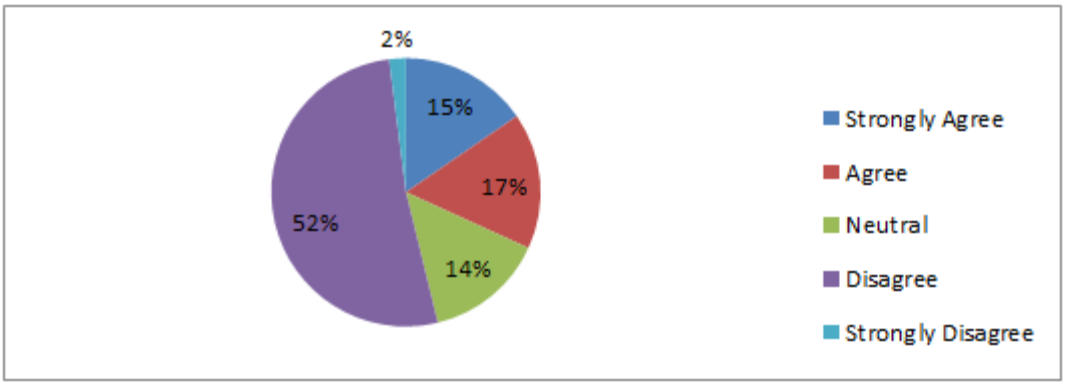
S.NO	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	44.2 %	46.8 %	3 %	4%	2%



- It is strongly agreed E-Training has a positive impact on employee motivation and learning.

E-Training process focuses more on theoretical part

S.NO	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	15.4	15.4	15.4	51.8	2



- It is strongly disagreed E-Training process focuses more on theoretical part

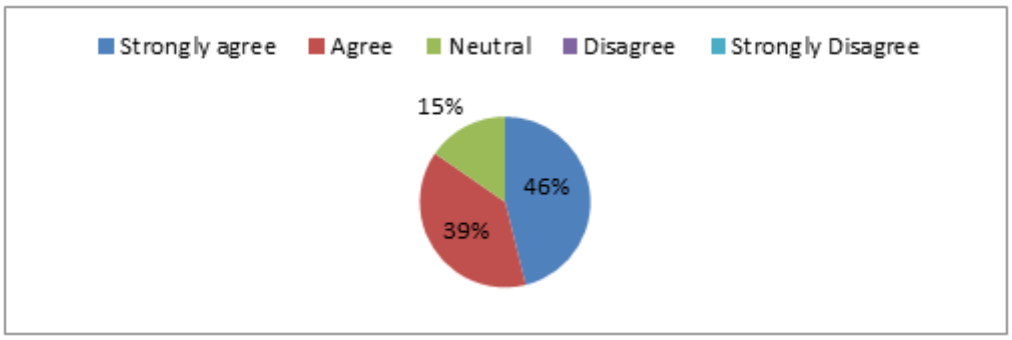
E-Training helps in fast learning to employees

S.NO	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	38.5%	15.4%	29.8%	15.4%	1%

- **It is strongly agreed E-Training helps in fast learning to employees**

E-Training removes the constraint of location, travel and time zone constraints

S.NO	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	46.2%	38.5%	15.4%	-	-



- **It is strongly agreed -E-Training removes the constraint of location, travel and time zone constraints**

RECOMMENDATIONS

 Duration of E-Training need to be expanded.

 E-Training ought to be given in a space of specialization to advance representative's information.

 Motivation program have to be coordinated regularly.

 Periodic updation of preparing system need to be finished in a legitimate way.

 New preparation strategy should be coordinated in order to more keen the information on the workers.

 Trainer ought to know his obligations and obligation regarding the advancement of the workers.

 Feedback have to be taken in an ordinary premise after the preparation.

CONCLUSION

E-Training is an important activity in the organization. Increasing the duration of E-Training program will help the employees to get better exposure the working environment and they can do their work effectively and efficiently. Giving E-Training in specialized area will help the employees in minimizing wastages and staying focused to their work. If E-Training is given according to the need of the job than the employees will have a better idea towards the work allotted to them. Periodically updating the E-Training program well allows the employees to know the changes happening in the organization and organizing new E-Training methods will allow the employees to stay focused and find it easy to perform their work. Getting E-Training from external faculties will help the employees to have a better idea on external environment. Trainer has to know their duties and responsibilities which help the employees to get proper E-Training and solutions in the required area. Taking feedback will always help the organization to develop the employee in the proper manner which ultimately leads to Productivity and Profit.

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USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICTS) IN MANAGEMENT OF INFORMATION RESOURCES IN UMARU MUSA YAR'ADUA UNIVERSITY LIBRARY, KATSINA

[1]Mohammed Tukur Lawal and [2]Nafiu Maharazu
[1]Research Scholar, Department of Library and Information Science, SRM University, Sonepat, Haryana, India,
[2]Department of Library and Information Science, Umaru Musa Yar'adua University, Katsina

ABSTRACT
The research identified the key issues relating to the application of Information and Communication Technology in the management in Umaru Musa Yar'adua University, Katsina.

This research work focused extensively on survey research, thereby studying the entire population of Umaru Musa Yar'adua University Library staffs and subsequently used questionnaire research instrument for the data collection. Presentation and analysis of data collected was done by using simple percentage with the illustration of tabulation in analyzing the data gathered. Finding was made regarding the level of usage of the technology and made recommendations and solutions to some issues such as: funding, inadequate infrastructures and area of training and education among others. While solutions preferred are implementation of policies and of actions by Government and its agencies increase in institutional funding to support and sustain Information and Communication Technology development, provision of adequate infrastructure and training in Information and Communication Technology related areas.

INTRODUCTION
The term, Information and Communication Technology (ICT) as it relates to library and as noted by DeWatteville and Gilbert (2000), is the acquisition, analysis, manipulation, storage and distribution of information; and the design and provision of equipment and software for these purposes. Oketunji (2002) defines ICT as computers and other technologies that are used in the acquisition, organisation, storage, and retrieval and disseminating of information in libraries. Mayer (2006) added that ICT in libraries is a term that covers the acquisition, processing, storage and dissemination of information in textual, numerical, pictorial and audio-visual formats. He further stated that the term is restricted to systems dependent on microelectronics; that is the technology and techniques involved in the design, development and construction of extremely small electronic circuits such as computer on a single silicon chip. Similarly, Daniel (2010) sees ICT as forms of technology that are used to create, store, transmit, share or exchange information. This broad definition of ICT includes such technologies as: radio, television, video, Digital Versatile Disk (DVD), telephone (both fixed line and mobile phones), satellite systems, computer and network hardware, software and the Internet, as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail.

The library is the nerve centre of academic activities in universities. It is a depository of knowledge with varied and useful information in numerous formats. Like every other library, the core functions of university libraries are; acquisition, cataloguing, circulation, serial control, interlibrary loan and management and delivery of information in both traditional and electronic format. They assist in achieving the goals and objectives of their parent institutions through the provision of current and relevant information resources that are necessary for sustaining the learning, teaching, research, other functions and activities within the institutions. In line with this, Vickus and Metsar (2004) noted that the library is a place where different social policies, theories and ideologies are met and a space to study different arts and cultures provided. In

order to achieve these, the library acquires and manages resources which include material and human resources.

STATEMENT OF THE PROBLEM

Over the years, library information resources have grown in terms of size, format and variety. The digital era has seen the emergence of digital information resources in Nigerian libraries. Similarly the deregulation of the telecommunication industries has made ICT accessible and available in Nigerian libraries (Gbaje and Okojie, 2010). Many libraries especially the academic libraries use ICT to manage their resources, the degree of which is yet to be established.

The manual method of operating the library in this contemporary society is becoming boring resulting to a slow rate of processing and management of the library resources. The decision for the introduction of a new method of operation became vital, which will be most efficient, effective and fast in retrieving and dissemination information.

However, in Umaru Musa Yar'adua University library is still at developing stage due to inadequate funds, presence of obsolete computers (ICTs) and of course lack of space to accommodate these ICTs, therefore making researchers interested to investigate more about the extent of computerization in Umaru Musa Yar'adua University Library.

Objectives of the Study

1. To identify the type of ICT facilities available for the management of library information resources in the Library.
2. To identify areas where library operations ICT facilities are applied for the management of library information resources in the Library.
3. To ascertain the extent of use of ICT facilities in the management of library information resources in the Library.

LITERATURE REVIEW

UNIVERSITY LIBRARY INFORMATION RESOURCES

The primary purpose of university libraries is to support the university functions of teaching, learning, research and community services in ways consistent with, and supportive of, the institution's mission and goals. In support of the above, Chiweza (2006) added that the growth of research in all fields of human endeavour is becoming increasingly detailed and sophisticated; Also, the staff and students have realized that the library has great roles to play in the provision of the information necessary for their day to day research. The library acts as a medium of getting the latest scientific and technological information either in print or in electronic form, for accessibility and use of the library patrons. Library resources include not only traditional print-on-paper media like books, journals, newspapers, and maps, but also audio-visual materials like cinematograph film records, audiocassettes, video cassettes, projectors, microfiches, Compact Disk Read Only Memory (CD-ROM), computer software, online databases, electronic books and e-journals and other media via the Internet. Halsey (2006) added that libraries maintain collections that include not only printed materials but also art reproductions, maps, photographs, etc. In addition to maintaining collections within library buildings, libraries often offer telecommunications links that provide users with access to information at remote sites. University libraries are often considered the most important resource centres of an academic institution. Hence, they should be sufficient in quality, depth, diversity and current to support the institution's curriculum as posited by Oyewusi and Oyeboade (2009).

Other important resources in the library are the human beings who are the most valuable asset of any library. Even with the availability of ICT infrastructure, funds and information resources in

a library, nothing gets done without man-power. Adekunle et al. (2007) noted that applying ICT in a library depends largely on human resource attitudes toward it.

MANAGEMENT IN LIBRARIES

Management is that field of human behaviour in which managers plan, organise, staff, direct, and control human and financial resources in an organisation in order to achieve the desired individual and group objectives with optimum efficiency and effectiveness,(Subedi, 2007). Management has been defined as the process of getting things done through and with people. It is the planning and directing of efforts and the organizing and employing resources (both human and material) to accomplish some predetermined objectives. For the purpose of this study, management is the use of people, technology and resources to achieve the set goals and objectives of a library.

In a book entitled Foundation of Management by Robbins and David (2004) looked at management as it relates to libraries as the ability of a librarian to manipulate library staff, users and material resources in order to achieve its organisational goals and objectives. It is also the act to exploiting the resources of a library efficiently in cost-effective ways to facilitate efficiency in decision making through planning of what to select and acquire. Management of library resources includes organizing orientation, staff training, workshop and seminar for staff and patrons and making sure that the information resources shelved for users are easily accessible. However, library staff in the management of information resources, controlling the library staff to see that they perform their duties and ensure that users obliged to obey rules and regulations governing the library. Management in libraries also involves recruitment of new staff and developing the old ones. It also entails reporting what the library has achieved quarterly, biannually or annually to the management and preparing annual budget on the type of information resources the departments need based on requests made by users or funds available to the library, what they will need to meet the demand of the users and other administrative duties (Robbins, & David, 2004). In his paper, "Introduction to Modern School and College Library Management, Ekoja (2010) summarised library management as:

"Working with and through people using material and other resources to achieve set goals, in other words, management is the synchronization of people and resources to achieve organisational goals. Management thus involves planning (deciding on future activities and putting in place plans for action); organisation (implementation of plans by making maximal use of required resources to achieve them); staffing (job analysis, recruitment and hiring of the appropriate staff to discharge the appropriate functions); leading/directing (determining what needs to be done in work situations and getting the people to do them); controlling/monitoring (checking progress against plans); and motivation (providing incentive to get the personnel to work effectively and efficiently)"

The implication of the statement above is that no individual can work alone to achieve the organisational goals and objectives without working with other staff in the library to effectively manage the resources to meet the user's need.

University library has to manage its resources for effective service delivery to its patrons. Iya et al. (2005) asserted that the basic tasks in managing library resources include acquisitions, processing, storing, maintenance, preservation, loaning and general administration. Other management issues include the planning of the construction of new libraries or extensions to existing ones and the development and implementation of outreach services and reading-enhancement services. Akintunde (2006) noted that having resources in the library is one thing and managing them for effective service delivery is another. Most of the libraries are managing their resources manually which takes time and energy. Faboyinde (2006) pointed out that this

can be done in a short period of time through the use of internet, computers and other ICTs facilities.

INFORMATION AND COMMUNICATION TECHNOLOGY

Information and Communication Technology (ICT) according to Chauhan and Murphy (2004) comprises two strong technologies, one is information technology which usually deals with the hardware and software elements that allow us to access, store, organise, and manipulate the information by electronic means, and the other is communication technology, which deals with the equipment, infrastructure and software through which information can be received, accessed and disseminated, for example, phones, faxes, modems, networks, etc. Today, we all are dealing with information and it is the strength of each nation, new status of any nation can be determined by its information resources rather than economic resources. All professions the library inclusive, are dominated by ICT and now we can hear about e-governance, e-banking, e-learning, e-business, e-education, e-publishing, e-documents, e-journals, etc.

The ICT as the synergy between computers and communication devices is a composite term, which embodies three important concepts, i.e. information, communication and technology. Information means many things to many people, depending on the context. According to DeWatteville and Gilbert (2000), information is any potentially useful fact, quantity or value that can be expressed uniquely with exactness. Womboh and Abba (2008) noted that information is processed data that aids decision making. It could also be visualized as a commodity that could be bought or sold. In this study, information is anything that we come in contact with directly or indirectly that adds to our knowledge and is capable of causing a human mind to change its opinion about the current state of the real world, and in a library, information is data that have been processed into form that is meaningful to the recipient/user and is of real or perceived value in current and future decision.

Communication refers to the transfer or exchange of information from person to person or from one place to another. When action produces a reaction, whether positive or negative, communication has taken place Kindersley (2003) noted that communication is the process of sharing our ideas, thoughts, and feelings understood by the people we are talking with. It is also an act of impacting news to the science and practice of transmitting information. Sanchez (2004) observed that communication is transfer of information, ideas, thoughts and messages that involves a sender, a receiver, a code and, a language that is understood by both the sender and the receiver. There must be a sender to transmit the message, and receiver to make appropriate decisions on how the rest of the exchange should continue (James, 2004). Womboh and Abba (2008) posited that it is a process involving the passing of messages through the use of symbols which all parties in the communication understand. It involves the exchange of ideas, facts, opinions, attitudes and beliefs among people. It is not a one-way affair. Communication is the activity of conveying meaningful information. Communication requires a sender, a message, massager and an intended recipient, even though the receiver may not be present or aware of the sender's intent to communicate at the time of communication. Thus it can occur across vast distances in time and space. It requires that the communicating parties share an area of communicative commonality. In the context of this work, communication is the process of information exchange between the user and the librarian.

Technology refers to the use of scientific knowledge to invent tools that assist human beings in their efforts to overcome environmental hazards and impediments to comfort. In this regard, technology refers to things like the computer, telephone, cell phone, GSM handsets, television, radio, etc. Thus, ICT includes: Computer, Internet, Digital camera, Webcam, Smart Card, Scanner, E-Books, Printers, Electronic Journals, WEB-OPAC, Animation, E-Mail, CD-ROM, DVD, RFID Technologies that enhance the acquisition, analysis, manipulation, storage

and distribution of information; and the design and provision of equipment and software in the library (deWatteville and Gilbert, 2000).

Population of the Study

The target group for this study is the staff of UMYUK library, because they have the common characteristics needed by the researcher and they are fifty five (55)

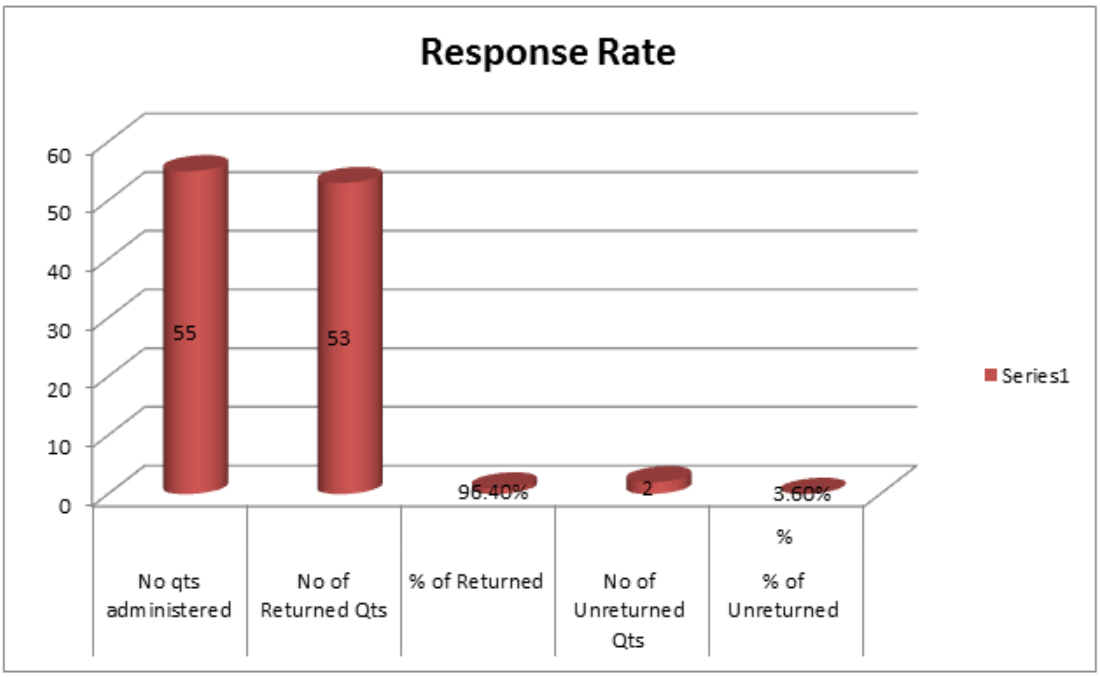
Analysis of Users Responses

As indicated in the preceding chapter the sample population involves fourteen (14) respondents. Out of the total respondents, all the questionnaires were filled correctly and returned.

Table 4.1 Response Rate

Copies of questionnaires administered	Number of Returned Questionnaires	Percentage of Returned	Number of Unreturned Questionnaires	Percentage of Unreturned %
55	53	96.4%	2	3.6%

Figure 1



Out of the 55 questionnaires administered to users, only fifty three (33) representing (96.4%were correctly filled and returned. This shows that the response rate was high.

Educational Qualification

Variables	Frequency	Percentage (%)
Diploma	20	36.36%
NCE	3	5.45%
First Degree	7	12.73%
MLS	12	21.81%
PhD	3	5.45%
Others	10	18.18
Total	55	100%

Figure 2

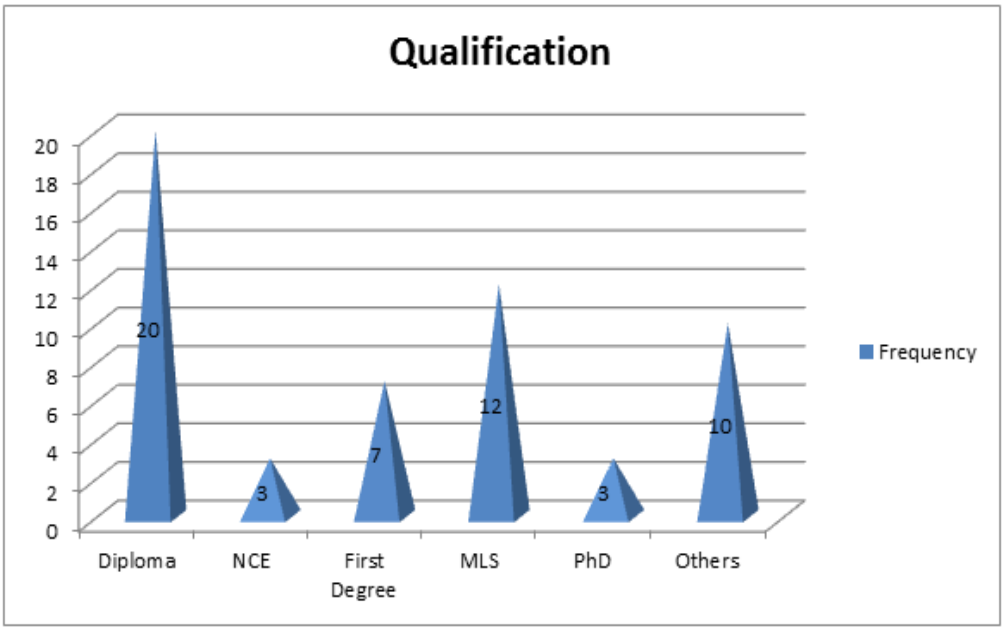


Table 2 and figure 2 shows that out of the 55 respondents, 3 of the respondents were NCE holders which is equivalent to 5.45% 7 of them (12.73%) were First Degree Holders, 3 (5.45%) are PhD and NCE holders and 20 constitute 36.36% which is large are diploma, while MLS is 21.81% and the remaining (18.18) indicated other educational qualifications. And this indicates that most of the respondents were Diploma holders.

Table 3: the Information and Communication Technology Available for Management of Information in the Library

Response	Frequency	Percentage (%)
Computer system, Printer, Scanners	33	100
Telephone, Fax machine, Photocopiers	33	100
Networking	19	57.57
CD ROMs, Optical disk, Flash drives	17	51.51
Others	33	100%

Table 3 shows that all the respondents indicated that computer system, printer, scanner, Telephone, Fax machine, Photocopiers and other ICT facilities are available. Whereas, Networking was indicated by the 19 respondents which is equivalent to 57.57%, CD ROMs, Optical disk, and Flash drives were represented by 17 respondents, that's 51.51%.

Table 4: the Information and Communication Technology often used for Management of Information

Response	Frequency	Percentage (%)
Computer system, Printer, Scanners	33	100
Telephone, Fax machine, Photocopiers	17	51.51
Networking	17	51.51
CD ROMs, Optical disk, Flash drives	17	51.51
Others	33	100%

Table 4. shows that all the respondents indicated that computer system, printer, scanner, Telephone, other ICT facilities are often used. Whereas, Fax machine, Photocopiers 17

(51.51%), Networking was indicated by the 17 respondents which is equivalent to 51.51%, CD ROMs, Optical disk, and Flash drives were represented by 17 respondents, that's 51.51%.

Table 5. the Degree of Computerization in Management of Information in the Library

Response	Frequency	Percentage (%)
Fully	24	72.72%
Partially	9	27.28%.
Total	33	100%

The table shows that, out of the 6 respondents, twenty four (24) of the representing (72.72%) responded that it is fully computerized, while those who revealed that it is not, were 9 which is equivalent to 27.28%.

Assessment on the level of using Information and Communication Technology in the table 6 Management of Information in the Departments of the Library

Variables	Frequency	Percentage (%)
Excellent	3	9.09%
Very good	7	21.21%
Fairly good	10	30.30%
Poor	13	39.39%
Total	33	100%

Table 6 shows that out of the 33 respondents, 3 of the respondents revealed that it is excellent which is equivalent to 9.09%, 7 of them (21.21%) confirmed that it is very good, 10 of them (30.30%) indicated that it is fairly good, and lastly, 13 of them (39.39%) indicated that it is poor.

CONCLUSIONS

In conclusion, this survey research found out that there is low or poor or inefficient use of ICT's in the management of information in UMYUK Library, Katsina. This was confirmed by the respondents that most of them are not happy with the use of ICT's in their departments due to the poor telecommunication networks, lack of training, power failure, and of course improper funding.

RECOMMENDATIONS

Going by the findings of this research, therefore the study recommends the following to be considered and implemented:

1. Since computerization of library resources and services is indeed very significant, then the in UMYUK Library, Katsina, must strive to ensure its effective and efficient implementation so that its dividends could be enjoyed in the library.
2. The Library Management should be active towards ensuring that networking is bettered.
3. The library should advance in the use of ICT's towards managing the information they have by becoming more digital and virtual so as to transform their personnel's perception about the use of ICT's and this will however motivates them.
4. Since the library is partially automated as revealed by the respondents, then it is highly recommendable that the library should be fully automated.
5. Since, the average assessment of the staff about the use of ICT's in information management in the library is a 'very good' assessment from average point of view, then this reveals that possibly the staff does not wanted to reveal the truth due to managerial factors. However, it is recommended that the library top management level should better the library's stance in

relation to the use of ICT's generally for example by training its staff on ICT skills and literacy.

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INTELLIGENT SENSOR AND IOT BASED TECHNICAL ASSISTANCE FOR DISABLED

Nageswari D[1] Vijayalakshmi S[2] and Geethamahalakshmi G*[3]
[1]Assistant Professor, R.M.K. College of Engineering and Technology, India,
[2]Professor, R.M.K. Engineering College, India
[3]Assistant Professor, R.M.K. College of Engineering and Technology, India

ABSTRACT
The aim of this research work is to detect and measure the wrist movements of paralytic patients with help of gyroscope, which is used to convey messages to the caretaker during regular or dire circumstances. Paralysis is the loss of strength in and control over a muscle or group of muscles in a part of the body, which many people in today's world suffer from. To cater to this problem of the paralytic patients, the wrist movements of the hands play a cardinal role in this proposed system.The proposed system works by measuring the tilt angle detected by the device which is placed on the opisthenar area (dorsal) which is the corresponding area on the posterior part of the hand. Different tilt angles convey different messages and at the time of exigency with the help of Wi-Fi module and emergency notification will be sent to the concerned caretaker facilitating effective and efficient communication, ensuring full time attention to the patient's needs in all the circumstances.

Keywords: Wrist movements, tilt angles, Wi-Fi, Emergency Notification, Sensors.

I. INTRODUCTION
Paralysis is the impairment of voluntary muscular power. Paralysis can be a result of either diseases involving alteration in the makeup of nervous, muscular tissues or result of any metabolic disturbances that meddle with the functions of nerves or muscles. Other substantial causes are stroke, head injury, spinal cord injury, cerebral palsy, peripheral neuropathy, ALS (Lou Gehrig's disease), Parkinson's disease and trauma with nerve injury. Depending upon the region affected, paralysis can be of many types and degree, like partial, complete, permanent, temporary, flaccid, and spastic. Alternatively, generalized paralysis can also be categorized based on how much of the body is paralyzed, namely monoplegia, hemiplegia, diplegia, paraplegia and quadriplegia. In addition to these, some patients may be speech impaired making it challenge for them to communicate with his or her caregiver to express his or her needs at all points of time. Therefore, the key motive of the proposed system is to cater to these problems by providing a pragmatic solution. To correlate with the above problem statement, our device is mounted on the posterior part of the hand (opisthenar or dorsal area) which still has motion abilities. Whenever the patient tilts his or her hand in a particular angle, a three-axis accelerometer is used to detect and measure these different tilt angles where every tilt angle is programmed to display certain messages with the help of microcontroller, which are then displayed on the LED screen in addition to a buzzer to alert the caregiver nearby. At emergency situations when the caretaker is not in the proximity, he or she is not only cautioned by the buzzer system, but also alerted with an emergency notification sent via Blynk application with the help of in-built Wi-Fi module present in the microcontroller. In this way, our device, Automated Paralysis Patient Care System truly automates the care taking ability of the patient which ensures timely attention to the patient thereby conveying vital messages to the caretaker.

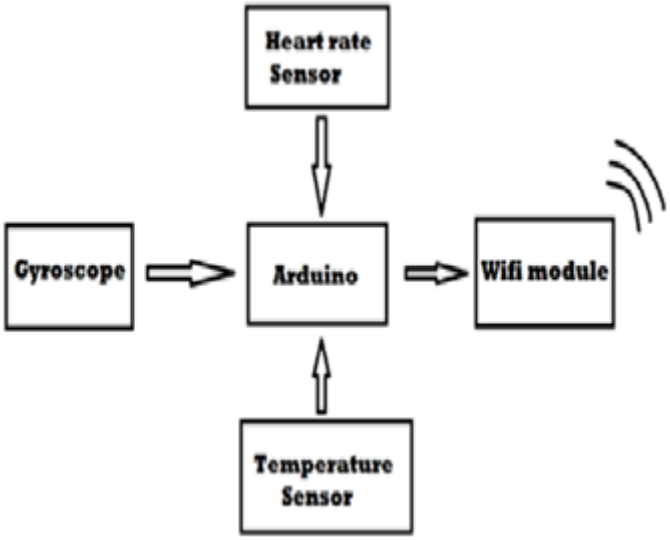

Fig 1. Block Diagram

II. SYSTEM DESIGN

The "Automated assistance for Paralytic Patient" accomplishes the task of providing seamless assistance to paralytic patients in both normal and emergency cases. This device is applicable for patients with either leg paralysis (paraplegia) or paralysis of one single limb or an arm (monoplegia) or patients with speech disorders. The device can be worn on any mobile part of a patient. Here, the unit is worn on the patient's wrist. The patient side consists of a system containing an analog accelerometer, a microcontroller with Wi-Fi module (Node MCU here), a LED display, an analog multiplexer, and a buzzer. Since the Node MCU has only one analog input A0, an analog multiplexer is used to interface the accelerometer with it. Here a triple axis accelerometer is used, which calculates the variation along X, Y and Z axes when triggered by motion. It is highly sensitive, and any small movement can cause variation. Hence, the directions of wrist movement and the corresponding messages to be displayed are predetermined. The block diagram in figure 1 shows the flow of the device. The inputs from the accelerometer are given to the analog multiplexer. One by one, the X, Y and Z coordinates are given to the microcontroller. Whenever the coordinates fall in the predetermined range, the corresponding message is displayed on the LED screen along with buzzer sound. Whenever a patient moves their wrist to the right, to the left and front, the messages "Need Water", "Need Food" and "Washroom" are displayed on the LED screen respectively. This way, a caretaker nearby will hear the buzzer, read the message on the screen, and respond accordingly.

In cases of emergency, the patient moves their wrist backward and a different buzzer sound is played, and the message "Emergency" is displayed. At the same time, a push notification is sent to the Blynk application on the caretaker's phone. This ensures that even when the caretaker is far away, the notification on their phone alerts the caretaker and they can be at service to the patient as soon as possible.

III SYSTEM IMPLEMENTATION

Hardware Implementation

1. Node MCU ESP8266

Node MCU ESP8266 is an open-source Lua based firmware and development board specifically used for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The Tensilica Xtensa 32-bit LX106 RISC microprocessor in the Node MCU ESP-12E module supports RTOS

and operates at 80MHz to 160 MHz adjustable clock frequency. Node MCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

Fig 2. Node MCU ESP8266

We use the Node MCU in our project as an IOT based microcontroller to process the data received from the accelerometer that is interfaced to Node MCU through the analog MUX and make decision of whether to display a message in the LED screen interfaced to it or send an emergency message to the user's caretaker's phone through the Wi-Fi module

2. GYROSCOPE SENSOR

Gyro sensors, also known as angular rate sensors or angular velocity sensors are devices that sense angular velocity. In simple terms, angular velocity is the change in rotational angle per unit of time. Angular velocity is generally expressed in deg/sec (degrees per second). An accelerometer is a device that measures proper acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system. The GY-521 module is a breakout board for the MPU-6050 MEMS (Micro electromechanical systems) that features a 3-axis gyroscope, a 3-axis accelerometer, a digital motion processor (DMP), and a temperature sensor. The digital motion processor can be used to process complex algorithms directly on the board. Usually, the DMP processes algorithms that turn the raw values from the sensors into stable position data. The sensor values are retrieved by using the I2C serial data bus, which requires only two wires (SCL and SDA).

- Gyroscope ranges: ± 250, 500, 1000, 2000 °/s

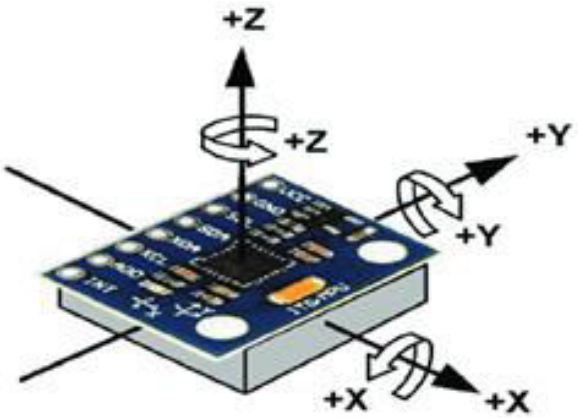

Fig 3. Gyrosope Sensor

3. Ifttt Software

It provides is a software platform that connects apps, devices, and services from different developers to trigger one or more automations involving those apps, devices, and services

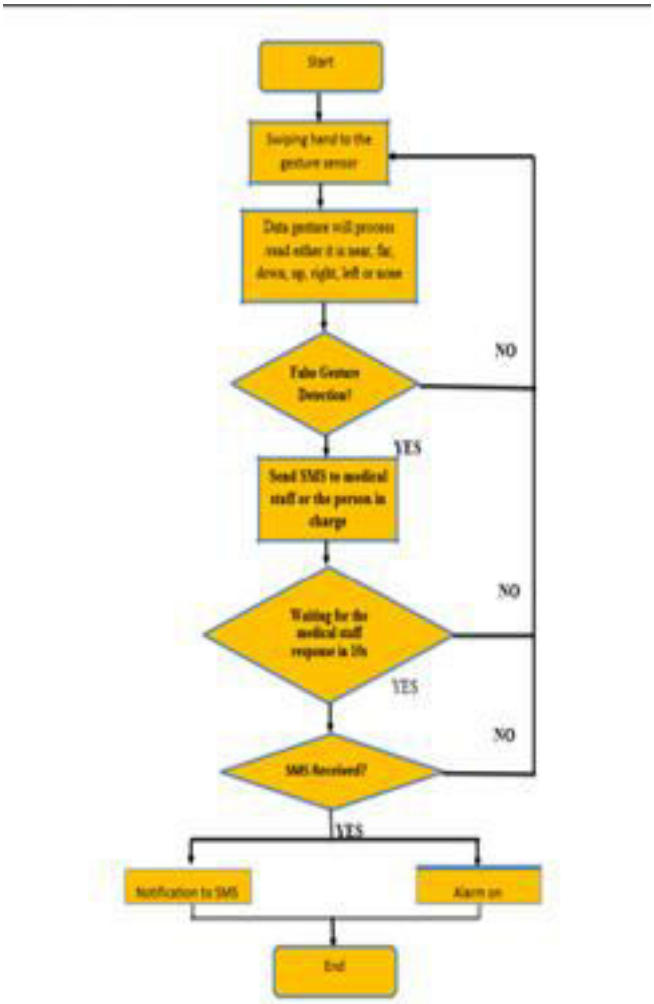

Fig 4. Flow diagram

The device can be worn on any mobile part of a patient. Here, the unit is worn on the patient's wrist. The patient side consists of a system containing an analog accelerometer, a microcontroller with Wi-Fi module (Node MCU here), a LED display, an analo g multiplexer and a buzzer. Since the NodeMCU has only one analog input A0, an analog multiplexer is used to interface the accelerometer with it.Here a triple axis accelerometer is used, which calculates the variation along X, Y and Z axes when triggered by motion. It is highly sensitive, and any small movement can cause variation. Hence, the directions of wrist movement and the corresponding messages to be displayed are predetermined. The inputs from the accelerometer are given to the analog multiplexer. One by one, the X, Y and Z coordinates are given to the microcontroller. Whenever the coordinates fall in the predetermined range, the corresponding message is displayed on the LED screen along with buzzer sound.

Whenever a patient moves their wrist to the right, to the left and front, the messages "Need Water", "Need Food" and "Washroom" are displayed on caretaker mobile phone and the caretaker respond accordingly. In case of emergency, the patient moves their wrist backward and a different buzzer sound is played, and the message "Emergency" is displayed.

At the same time, a push notification is sent to the on the caretaker's phone. This ensures that even when the caretaker is far away, the notification on their phone alerts the caretaker and they can be at service to the patient as soon as possible.

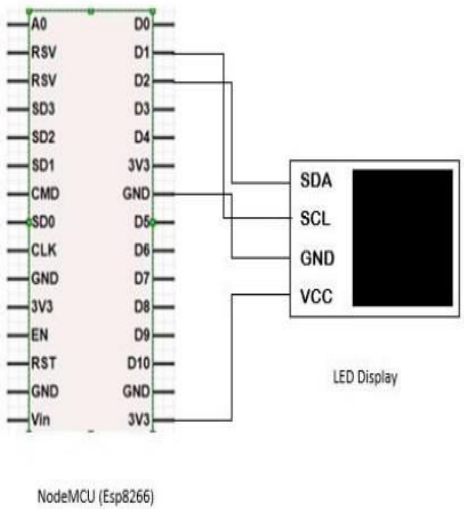

Fig 5. Node MCU with LED display

It is found that there are many problems existing for the paralyzed people such as paralysis in their leg, hand, vocal tract and in other body parts. There are systems existing for their comforts individually. But this system will help to monitor all the factors that cause paralysis and intimate that to the caretakers so that treatment can be given before the paralysis reaches hike.

Up A swipe from the bottom of the board to the top and out of range of the sensor. Make sure that our wrist/arm is not in the sensor's range at the end of the swipe!

Down A swipe from the top of the board to the bottom and out of range of the sensor.

Left A swipe from the right side of the board to the left and out of range of the sensor.

Right A swipe from the left side of the board to the right and out of range of the sensor.

NEAR Object (e.g., hand) starts far above the sensor, moves close to the sensor, hovers for at least 1 second, and moves out of range of the sensor.

Far Object starts near the sensor, hovers for at least 1 second, and then moves up above and

Out of range of the sensor.

None the sensor could not correctly guess the gesture being performed.

The main aim of the project was the development of automated paralysis patient healthcare system using wifi module. And we have already tested the time taken for receiving SMS from WIFI MODULE to the hardware component, i.e., mobile or device to which output is connected. Based on that the analysis of the performance of the system is done. Paralysis patient's need to be taken care almost for 24 hours and they need someone beside them all the time to be taken care of. So based on the gesture they can convey the message to the caretaker and the output is the digital format. Based on the gestures the output is digitalized.

IV. Source Code

1. START
2. Read (X, Y, Z);
3. N = 0;
4. LED display “**********”;
5. If (var 510<=x<=550) && (var 530<=y<=570) && (var

585<=z<=620)

6. LED display “Name: XYZ”;

7. LED display “Contact Number: 123”;

8. BZ = 1;

9. Delay ();

10. BZ = 0;

11. End if

12. Else if (var 520<=x<=560) && (var 630<=y<=670) &&

(Var 510<=z<=545)

13. LED display "Need water";

14. BZ = 1;

15. Delay ();

16. BZ = 0;

17. End if

18. Else if (var 495<=x<=540) && (var 440<=y<=480) &&

(Var 535<=z<=580)

19. LED display "Need food";

20. BZ = 1;

21. Delay ();

22. BZ = 0;

23. End if

24. Else if (var 425<=x<=460) && (var 540<=y<=575) &&

(Var 525<=z<=560)

25. LED display "washroom";

26. BZ = 1;

27. Delay ();

28. BZ = 0;

29. End if

30. Else if (var 620<=x<=675) && (var 530<=y<=570) &&

(Var 490<=z<=555)

31. LED display "Emergency";

32. Tone (BZ, 523, 200);

33. Delay ();

34. N = 1;

35. BV = n;

36. End if

37. END

The opportunity for patients to have constant monitoring of their health state is now possible by means of intelligent sensors. The continuous monitoring of health status is a fundamental practice for paralytic patients. In a hospital either the nurse or the doctor must move physically from one patient to other for continuous health monitoring, due to which it is not possible to monitor one patient continuously.

Thus, any critical condition cannot be identified unless the doctor or nurse check the patient's health at that time. So, a system is developed to convey a message from patient to person monitoring his health

V. Hardware Circuit

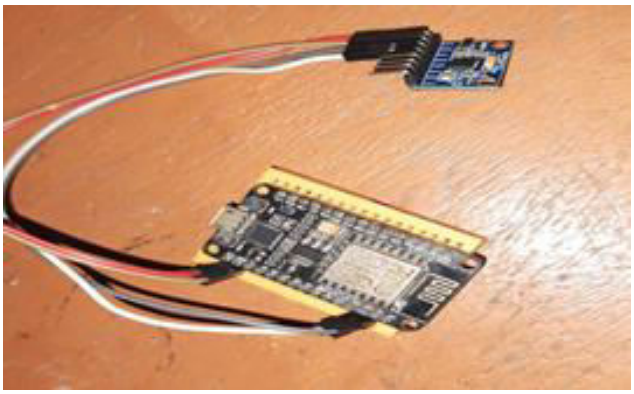

Fig 6. Hardware

VI. RESULTS AND DISCUSSION

The opportunity for patients to have constant monitoring of their health state is possible by means of intelligent sensors. The continuous monitoring of health status is a fundamental practice for paralytic patients. In a hospital either the nurse or the doctor must move physically from one patient to other for continuous health monitoring, due to which it is not possible to monitor one patient continuously. Thus, any critical condition cannot be identified unless the doctor or nurse check the patient's health at that time. Thus a system is developed to convey a message from patient to person monitoring his health using the above research work.

VII. CONCLUSION

A very efficient, secured, and reliable assistance can be provided to the paralysed patients which aids them to overcome the difficulty to convey their basic needs via simple messages to their caretakers by just tilting their hands. The pre-set configurations for each tilt display the messages as and when there is a tilt detected in the patient's hand. Also, the buzzer's presence in the device ensures that no message is left unnoticed by the caretaker. The proposed solution can be modified by using a digital multiplexer for the Analog multiplexer which is an up gradation of the technology which also in turn reduces the hardware of the device. An overview of the device shows that it is simple, cost effective and easy to use and can be used by patients with all kinds of paralysis cases.

The proposed system has a vast future scope with the ability to monitor various other vitals and parameters of the human body, this serves to be a great device in assisting the paralysed patients with easy and effective communication process with very less efforts from the patient's end

VIII. FUTURE WORK

With the growth trend of biomedical technology, one can incorporate many other methodologies to this device. Flex sensors are being rapidly developed and find a wide range of applications everywhere. They detect the amount of deflection or bending and can be incorporated to the existing proposal. Integrating the flex sensors to each finger along with the wrist device at its position increases the number of recordings of the movement that can be made, which in turn increases the number of messages that can be conveyed.

One of the most advanced and biocompatible technology, “magnetic skin” can be used as an alternative for the fabrication that is required for the existing proposal. The advantage of the magnetic skin is that it can also be made to match the colour complexion of the skin, thus camouflaging it when it is worn to measure change in different parameters.

Down the lane this method could possibly make one of the best ways to implement the idea and reduce the fabrication process to a very large extent. Also, the idea has a scope to process EEG signals in fully paralysed patients who are completely deprived of the capability of motor responses. This method can be used to convey different messages from the signals processed.

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BLOCKCHAIN TECHNOLOGY AND ITS APPLICATIONS: A SYSTEMATIC REVIEW OF THE LITERATURE

Ms. Priyanka[1] and Dr. Ritu Makani[2]
[1]Research Scholar and [2]Associate Professor, Guru Jambheshwar University of Science and Technology, Hisar, Haryana

ABSTRACT
The BT can cause considerable changes in every aspect of human lives and might have a significantinfluence for the subsequent couple of decades. This technology changes the way as we are seeing processes of business and has transformed our existing economy. The BT is a peer-to-peer decentralized immutable public database technology that has changed management of various systems and was developed by Satoshi Nakamoto in 2008 through the cryptocurrency called Bitcoin. The interest in BT has beengrowing since the thought was conceived in 2008. The motive for the concern in BT is its Decentralized and Distributed features that give security, anonymity, and data integrity with no intermediary agency on top of things of transactions. Blockchain is used more and more for registering, authenticating, and validating digital assets (Financial assets, land, etc.) and transactions, governing interactions, recording data, and managing IDs among multiple parties in a very trusted, decentralized, and secure manner. A term that every time arises when discussing about Blockchain is the Bitcoin, many peoples still confuse with Blockchain and Bitcoin; regardless, both are different. Bitcoin is simply one of the applications that uses BT. In this review paper, we describe concept of Blockchain, Applications, Advantages, Disadvantages of Blockchain.

Keywords: Blockchain, Cryptocurrency, Bitcoin, Decentralized, Ledger, Applications, Consensus.

INTRODUCTION
The main objective of this Review manuscript is to describe the summary of literature on various execution of blockchain technology, similarly some computerized ledger-based techniques in different fields beyond the bounds of its applications to digital currency and to extract the valid conclusions. The Blockchain technology gaining popularity in last ten years and now increasing more and more in different areas like healthcare, IOT, Cryptocurrency etc. Different types of Blockchain technology usage and some techniques used in which, different applications, inspection of various security and privacy related issues are main focus of the review study.

We can also represent blockchain technology as distributed and decentralized computerized ledger-based technology, is a fundamental technology that encourage operations of bitcoin, which is expanded by Satoshi Nakamoto in 2008 through the cryptocurrency know as Bitcoin. Blockchain Technology is an integration of various other technologies such as decentralized, distributed and peer to peer network technology. By combining all these technologies, we can mutually preserve a unique particular and trustworthy ledger throughout a decentralized and trustful procedure, and frame a way of data storage recording, delivery, and presentation. In Blockchain technology all the blocks are linked in a linked list manner and each block have a unique hash value that provide protection from alteration of data. PoW, PoS, a cryptographic puzzle, complex mathematical problems and various other consensus algorithms play an important role for ensuring Blockchain privacy and security by maintain a computerized or digital ledger-based transitions, which are examined to be incorruptible.

Every time when a new transaction or Block is added to the current existing blockchain, it is compulsory to validate that new block by all the participated nodes of that current Blockchain

System. For verification and validation of new transaction various algorithms are used. When a Transaction proved valid then it is added to the Blockchain otherwise rejected or not added to the Blockchain. All succeeding node comprise a value of hash, a unique computerized fingerprint of previous node. For that reason of blockchain as its transparency andimmutability features for every transaction accomplished in the system of Blockchain, this Blockchain technology has various applications. Throughout the development in 2008, blockchain technology was not got lot of attentions. Now a days Blockchain has become more and more popular in various countries and enterprisesand institutions and researchers etc. [2]

Some Fundamentals of Blockchain Technology:

The BT is the combination of two different parts, as follows:

1. Blockchain Transaction: Every action triggered by user is represented by the Blockchain transaction or we can say that any changes done by user over the blockchain is called transaction.

2. Block: A block may be represented as a database that contain collection of information related to transactions and some other details such as block creation timestamp value, exact sequence of blocks etc.

TYPES OF BLOCKCHAIN

- **Public Blockchain:** In which all the participated users can perform read and write operation such as Bitcoin, in which anyone can join and become the part of the Blockchain. However, some public Blockchains are restricted with access the data of Block, it can either to read or write down only not both.
- **Private Blockchain:** Only the trusted participants can access the data of blockchain, mostly used by private organisations where they don't want any interaction of public on blocks because the blocks maycontain sensitive or private information of company.
- **Consortium Blockchain:** the consortium Blockchains are semi-decentralized. When multiple companies want to become the part of blockchain, control its operations and access control protocols simultaneously, instead of one particular organization have fully controlling access to it.[1]

Figure 1 represents the working of blockchain transactions, from trigging the transaction to addition of node in the blockchain. Here Ram wants to transfer money to Shyam. First of all, monetary transaction is initiatedwhen the transaction is generated by ram then this transaction is broadcasted to all over the network's Nodes or parties. After Broadcasting the transaction get approval as the transaction is "valid" or "invalid" by the Blockchain system. When the transaction gets approval as a valid with their hash code of that successive node are supplied to a current new node or block and communicates with every participated block to be successively attached with currently present blockchain of blocks within the computerized or digital database as ledger.[3]

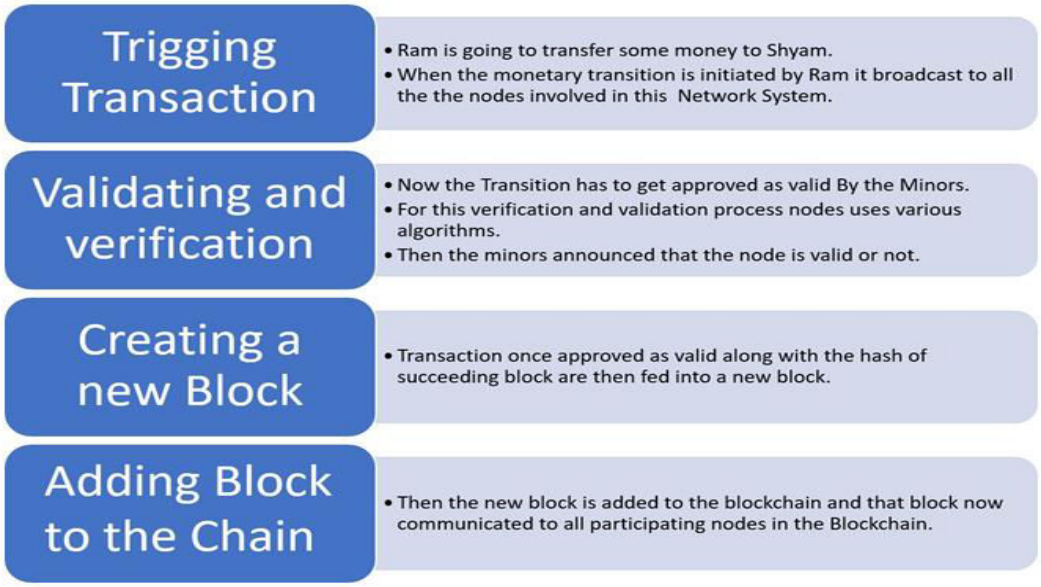

Figure 1. Blockchain Operations.

Some Technical Terms used in Blockchain [5]

Term	Description
Miners	Miners are the special node or devices which execute the block verification process previously adding anything to the blockchain structure
Node	A node may be a user or system that capture an independent copy of complete ledger and perform operations on Blockchain.
Chain	Chain is a sequence of blocks in a specific order
Transaction	Transitions are smallest block of a blockchain system (records, information, etc.) that serves as the main objective of blockchain
Consensus	Consensus are the complex computation or a set of rules which are predefined and executed when some specific conditions are satisfied.
Timestamp	Timestamp is the date and time of computer system during execution of transaction used as an electronic time stamp for the transaction.
Decentralized	In Decentralized system data are stored in different location allover the network.
Transparent	In which every block of blockchain can see the complete information of ledger transitions.

APPLICATIONS OF BLOCKCHAIN

1. Blockchain Technology in the Food Industry

The blockchain gets more and more integrated into the food industry it'll make the entire process moretransparent and safer.

These are the Benefits of a Transparent Food System

- BT strengthen the safety of food.
- It makes sure about fresher food because nobody will take any risk for transfering "non-

fresh" foodin a public decentralized system.

- In which a very small amount of waste product found because all record of data about food is storedin which.
- Food fraud also stopped by using BT because anyone can determine anything from this open system.

2. **Blockchain Technology in Cybersecurity:** On 7 September 2017, Equifax, one in all the world's bigger bank line reporting agencies, shocked the planet once they revealed that they'd just faced an enormous cybersecurity breach. They faced unauthorized data access from mid-May through July 2017, which they found on July 29. Around 145.5 million consumers were in danger of getting their personalinformation stolen which included:

- Names of customer
- Social Security identification
- Dates of birth of customer
- Residence Addresses
- License numbers of Driver's

These are Some Features of Blockchain That Helps in Preventing Cyberattacks

Immutability: This is one of the most effective features of Blockchain in which when a user entered the data then the data can't be tampered by anyone, this can be called as "immutability." The BT permits us to keeping information safer by employing its several properties of cryptography like some cryptographic algorithms, digital signatures and various hashing algorithms.

Decentralization and Consensus: BT is a P2P, decentralized and distributed block system in which a group ofnodes can be created and any changes in the nodes needs consensus algorithm and verify first these changes then perform all operations. So, rather than a central authority, we've a democratic and decentralized system that control all over the transactions of Blockchain.

3. Voting

These are some common problems related to the system of paper ballot:

- After getting the cast of a vote you can't change the transactions.
- The election can be hijacked or we can change the transaction via the inserting the bogus ballotpapers.
- It is very difficult to track or access your vote.
- The total amount of time consumes for counting the votes is too much high.
- The amount of wastage paper in paper ballot system may be harm to the environment.
- The cost of paper ballots expenditure is very high.

The Solution of All These Problems is Given by Blockchain Technology.

By using Blockchain technology we can make this voting process transparent where anyone can see the transaction of voting system and casting of vote will be hidden by integrating the blockchain. The voter can givevote securely by login their personal government-issued ID card and their own webcam. The voter for vote canthen create their own transaction, this process make it unique and differentiate with others. During the casting of vote, we can easily verify

that the vote is valid or not and confirm that the votes are not tempered. We can simply verify the vote by voter's public key to test whether the who did the vote is authorized or not.

4. Applications of BT in Healthcare:

There are various applications of Blockchain in healthcare in which some popular applications are:

- **Electronic Medical Records:** The main use cases of BT in healthcare is EMR (Electronic medical records). By using this we can achieve tamper-proof and longitudinal patient record because Blockchain provides distributed ledger technology that helps to place all records of medical like vaccines records, results of lab report, treatment strategies, and history of prescription with a decentralized way excepting a central location of all records.
- **Tokenized Healthcare:** Through tokenization the users can share the personal medical information, earn and learn something new by using their unique medical information. To Prevent the diseases or for treatment of patients may well be incentivized by using tokenization. For building a healthcare general population we can use tokens that inspire society peoples to enhance public health consequences records.

5. **Vehicle Industries**: Auto or vehicle companies have many application areas for BT because it's a component-intensive industry. The centralized supply chain and trust-based distribution is that the current model for a way we manufacture and procure vehicles for daily use. IoT may well be accustomed automatically update blockchain-based ledgers to stay a transparent and immutable vehicle record. this may work to extend transparency across the industry and make purchasing a "lemon" near impossible. Parts are sourced from such a lot of different vendors and implementing blockchain applications and IoT to assist track these moving pieces in an exceedingly tamper-proof and authenticated system would improve the way vehicles are sold, bought, manufactured, and distributed.
6. **Smart Devices:** Smart devices currently play a vital role in every field, used in new houses and office buildings all have appliances that can connect with other appliances, mobile apps, and also the internet. instead of storing this data during a central server or cloud-based storage solution, smart appliance data might be stored on the blockchain. this is able to help to secure personal information and keep home IoT webs secure. Data can be accustomed improve things like energy costs for a complete grid without linking the data to the human by applying public/ private key cryptographic algorithm to analyse out personal identity from currently available data, while keeping the info is authentic.
7. **Supply Chains:** It involves globally many parties across time zones and is a multi-layered chain. Moving the provision chain to the blockchain is usually discussed by distributed ledger enthusiasts. From food distributors to pharmaceutical enterprises, many supply chains may benefit from employing a combination of IoT and blockchain to streamline processes. Transfer of ownership and placement can be tracked in real time between IoT instruments, the freights themselves or each object individually. Using the "things" within the Internet of Things ability to attach and migrating the connection and related data to the blockchain automates supply chain verification and transactions.

Comparative Study of Literature Review

Sr. No.	Title	Author	Year	Tools	Evaluation	Findings
1.	BT and cryptocurrency are database for contract management in construction engineering	Apichart Boonpheng et.al.	2021	AHP's principles	6 Main Factors are evaluated 1) speed 2) confidence 3) time 4) cost 5) management 6) efficiency	Blockchain Technology and Cryptocurrencies can be used in Contract Management in Construction Engineering work in terms of confidence innumber one. Performance is in the second. The cost side is the third the speed isthe fourth. Management is the fifth. The timing is inthe sixth, which is the last, from sortingorder.
2.	PPChain: A Privacy-Preserving Permissioned Blockchain Architecture for Cryptocurrency and Other Regulated Applications	Chao Linet.al.	2020	Accumulator tools	By using Accumulator tools author evaluated the contradictory Between size of ring signature and storage cost.	For solving this contradiction accumulator tools are used to design a novelring signature mechanism which can balance theefficiency and privacy concerns.
3..	Does blockchain patent-development influence Bitcoin risk?	Yang Huet.al.	2020	BK18,DY12	The DY12 approach measures total, directional, net and pairwise spill over indexes while the BK18 procedure further provides a measureof these spill over indexes in short-, medium-, and long-term frequency by taking into account the different strengths of the shocks to economic variables at different frequencies.	We notice that there was a sharp negative spike of pairwise volatility spill overs atfrequency, to Bitcoin from several companies including Amazon, BofA, Capital One, Cisco, IBM, Intel, Microsoft, NASDAQ, Raytheon,Visa and Walmart.
Sr. No.	Title	Author	Year	Tools	Evaluation	Findings
4.	Digital signature scheme for information non-repudiation in blockchain: a state of the art review	Weidong Fang et.al.	2020	Elliptic curve discrete logarithm and bilinear mapping	According to the security analysis,the potential forgery of the attacker cannotbe realized, andthe the same.	ECDSA can protectthe owner's unforgery and trader's non-repudiation
5.	A Brief Survey of Cryptocurrency Systems	Ujan Mukhopadhya y et.al.	2020	Proof of Work, Proof of stack, SHA-256,	Evaluated Different Cryptocurrenciesby applying different mining methods and	Major Cryptocurrencies use Proof of Work,Proof of Stake or a combination thereof for mining. While Proof of Work is resource

				Scrypt	algorithms.	intensive, Proof of Stake cannot act independently. A combination of the both is found to beeffective.
6.	Blockchain Technology: A Review of the Current Challenges of Cryptocurrency	Diego Valdeolmillos et.al.	2020	PoW, PoS, PBFT	Evaluated Different Cryptocurrenciesby applying different mining methods and algorithms.	POW is consistent and decentralized, POS is scalable and decentralized, PBSTis scalable and consistent.
7.	An Overviewof Blockchain Applications and Attacks	Rahul Rao Vokerla et.al.	2019	ECDSA, Digital Signature, Consensus Methods	In Blockchain based cryptocurrency system Various Cryptography algorithms like ECDSA, Digital signature provide security and reliability ofdata.	By applying Smart Contracts and Hashing Algorithmstransitions become more secure.
8	Blockchain-based decentralized and secure keyless signature scheme for smart grid	Hongwei Zhang et.al.	2019	KSI and Consensus Methods	KSI scheme based on a consortium type blockchain to enhance the efficiency and providing the secure key management.	To reduce the message authentication timeof the blockchain scheme, Two components are KSI and Consensus methodare used.
9.	Simulating a Blockchain Network with SimBlock	Ryohei Banno et.al	2019	SIMBLOCK	Evaluated Blocksize, block generation capacity of each block, number of nodes, Average network delay	SimBlock can find the performance of block and can easilychange the behaviorof nodes, so that it enables to investigate the
					between each pair of regions	influence of nodesbehavior on blockchains.
10.	Research on Information Security Technology Based on Blockchain	Liang Liu et.al.	2018	RSA, Elgamal, D-H, ECC	Evaluated the Different cryptography algorithm for providing authentication, Non-Repudiation, Integrity of Data.	Blockchain provides all security features by using Hashing and Timestamp methods and Cryptography algorithms.

ADVANTAGES OF BT

1. **Decentralization:** Blockchain is a peer-to-peer decentralized technology, it removes the requirement of third-party as middleman and also preventing all the additional operating expenses and fees of transaction.
2. **Immutability and Data integrity**: whenever a new transition has been recorded in the computerized based blockchain database, it cannot be altered directly or can be deleted only after applying consensus. Participants of Blockchain can reduce fraud while strengthening regulatory compliance.
3. **Greater Accessibility and availability**: In BT data are stored in a decentralized way that's why anyone can easily access the data whenever they need the data with accuracy.
4. **Processing Time:** Transaction's processing time also reduced by using the BT, it is almost reduced from 3 days to minutes or seconds.

5. **Security:** In which every transaction assigned with a unique time-stamped cryptographichash code, it may be a 64- or 128-digits alpha-numeric key signature value which is entered corresponding to transaction each block.
6. **Reliability:** In BT chances of failure are very less because it is regulated by different control centres not a single point.
7. **Transparency:** All the transactions involved in BT are transparent. Everyone can see the details of other transactions and each node contains the complete ledger. The shared digital ledger contains all the information of the actual source, destination, date and timeof the block transactions.[4]

Disadvantages of BT:

1. **Issue of high Expense:** BT has first opening charges and therefore the applying theBT isn't freed from cost which could be a downside of decentralization. The user node must pay money for the transactions and computational power.
2. **Latency issues:** For providing the security in BT, complex verification and validation process are performed that takes lots of time for verifying the transactions of BT.
3. **Wasted Resources:** During complex verification and mining process it requires huge amounts of computational power like CPU's and GPU's power. The energy used in Bitcoin mining network is near about $15 million per day.[4]

CONCLUSION

Blockchain is decentralized, distributed and P2P based technology which not only provide security but also provide immutability to data. The use of Bitcoin generation and transactions increases the demand of Blockchain Technology for providing the security. The main characteristics features of its privacy and security, traceability and time-stamping has watching its acceptation beside its primary application areas. Various types of Blockchains are now used for securing any type of transactions, whether it's person-to-person communications or system-to-system. The adoption of BT seems to be protected especially with the worldwide emergence

of the IoT. BT can transform people's ways of forming trust from building it by the third-party organization to assembling it by technology. There is no need of interaction with third party or no need to pay any transaction fee to third party. By using BT operations performed on each transition are recorded as well as monitored when smart contract is applied with blockchain. The trust among the themes is predicated on the BT itself, not any third-party. Equivalence indicates to the equal rights and possibilities that everyone has on a blockchain network. The transparency, permissionless and borderless nature of BT provide the everybody to equal opportunity of the technology and as a result the blockchain network constructed with it. In public Blockchain everyone can access and use an electronic wallet on blockchain network for personal or professional work. Blockchain technology doesn't define any boundaries for the users. Everyone can join, use and become a part of public blockchain in various different areas.

Some abbreviations used here:

BT = Blockchain TechnologyPoW = Proof of Work

PoS = Proof of Stack IoT = Internet-of-thingsP2P = Peer-to-peer

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THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICTs) IN LIBRARIES OPERATIONS

[1]Abdulwahid Usman and [2]Mohammed Tukur Lawal
[1]Librarian I Bilya Sanda (Khadimul Islam) Library Al-Qala University Katsina P.M.B. 2137 Katsina
[2]Research Scholar, Department of Library and Information Science SRM University, Sonepat, Haryana, India

ABSTRACT
Information and communication technology (ICT) has become a key tool in acquiring processing and disseminating knowledge. It has become an imperative tool for measuring development of a nation in the 21st century. The paper attempt to give an overview of the concept of ICT and its significance in libraries operations and other services to be more functional in achieving the library's set objectives. It also highlights some of the significant roles played by libraries through the applications of ICTs in some of its services in the areas such as acquisition policy, selecting stock, cataloguing of books, circulation routines, references services and others. It also identified some of the challenges facing libraries in the application of ICTs in libraries operations and their possible solutions were discussed. And finally it concludes that ICTs plays a significant role in achieving libraries objectives.

Keywords: Information and communication technology, digital information, libraries, cataloguing, services

INTRODUCTION
Information and Communication Technology (ICTs) have become key tools have a revolutionary impact of how people see and live in the world. The place of ICTs in education and the world in general cannot be ignored. Modern day businesses are conducted and facilitated through the use of telephone, fax machines and computer communication networks through the internet. This phenomenon has given birth to the contemporary of e-government, e-medicine, e-banking and e-education among others. Bandele (2006) summed up that ICT is a revolution that involves the use of computer**,** internet and other telecommunication technology in every aspect of human endeavor. He posited that ICT is simply about sharing and having access to data with ease. It is regarded as the super highway through which information is transmitted andshared by people all over the world**.**

Automation is the application of computers and information technologies to libraries operations and services most especially in the areas of housekeeping such as cataloguing, acquisition, circulation, serial control, and reference services**.** Chauhan (2004) posited that the benefits of ICT in library services can be broadly explained in terms of economy, ease, extension (or expansion) and efficiency. Devchoudhary (2007) also observed that ICT has influenced the traditional library services; bringing out fundamental changes in the process of acquiring, processing, storing, retrieving and information delivery. The term, Information and Communication Technology (ICT) as it relates to library and as noted by DeWatteville and Gilbert (2000), is the acquisition, analysis, manipulation, storage and distribution of information; and the design and provision of equipment and software for these purposes. Oketunji (2002) defines ICT as computers and other technologies that are used in the acquisition, organization, storage, and retrieval, disseminating of information in libraries. Mayer (2006) added that ICT in libraries is a term that covers the acquisition, processing, storage and dissemination of information in textual, numerical, pictorial and audio-visual formats. From these views, ICT could therefore be seen as processing and sharing of information using all kinds of electronic device, an umbrella that includes all technologies for the manipulation and

communication of information. The new technology has become useful in the personal lives of individuals. It has let to improvements in the operations and services in industries, administration, management, education and other services. It has also become useful in the provision of library and information services (LIS) such services as selection and organization of information resources, access to collections, reference help and instructional services, still continue in the digital library, but in new ways. According to Rosenberg (2005) the advent of information and communication technology has accelerated availability and usage of electronic resources in the modern time. This global development has posed challenges to libraries and information institutions in their attempt to meet information needs of user in the digital era. Libraries are now investing heavily on electronic resources especially academic libraries where users are exposed to various electronic resources outlets via internet. This development is noticeable in the developed nations of the world as African countries and other developing nations are still struggling to bridge the digital divide that is preventing them from the full benefits of electronic era. However, different efforts have been made to lunch African Universities into the digital society with different initiatives by both National and International bodies toward providing the required networked infrastructure that would enable them have access to free or heavily discounted Journals and databases through programmes like AGORA, elFL, HINARI and PERI. The Federal Government of Nigeria through the National Universities Commission (NUC) initiated various programmes designed to lunch Nigerian Universities into information global society. Among the projects according to Nok (2006) include automation of university libraries using Management Information Systems (MIS) and Nigerian Universities Network (NUNET).NUNET was aimed at developing a viable local and wide area network in each institution. Fabunmi (2009) added that Nigeria virtual library initiative is another step by Federal Government of Nigeria to provide higher institutions access to relevant and current information resources. Despite these efforts, many Universities are yet to harness the opportunities provided by these initiatives, due to inadequate facilities or lack of maintenance culture and even where these facilities are in place the potential users of these new information sources are not making use of the valuable electronic resources owing to lack of awareness or lack of skills required to navigate the modern technology. Corroborating this assertion, Abdullah (2006) noted that most users are unaware of the existence of e-books in library collections and that they are willing to discover and use them more effectively, also unfriendly interfaces or usability problems tend to hinder their further use of electronic resources. It is in the light of this that this paper intends to assess the awareness and use of the electronic library of the University of Ilorin, Ilorin, Nigeria.

LIBRARIES AND THEIR SERVICES

The various services provided in the libraries are complimented by available facilities, some of which are technology driven. In modern library, technology application in the provision and performance of library services provided by libraries to patrons. The utilization of emerging technologies in recent times in libraries worldwide has proved beyond reasonable doubt, that a library, whatever its services can perform better when facilities are adequately provided to enhance access to the content of the library. However, the services rendered in a library differ from are library to another, depending on the clientele, the parent body and type of library. Idowu (2011) enumerated the following library services according to the international standard:

- Reference services
- Document delivery service
- Borrowing, renewing and reserving
- Technical services

- E-library services
- Serials services
- Exhibition and displays
- User education
- Selective dissemination of information (SDI)
- Current awareness Services (CAS)
- Reprographic service

From the above mentioned services listed ICT has impacted or every sphere of library activity especially in the form of library collection development strategies, library building and consortia. ICT presents an opportunity to provide value-added information services and access to a wide variety of digital based information resources to their clients.

Role of ICT in provision of effective Library Services

Neankwo (2006) opines that ICTs application to library works and services could be seen as the best way that could be used to assist researchers to adequately solve their literature need for effective research activities. This, according to the writer, is because the application of ICT to library operations greatly helps in the provision of efficient reference and information services, the utilization of network operations such as cataloguing, authority control, inter library loans and cooperation and in the participation of international bibliographic project. Also Dike (2000) claimed that instant access to information from a multiplicity of source is one of the major roles of ICT application to library services. Not only can it help in locating the materials where the required information can be found easily but ICT helps in sorting out what information is relevant from a mass of irrelevant information. The use of ICT has impacted on library services according to Uwaifo (2010) in the following ways:

- Online Public Access Catalogue (OPAC): It is the computer form of library catalogue to access materials in the library.
- Storage Capacity: Digital libraries have the potential to store much more information, since it requires very little space to contain it.
- Indexing and Abstracting Services: With the aid of ICT, database of print and audio-visual materials can be created and indexed. Also, ICT has made it possible for information seekers to conveniently access a wide range of library produced abstracts (indicative or informative).
- Preservation and Conservation: An exact copy of the original can be made any number of times without any degradation in quality.
- Inter-Library Loan: Needed materials from other libraries can be received within the shortest time through the email, courier services.
- Access to Electronic Resources: Electronic resources are internet based resources such as electronic journals, reference sources, books etc.
- Document Delivery Service: Document can be sent to needed users through e-mail, fax, etc.

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- African Society for Scientific Research (ASSR)
- Library Retrieval Systems: This involves using Compact Disc Read Only Memory CDROM (technological mechanism of acquisition of specialized CD-ROM databases in various

courses such as sciences, law, technology, agriculture, social sciences, medicine, humanities etc. the prominent ones are MEDLINE in medicine, AGRICOLA and

- **Application of ICT) in Library operations**

ICT can be applied in various Library services/operations. They include:

(I) ACQUISITIONS

The acquisition of new items for the library stock is governed principally by an acquisition policy. Different types of libraries have different methods but the following areas are usually covered in any acquisition policy regardless of which library type.

- The total level of resources available for the library service as a whole is slated.
- Priorities for spending are agreed
- The total budget is then broken down across the various budget headings, e.g. books, journals, and resources in other formats such as DVDs.
- Budget holders and key functionaries such as heads of departments and deans of faculty as obtain in tertiary institutions are informed of their budget allocation and acquisitions may proceed.

The automated system helps facilitate the process of acquisition with regard to ordering, receipting and invoicing. The system then will allow the acquisitions process to run, using its reporting systems and order transmission.

The automated system helps to expedite the acquisition process in no small way. It will give the spending situation under the various budget headings in no time. This includes both the projected and the actual spending to date. This can be ensured by entering of order information accurately to enable the computer do the computation effectively.

(II) SELECTING STOCK

The key information that affects the selection of stock is current demands of the borrowers and the current stock available. The current needs of the users and in a university set up it usually comes from the faculties, must be checked against what is available in the library. This will enable the librarian determine what the actual demand is. Information on borrowing can also be compared with the current stock to ascertain which books are hardly used. All of these can be checked by the computer. When the borrowing information is matched with current stock it shows which books by which authors are more in demand and that way libraries can maximize their budget allocations by buying books that are very much in demand.

The use of ICTs makes it possible for libraries to use only library catalogues. The searching of catalogues of libraries around the world has been enabled by the internet. Some of these catalogues are:

- British library http://catalogue.bl.uk
- Northern Ireland http://opac.ni.libraries.net/cgi-bin/nireland.vps.sh
- Neath Port Talbot http://ipac.npt.npt.gov.uk/#focus
- Birmingham http://www.birmingham.gov.uk/libcat.bcc

The most obvious place to search for information online is publishers and book settlers' websites. These companies aim to sell the items and so one would expect that they contain the most up-to-date information on things like prices and publication dates for the items. Some of the websites offer a range of sophisticated services – such as pre-publication ordering facilities, EDI (electronic Data Interchange) information, download facilities of MARC (machine Reading

Catalogue) records and tracking systems for current orders. The most important aspect of these online acquisition resources is that it saves money particularly for libraries in developing countries economics. When you think of the amount used in procuring publishers' catalogues and books-in-print on yearly basis, the amount saved by these online catalogues is evident.

(III) CATALOGUE SECTION

The function of a library catalogue is two parts: First it provides a record of the library stock, including the authors as in the authors' catalogue, the title for the title catalogue and subjects as in the subject catalogue. The second function is that it enables library clients to know resources available in a particular library and their various locations.

In an automated catalogue library patrons use keywords to search for resources and their various locations in the library. With the internet it is possible to search for catalogues of other libraries remotely. This is far better than the manual system of surfing through card catalogues of materials only within a library.

With the help of information technology, a computer can also be programmed to produce catalogue cards, spine labels, processing and transaction slips. It also assists in reference work because it permits the production of special purpose bibliographic and reading list and makes it possible to answer several questions pertaining to the library stock within a reasonable period in some cases, in a matter of seconds particularly in an on-line system.

(IV) CIRCULATION DUTIES

Circulation module has a databases of users' details necessary of circulation of materials, provides overdue list, charges, generates reminder notice on borrowed materials, Crossby (2002) stated that, years ago, paper cards and ink stamps were the primary way books were tracked, now, most librarians use automated circulation systems to simplify book management. Librarians also set policies about lending time and renewal and, in libraries – that offer computer access; they established rules governing computer use. Materials are circulated electronically to users with the aid of hand held scanners and bar code labels. Request for materials, reservation and renewal are done online. Request/reservation slips are printed out to retrieve the material for the user. Request/reservation is cancelled if the user failed to turn up after some days.

(V) REFERENCES SERVICES

ICT provides full text article databases, electronic books, chat – based interactive technologies, current awareness services, selective dissemination of information, Users portals services, videoconferencing, voice – over IP applications, telephone and e-mail have already impacted the services and roles of reference librarians and information professionals. Traditionally, human intermediation occurs in a face – to face mode where users express their information problems (or what they know about them) to intermediaries. Jane and McMillan (2003) noted that there is evidence, both anecdotal and recorded, that increasing numbers of people are turning to the internet as their preferred source of information, and this is being reflected in library reference desk statistics. Coffinan (2004), noted that by the late 1990s, it had become apparent to many that it librarians were ever to successfully move their reference service to the web, they will need something live, interactive and real time. Something that allowed reference librarian to work with patrons to help them find the information they wanted at the right time when they sought for it and not days later in an e – mail. This has resulted to the use of reference application like Web contact software centre, to provide on – line chat where patrons can get instant response from the reference Librarian and enable users and librarians to look at and work with the same on – line sources simultaneously Understanding these varied technologies, including imaging technologies, web mark up languages, metadata, user interface design, internet searching are all changes in reference services For general information it is

important to check useful sites such as general information online, encyclopedia such as Britannica online or Encarta online. Online encyclopedias e.g. Wikipedia free encyclopedia, Ezeani (2009) pointed out that Search engines such as Google, Google scholar are recommended for research. Some guides are also online such as Walford, Albert John-Guide to reference materials, 5th edition, London this is online. Also Ifidon (2008) added that the librarians' Index to the internet is a directory of more than 7100 internet resource description. These resources are selected and evaluated for their usefulness to users in public libraries. This online resource is both browsed and searchable.

CHALLENGES

Although significant progress has been observed in the use of ICTs in most libraries in Nigeria within the last couple of years, major constraints still hinder the promotion of universal access. These are:

LACK OF ICT POLICIES:

There is a lack of systematic ICT policy in most libraries in developing countries. This in no small way impedes the effective deployment of penetration in their organization. Various polices on ICTs in Nigeria like NUNET, school-net etc are not properly monitored. Also, there is lack of systematic ICT policy in most libraries in developing countries which Nigeria is part of them.

Lack of Sufficient Monetary Allocation to ICTs in Libraries

Most libraries do not earmark sufficient amount of money to the building of ICT infrastructure in their libraries. The ICT of every library should specify the percentage of the total resources of the library which should be allocated to ICT. If this is not done then adequate resources may never be committed to ICT development.

Low Level of ICT Compliance

Many users and members of the library community require knowledge of ICT. To meet this challenge, libraries and librarians can help make ICT knowledge available by creating electronic learning centre within the libraries. Such creation will go a long way to satisfy knowledge thirsty citizenry whose only handicap is lack of opportunity.

Poor infrastructural Facilities

The problem of poor infrastructural facilities especially erratic power supply has been the major cause of setback in the integration of ICT in library services. Government should therefore provide enabling environment that would allow donor agencies to provide investors particularly those in information sector to take full advantage of recent advances in information technology to bring our libraries up-to-date. In this regards, efforts should be made to make the Nigerian technology limited and power Holding services more efficient that what is currently obtained.

Inadequate Technical/Skilled Manpower

There are deaths of technical manpower in the area of ICT in Nigeria. Faulty equipment is abandoned in some libraries because there is no knowledgeable staff to repair them.

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SOLUTIONS

- There must be adequate planning and survey by any library before the introduction of ICT in order to forestall frequent change in the use of the hardware and software; Government

should endeavor to vote huge amount of money for ICT infrastructural development in libraries.

- . There should be training and retraining for library staff at all level in respect of use of ICT.
- The concept of e-library should be revitalized in Nigeria libraries.
- ICT equipment should be service regularly by expert, fault should be promptly connected.
- Adequate funds should be provided by the government and all stakeholders in education sector. This is necessary to enable libraries acquire and procure all ICT equipment that can improve the quality of their services.

CONCLUSION

Information and Communication Technology (ICT) plays an important role in enhancing efficiency in development of library services. ICT is changing the work of libraries and information centers. The rapid development of information technology has brought tremendous revolutionary changes in information processing, storage, dissemination,and distribution. And has indeed, become a key factor in bringing about the rapid changes witnessed in every sphere of human endeavor.

RECOMMENDATIONS

1. More generous financial support should be made available to provide the basic ICT infrastructural facilities.
2. Since Information and Communication Technology (ICT) has come to stay, library staffs that are not computer literate should take positive steps to remedy their deficiencies so as to flow along with reforms. By this, library and information services will become ennobled through the acquisition of adequate ICT knowledge/skill and its full application in Nigerian University Libraries or else they will become irrelevant in this era of ICT.
3. Effective and efficient power supply supplemented with standby generators should be provided to check the menace of frequent electricity power failure. In the same vein, the government should address the problem of erratic power supply more seriously not through military order but through research and development.
4. The assistant of some donor agencies such as TETFUND and Open Society Initiative for West Africa must be actively enlisted (OSIWA).
5. Every division of the Nigerian academic libraries should be automated in order to facilitate and create an avenue for effective services.
6. Short computer training and retraining programs should be organized from time-to-time to assist Librarians who do not have knowledge and computer skills. This will also aid awareness of computer potentials and capabilities.
7. Orientation programs on the use of computer for information retrieval should be conducted and made compulsory for new entrants into the profession.
8. Imported ICT equipments should be taxed free.
9. There is a need for the Government and other Education stakeholders to respond positively and provide enough ICT infrastructures in all the academic libraries across the country so as to encourage lecturers to utilize them in their teaching.
10. There should be teacher training programs and skill development of teachers that will encourage them to have the requisite skill, competence and exposure to enable them to be more proficient in the utilization of ICT in teaching/learning activities especially in academic

libraries. Government can do this by partnering with other organizations to provide training and tenure of such training or workshop periodically.

11. The government should introduce and implement oriented policies that will support ICT related teaching methods. This will encourage both students and lecturers to utilized ICT in teaching/learning activities

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ASSESSING THE EFFECTIVENESS OF TRADITIONAL ARCHITECTURAL TECHNIQUES IN DISASTER RESILIENCE: A COMPARATIVE STUDY OF VERNACULAR AND MODERN APPROACHES IN HIGH-RISK AREAS OF INDIA

Amit Chatterjee
Department of Architecture, Veer Surendra Sai University of Technology, Burla, Sambalpur, Odisha, India

ABSTRACT

This comparative study delves into the efficacy of conventional architectural methodologies in enhancing disaster resilience, focusing on vulnerable regions within India. The investigation specifically contrasts traditional vernacular techniques with contemporary approaches to comprehend their respective effectiveness in mitigating the impact of disasters.

In recent times, escalating natural disasters have highlighted the urgency to fortify structures against their destructive forces. This research acknowledges the rich historical wisdom encapsulated in vernacular architecture, handed down through generations, and juxtaposes it with modern engineering marvels. By analysing case studies within high-risk areas of India, encompassing seismic zones and flood-prone regions, the study assesses structural integrity, adaptability, and overall resilience.

Employing a multidisciplinary framework, this research amalgamates architectural insights with geotechnical and environmental perspectives. The analysis involves structural simulations, historical retrospectives, and community engagement to comprehensively evaluate both qualitative and quantitative dimensions of resilience. Findings from this study are anticipated to illuminate the potential synergies between time-honoured practices and contemporary innovations, culminating in comprehensive recommendations for constructing disaster-resilient habitats. Ultimately, this research contributes to the discourse on sustainable development, emphasizing the symbiotic relationship between cultural heritage and cutting-edge advancements in bolstering societal resilience against an increasingly unpredictable natural landscape.

Keywords: *Disaster resilience; Traditional architectural techniques; Vernacular approaches; Comparative study; High-risk areas*

1. INTRODUCTION:

In the face of escalating natural disasters, the need to develop resilient architectural practices has become an urgent global imperative. This study delves into the effectiveness of traditional architectural techniques in bolstering disaster resilience, focusing on the contrasting paradigms of vernacular and modern approaches within high-risk regions of India. The juxtaposition of age-old wisdom with contemporary innovations offers a unique vantage point for assessing the sustainable integration of cultural heritage and technological advancements.

Vernacular architecture, characterized by its deep-rooted connection to local culture and environment, has historically demonstrated an innate ability to withstand and adapt to natural adversities. This is achieved through the thoughtful incorporation of indigenous materials, construction methods, and spatial layouts, resulting in structures that endure through generations and endure harsh conditions. In contrast, modern architectural practices often prioritize sleek designs and innovative materials, sometimes overlooking the intrinsic resilience ingrained in traditional wisdom. To evaluate the comparative efficacy of these approaches, this study engages in a comprehensive analysis spanning seismic and flood-prone areas of India.

Drawing from the domains of architecture, engineering, and disaster management, this research adopts a multidisciplinary approach. Structural simulations, historical retrospectives, and community engagement form the crux of the methodology, encapsulating both quantitative and qualitative dimensions of resilience assessment. By exploring real-world cases, such as the seismic heritage of Bhuj and the floodplain settlements of Assam, this study bridges the gap between theory and practice.

1.1. PURPOSE OF THE STUDY:

The study aims to assess the effectiveness of traditional architectural techniques in enhancing disaster resilience, with a focus on the comparison between vernacular and modern approaches in high-risk areas of India. Natural disasters pose significant challenges to communities, infrastructure, and ecosystems worldwide, necessitating the development of strategies that can mitigate their impacts and enhance societal resilience (Smith, 2019; UNDRR, 2019). Vernacular architecture, characterized by its adaptability to local conditions and cultural contexts, has historically demonstrated a capacity to withstand natural adversities (Oliver, 2006).

However, in contemporary times, the dominance of modern architectural practices has often led to a divergence from traditional techniques. These modern approaches prioritize innovation, often neglecting the inherent disaster-resilient attributes of vernacular structures (Twigg, 2015). The study aims to bridge this gap by conducting a comparative analysis that evaluates the performance of both traditional and modern architectural methods.

The study will adopt a multidisciplinary approach, incorporating insights from architecture, engineering, and disaster management. Structural simulations will be employed to assess the seismic and flood-related performance of selected vernacular and modern structures. Historical data and case studies from high-risk regions, such as Bhuj and Assam, will provide valuable insights into the resilience of traditional architectural practices in the face of disasters (Bandyopadhyay & Dave, 2018).

By conducting a comprehensive assessment, the research intends to offer insights into the potential synergies between vernacular wisdom and contemporary innovations, thereby contributing to the discourse on sustainable development and disaster resilience in India and beyond.

1.2. SCOPE OF THE STUDY:

This study encompasses a comprehensive scope focused on assessing the effectiveness of traditional architectural techniques for disaster resilience within high-risk areas of India. It involves a comparative analysis of vernacular and modern approaches, exploring their structural performance and adaptability. The study will employ structural simulations, historical case studies, and community engagement to evaluate the resilience of both approaches (Bandyopadhyay & Dave, 2018; Oliver, 2006). By considering seismic and flood-prone regions such as Bhuj and Assam, the research intends to provide insights into the applicability of traditional practices in contemporary disaster mitigation strategies. This study's outcomes are anticipated to contribute to a deeper understanding of the synergies between cultural heritage and modern innovations in fostering disaster-resilient communities.

1.3. LIMITATIONS OF THE STUDY:

Several limitations accompany this study that warrant acknowledgment. Firstly, while efforts have been made to select representative high-risk areas, the scope might not encompass the full diversity of disaster-prone regions within India. Furthermore, the comparative analysis heavily relies on available historical data, which might be limited or incomplete, potentially affecting the accuracy of the findings (Bandyopadhyay & Dave, 2018). The study's structural simulations are based on assumptions and simplifications, potentially overlooking intricate real-world complexities.

Another limitation pertains to the challenge of disentangling the individual contributions of architectural techniques from other contextual factors influencing resilience. Sociocultural, economic, and environmental dynamics may confound the assessment, necessitating careful interpretation of results (Smith, 2019). Additionally, the study primarily focuses on structural aspects of disaster resilience, possibly sidelining important socio-psychological dimensions that contribute to community resilience.

Finally, the study's generalizability beyond the Indian context may be constrained due to the unique blend of cultural, geographical, and socioeconomic factors present in the study regions. Despite these limitations, the research contributes valuable insights into the potential of traditional architectural practices in enhancing disaster resilience, although its applicability in different settings requires further exploration.

2. LITERATURE REVIEW:

The literature surrounding the effectiveness of traditional architectural techniques in disaster resilience reveals a rich tapestry of insights, highlighting the significance of both vernacular and modern approaches. Traditional architecture, often rooted in indigenous knowledge, has demonstrated remarkable resilience against natural disasters owing to its contextual appropriateness and resourcefulness (Oliver, 2006). This adaptive capacity stems from the harmonization of structures with local climate, materials, and cultural practices, facilitating long-term sustainability (Smith, 2019).

Conversely, modern architectural practices emphasize innovation, employing advanced materials and engineering techniques to achieve functionality and aesthetic appeal. However, the heightened focus on modernity occasionally leads to an oversight of the inherent resilience embedded in traditional wisdom (Twigg, 2015). Recent studies have spotlighted the benefits of integrating vernacular techniques into contemporary design to enhance disaster resilience, thereby revitalizing heritage while addressing modern challenges (Bandyopadhyay & Dave, 2018).

In the Indian context, the amalgamation of traditional and modern architectural strategies is particularly relevant due to the nation's susceptibility to diverse natural hazards. For instance, historical earthquakes in Bhuj and recurrent floods in Assam have spurred investigations into the resilience of traditional structures, illuminating the wisdom encapsulated in indigenous architectural practices (Bandyopadhyay & Dave, 2018).

This study bridges this literature gap by undertaking a comprehensive comparative analysis. Utilizing structural simulations and historical case studies, the research intends to ascertain the disaster-resilient attributes of both vernacular and modern approaches. By focusing on high-risk areas like Bhuj and Assam, the study contextualizes findings within regions vulnerable to specific disasters, contributing to localized disaster mitigation strategies. Furthermore, insights from this research can facilitate informed decisions for architects, engineers, policymakers, and community stakeholders, fostering a nuanced understanding of the potential convergence between tradition and innovation in disaster resilience.

In conclusion, the literature underscores the importance of reconciling traditional architectural practices with contemporary innovations to enhance disaster resilience. By situating this study within the existing discourse, a foundation is laid for a comprehensive investigation into the comparative effectiveness of vernacular and modern techniques in high-risk areas of India.

3. RESEARCH METHODOLOGY:

The research methodology for this study employs a comparative analysis approach to assess the effectiveness of traditional architectural techniques in disaster resilience, specifically focusing on vernacular and modern approaches in high-risk areas of India. This approach enables a

systematic examination of the two paradigms, facilitating a nuanced understanding of their respective strengths and weaknesses.

Structured case studies from diverse high-risk regions, such as the seismic heritage of Bhuj and the flood-prone settlements of Assam, form the foundation of the analysis. Historical and contemporary data will be collected to gain insights into the performance of traditional and modern structures during disaster events (Bandyopadhyay & Dave, 2018). Structural simulations will further augment the analysis by providing quantitative data on the resilience of architectural designs to seismic and flood-related stresses.

Data collection will also encompass qualitative aspects, including expert interviews and community engagement, to capture the cultural, social, and contextual dimensions influencing architectural choices. The gathered data will be systematically analysed, juxtaposing the resilience attributes of vernacular and modern techniques.

This comparative analysis will be underpinned by a mixed-methods approach, amalgamating quantitative structural assessments with qualitative insights. The outcome will be a comprehensive evaluation of the disaster resilience of both vernacular and modern approaches, offering recommendations for optimal design strategies in high-risk areas.

4. FINDINGS AND DISCUSSIONS:

The research findings shed light on the comparative effectiveness of traditional architectural techniques in disaster resilience within high-risk areas of India. Through a thorough analysis of vernacular and modern approaches, it becomes evident that both paradigms possess distinct attributes that contribute to overall resilience.

Vernacular architectural techniques, rooted in indigenous knowledge and cultural contexts, showcase remarkable adaptability and resilience in the face of disasters. The integration of local materials, construction methods, and spatial arrangements enhances the structures' ability to withstand seismic activities and floods (Bandyopadhyay & Dave, 2018). These techniques provide insights into sustainable design principles that have withstood the test of time. On the other hand, modern architectural practices exhibit strengths in terms of structural integrity, particularly when utilizing innovative materials and engineering methods. These advancements contribute to enhanced safety and preparedness measures against natural disasters (Twigg, 2015).The research underscores the potential for a symbiotic relationship between these approaches. Integrating traditional wisdom with contemporary innovations can lead to comprehensive disaster-resilient solutions. By combining the strengths of both paradigms, architects and engineers can design structures that amalgamate cultural heritage with advanced safety standards, promoting sustainability and functionality.

It is important to note that the findings are context-specific and may not be universally applicable. Further research is essential to explore the transferability of these conclusions to diverse geographical and cultural contexts.

5. CONCLUSIONS

In conclusion, the comparative analysis of traditional architectural techniques in disaster resilience, focusing on vernacular and modern approaches within high-risk areas of India, yields valuable insights into the potential synergies between age-old wisdom and contemporary innovation. The juxtaposition of these approaches underscores the importance of preserving cultural heritage while addressing the evolving challenges posed by natural disasters. The study's findings illuminate the inherent adaptability and resilience ingrained in vernacular architecture, showcased through historical successes in withstanding earthquakes and floods. These techniques, characterized by their context-specific design, construction methods, and material usage, offer a robust template for disaster mitigation (Bandyopadhyay & Dave, 2018).

Additionally, the study acknowledges modern architectural practices' advancements in structural integrity and engineering, contributing to disaster resilience through innovative design and materials (Twigg, 2015).

The research suggests that a balanced synthesis of traditional and modern practices could yield comprehensive disaster-resilient solutions. By integrating vernacular wisdom with contemporary innovations, architects and engineers can capitalize on the strengths of both paradigms. Such an approach entails the strategic incorporation of indigenous techniques alongside advanced materials and engineering principles, potentially creating structures that endure natural adversities while addressing current standards of safety and functionality. Nonetheless, this study's insights are situated within specific contexts, emphasizing the need for tailored strategies considering the diverse landscape of India. Further research is warranted to explore the wider applicability of these conclusions across different geographic and cultural settings.

In essence, this study underscores the transformative potential of marrying tradition with innovation in the pursuit of disaster resilience, emphasizing the intrinsic link between architectural practices and societal well-being.

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COMMUNITY ENGAGEMENT AND DISASTER-RESILIENT ARCHITECTURE: EXPLORING THE ROLE OF PARTICIPATORY DESIGN IN ENHANCING LOCAL ADAPTIVE CAPACITY

Amit Chatterjee
Department of Architecture, Veer Surendra Sai University of Technology, Burla, Sambalpur, Odisha, India

ABSTRACT
This abstract delves into the symbiotic relationship between community engagement and disaster-resilient architecture, focusing on the efficacy of participatory design in bolstering local adaptive capacity. As the frequency and intensity of disasters rise, the significance of community-driven approaches to architecture becomes paramount. This study investigates the multifaceted impact of involving local inhabitants in the design and planning of resilient infrastructure. By synergizing local knowledge, needs, and aspirations with architectural expertise, participatory design not only fosters a sense of ownership but also enhances the community's ability to adapt and respond effectively in the face of disasters. The abstract underscores the vital role of collaborative design processes in cultivating disaster-resilient communities, advocating for their integration into broader urban planning and architectural frameworks. Through a comprehensive analysis of case studies and theoretical frameworks, this abstract shed light on the potential of participatory design as a catalyst for sustainable disaster resilience.

Keywords: *Community Engagement; Disaster-Resilient Architecture; Participatory Design.*

1. INTRODUCTION:
In an era marked by escalating environmental uncertainties and the mounting impacts of natural disasters, the nexus between community engagement and disaster-resilient architecture has emerged as a critical paradigm for enhancing local adaptive capacity. As climate change intensifies the frequency and severity of disasters, traditional top-down architectural approaches are proving inadequate to address the intricate needs and vulnerabilities of communities facing these challenges. Consequently, a shift towards participatory design strategies has gained prominence, aiming to integrate local knowledge, values, and aspirations into the development of disaster-resilient infrastructures.

Participatory design, characterized by its collaborative and inclusive nature, has garnered attention for its potential to create architectures that align with the distinct socio-cultural contexts of communities at risk (Marcus, 2018). Engaging residents and stakeholders in the design and planning process empowers them as active contributors, fostering a sense of ownership and stewardship over their built environment (Coles, 2019). This process facilitates a holistic understanding of community dynamics, allowing architects and planners to co-create solutions that are contextually relevant and sensitive to the intricate web of local socio-environmental factors (AlWaer & Al-Obaidi, 2010).

This interdisciplinary exploration seeks to probe the multifaceted interplay between community engagement, disaster-resilient architecture, and participatory design. By critically analyzing existing literature, case studies, and theoretical frameworks, this research aims to unravel the potential of participatory design as a catalyst for augmenting local adaptive capacity in the face of disasters. Furthermore, this investigation underscores the significance of integrating participatory design principles into broader urban planning and architectural strategies to foster sustainable and resilient communities.

As the global community grapples with the urgency of constructing environments that can endure and swiftly recover from disasters, it is imperative to reevaluate the dynamics between architecture, community engagement, and disaster resilience. This study endeavours to contribute to this discourse by illuminating the role of participatory design in not only shaping physical structures but also nurturing a resilient ethos within communities, thereby fostering adaptive capacity in the midst of an uncertain future.

1.1. PURPOSE OF THE STUDY:

The purpose of this study is to investigate the pivotal role of participatory design in enhancing local adaptive capacity through community engagement in the context of disaster-resilient architecture. With the increasing vulnerability of communities to natural disasters due to climate change, understanding how participatory design processes can empower communities to actively shape their built environment is crucial. By analyzing existing literature, case studies, and theoretical frameworks, this research aims to shed light on the mechanisms through which participatory design fosters community ownership, resilience, and responsiveness to disaster challenges. The findings of this study will contribute to the discourse surrounding sustainable disaster-resilient strategies and offer insights into the integration of participatory design principles into urban planning and architectural practices.

1.2. SCOPE OF THE STUDY:

This study aims to explore the scope of participatory design in enhancing the disaster resilience of communities through community engagement and collaborative architecture. It will analyze existing literature, case studies, and theoretical frameworks to ascertain the effectiveness of participatory design in building local adaptive capacity. By investigating the symbiotic relationship between community engagement and disaster-resilient architecture, this research seeks to contribute to a comprehensive understanding of how participatory design principles can be integrated into urban planning and architectural strategies. The study's scope encompasses examining the socio-cultural aspects of communities, the role of local knowledge, and the potential challenges and benefits of implementing participatory design approaches in disaster-prone regions.

2. LITERATURE STUDY:

The literature on the relationship between community engagement, disaster-resilient architecture, and participatory design reveals a growing consensus on the transformative potential of involving local communities in shaping their built environment. Participatory design, characterized by its collaborative approach, emerges as a significant strategy in enhancing disaster resilience through community engagement.

AlWaer and Al-Obaidi (2010) emphasize the importance of incorporating local voices in the design of sustainable communities. They argue that participatory design facilitates the integration of community-specific needs and aspirations, ultimately contributing to disaster-resilient urban landscapes. Similarly, Marcus (2018) underscores that the future of architectural design lies in embracing community engagement, as it not only bolsters disaster preparedness but also nurtures a sense of ownership and social cohesion. Furthermore, Coles (2019) asserts that the democratization of design processes empowers communities to develop solutions that are culturally relevant and adaptable, crucial attributes in disaster-prone areas.

Case studies also exemplify the tangible benefits of participatory design. In the aftermath of Hurricane Katrina, the "Make It Right" initiative in New Orleans exemplified the successful collaboration between architects, residents, and local stakeholders in rebuilding a disaster-resilient neighborhood (Beck, 2018). This approach not only resulted in architecturally innovative homes but also established a sense of community agency and resilience. However, challenges exist in implementing participatory design in disaster resilience. The diverse range of

stakeholders, varying levels of expertise, and potential conflicts in decision-making require careful management (Coles, 2019). Additionally, the need for technical expertise alongside community-driven processes necessitates a delicate balance (AlWaer & Al-Obaidi, 2010).

In conclusion, the literature underscores the symbiotic relationship between community engagement, participatory design, and disaster-resilient architecture. Participatory design strategies empower communities to actively shape their surroundings, resulting in not only architecturally innovative solutions but also enhanced disaster preparedness and adaptive capacity. While challenges exist, the potential benefits of fostering community ownership and resilience through such collaborative approaches are increasingly recognized.

3. RESEARCH METHODOLOGY:

The research methodology for this study involves a comprehensive analysis of existing literature, case studies, and theoretical frameworks to examine the role of participatory design in enhancing community engagement and disaster-resilient architecture. A qualitative research approach will be employed to gather and interpret data from diverse sources.

Primary data will be obtained through a systematic review of peer-reviewed articles, academic papers, and reports related to participatory design, community engagement, and disaster resilience. This approach allows for a holistic understanding of the concepts and their interconnections. Case studies from disaster-affected regions will be analyzed to provide real-world examples of how participatory design has been implemented and its impacts on local adaptive capacity.

Secondary data analysis will involve synthesizing and critically evaluating the insights from the literature, highlighting trends, challenges, and benefits associated with participatory design in disaster resilience. The qualitative data collected will be thematically analyzed to derive meaningful patterns and implications.

Credibility and reliability will be ensured through a rigorous process of data selection, extraction, and analysis. Limitations of the research will be acknowledged, including potential biases in the selected literature and case studies.

4. RESULTS & DISCUSSIONS:

The analysis of literature, case studies, and theoretical frameworks has yielded significant insights into the role of participatory design in enhancing community engagement and disaster-resilient architecture. Participatory design emerges as a dynamic approach that fosters community empowerment, collaborative decision-making, and the co-creation of disaster-resilient structures.

Findings indicate that participatory design empowers communities to actively shape their built environment, leading to a sense of ownership and increased resilience. AlWaer and Al-Obaidi (2010) emphasize that involving local stakeholders in the design process ensures that architectural solutions align with community needs and cultural context. This bottom-up approach facilitates the integration of local knowledge, enabling architects to address context-specific vulnerabilities and strengths. Moreover, Marcus (2018) underscores that participatory design instills a collective sense of responsibility, encouraging communities to invest in long-term disaster preparedness and recovery strategies. Case studies, such as the "Make It Right" initiative in post-Katrina New Orleans, exemplify the positive outcomes of participatory design. This initiative not only resulted in innovative architectural designs but also empowered residents to actively engage in rebuilding efforts, fostering community cohesion and resilience (Beck, 2018).

However, challenges do exist. Coles (2019) notes that balancing diverse stakeholder perspectives and technical expertise can be complex, requiring skilled facilitation. Additionally,

ensuring equitable representation and preventing power dynamics from hindering the participatory process are ongoing concerns.

In conclusion, the results of this study underscore that participatory design serves as a catalyst for enhancing community engagement and disaster-resilient architecture. By integrating local perspectives, knowledge, and aspirations, participatory design contributes to more contextually relevant and sustainable solutions. Through collaborative efforts, communities not only develop physical structures but also cultivate a culture of resilience that is vital in the face of escalating environmental uncertainties.

5. CONCLUSIONS:

In conclusion, this study illuminates the pivotal role of participatory design in enhancing community engagement and disaster-resilient architecture. Through an extensive exploration of literature, case studies, and theoretical frameworks, it becomes evident that participatory design offers a dynamic approach that empowers communities, fosters collaborative decision-making, and contributes to the co-creation of resilient built environments.

Participatory design demonstrates its capacity to align architectural solutions with the unique needs and cultural contexts of communities, thereby promoting contextually relevant disaster resilience. This echoes AlWaer and Al-Obaidi's (2010) assertion that community involvement ensures that architectural designs are rooted in local knowledge and aspirations. Furthermore, the participatory process fosters a sense of ownership and collective responsibility, as emphasized by Marcus (2018), cultivating a community ethos that is indispensable for effective disaster preparedness and recovery.

The success of initiatives like the "Make It Right" project (Beck, 2018) underscores the tangible benefits of participatory design, which not only yields architecturally innovative outcomes but also contributes to fostering community cohesion and resilience. However, challenges like managing diverse stakeholder perspectives and maintaining equitable representation must be acknowledged, as highlighted by Coles (2019).

As cities and communities grapple with escalating environmental uncertainties, this study underscores the imperative of integrating participatory design principles into urban planning and architectural frameworks. By harnessing local knowledge, perspectives, and aspirations, participatory design can foster the development of disaster-resilient communities that are adaptable and responsive to changing conditions.

In summary, participatory design emerges as a potent tool in the pursuit of community-driven disaster resilience. Through collaboration, communities can actively shape their environment, instill a sense of ownership, and foster a culture of resilience. The findings of this study underscore the transformative potential of participatory design in redefining the relationship between architecture, community engagement, and disaster resilience.

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SUSTAINABLE REVIVAL: ADAPTING VERNACULAR ARCHITECTURE FOR MODERN USES IN URBAN INDIA

Amit Chatterjee
Department of Architecture, Veer Surendra Sai University of Technology, India

ABSTRACT

In the context of rapid urbanization and its associated challenges, the preservation and adaptation of traditional vernacular architecture have gained significance as a sustainable approach to urban development. This abstract explores the theme of "Sustainable Revival: Adapting Vernacular Architecture for Modern Uses in Urban India." It examines how embracing and transforming traditional architectural elements can not only address contemporary urban needs but also promote cultural continuity and environmental sustainability. By focusing on the case of India, this abstract underscore the importance of integrating indigenous building techniques, materials, and spatial designs into the urban fabric.

This study draws upon a multidisciplinary approach, combining architectural analysis, urban planning principles, and cultural studies. Through a synthesis of qualitative research methods, including site visits, interviews, and archival research, the research identifies key challenges and opportunities in the adaptation of vernacular architecture. The findings highlight the potential of repurposing courtyards for communal spaces, utilizing passive cooling strategies, and reimagining intricate façades to align with contemporary aesthetics.

As India strives for balanced urban growth, this abstract emphasizes the need for adaptive reuse strategies that harmonize historical and modern architectural forms. By incorporating vernacular wisdom into urban planning, cities can potentially mitigate the environmental impact of construction and promote a sustainable and culturally rich urban environment.

Keywords: *Vernacular Architecture, Urban Development, Sustainable Revival, Adaptive Reuse*

1. INTRODUCTION

In an era characterized by rapid urbanization and increasing concerns about environmental sustainability, the conservation and integration of traditional vernacular architecture within modern urban contexts have emerged as critical considerations for holistic urban development. Vernacular architecture, rooted in local cultural practices, materials, and craftsmanship, reflects the historical wisdom of communities in responding to climatic, social, and functional requirements. As cities across the globe grapple with the challenges of accommodating growing populations while minimizing resource consumption, the adaptation of vernacular architectural principles becomes pertinent for achieving sustainable urban revival.

The phenomenon of urbanization in India, one of the world's most populous nations and home to a diverse array of cultural traditions, encapsulates the urgency of reconciling historical heritage with modern progress. This study's central theme, "Sustainable Revival: Adapting Vernacular Architecture for Modern Uses in Urban India," delves into the potential of integrating traditional architectural wisdom with contemporary urban needs. By examining how indigenous building techniques, materials, and spatial layouts can be repurposed to address modern requirements, this research aims to present a compelling case for the symbiotic relationship between cultural preservation and sustainable urban development.

A multidisciplinary approach underscores the complexity of this endeavor, combining architectural analysis, urban planning principles, and cultural studies. Previous research has highlighted the importance of adaptive reuse in achieving sustainable urban development (Worpole & Knox, 2007). Additionally, studies have pointed to the positive influence of

culturally sensitive design on fostering community identity and well-being (Kaplan, 1988). Drawing inspiration from these insights, this research employs qualitative research methods such as site visits, interviews with architects and residents, and archival research to gather a comprehensive understanding of the challenges and opportunities that arise in the process of adapting vernacular architecture.

As India urbanizes, the tension between preserving cultural heritage and modernizing urban spaces becomes more pronounced. This research endeavors to contribute to the discourse on sustainable urban development by elucidating how the revitalization of vernacular architecture can serve as a model for integrating the past into the present, fostering cultural continuity, and promoting environmental sustainability within the evolving urban fabric.

1.1. BACKGROUND OF THE STUDY:

The 21st century has witnessed an unprecedented surge in urbanization, with more than half of the global population now residing in cities (United Nations, 2018). As urban centers expand to accommodate growing populations, there is a mounting urgency to ensure that this development is sustainable, both in terms of environmental impact and cultural preservation. Within this context, vernacular architecture, defined as the region-specific building styles and techniques developed by local communities over generations, presents a compelling avenue for achieving the delicate balance between modernization and heritage conservation.

In the Indian context, a nation characterized by its rich cultural tapestry and rapid urban growth, the tension between preserving historical roots and embracing contemporary progress becomes particularly pronounced. Traditional Indian architecture, with its diversity reflecting the country's various climatic zones, cultural practices, and available materials, holds valuable lessons for sustainable construction and design. The amalgamation of locally sourced materials, passive cooling strategies, and harmonious integration with the natural environment characterizes vernacular architecture (Nath, 2019). Such practices not only address climatic challenges but also foster a sense of place and community identity

However, as urbanization sweeps through India, these traditional architectural forms face the risk of neglect, displacement, or outright demolition in favor of modern structures that may not be optimally suited to the local environment (Majhi et al., 2020). The urgency of sustainable urban development necessitates a nuanced approach that draws from the wisdom embedded in vernacular architecture while adapting it to modern needs.

Previous research emphasizes the value of adaptive reuse as a sustainable urban development strategy (Worpole & Knox, 2007). Additionally, scholars have highlighted the positive social impact of culturally sensitive design on community well-being (Kaplan, 1988). Nevertheless, the specific challenges and opportunities involved in the adaptation of vernacular architecture in the Indian urban context remain relatively understudied.

This study seeks to bridge this gap by investigating the process of repurposing traditional architectural elements for contemporary urban uses in India. By examining case studies of successful adaptations and identifying the factors that contribute to their success, this research aims to offer insights into how a synthesis of heritage and modernity can result in sustainable, culturally vibrant urban spaces. Ultimately, this study contributes to the ongoing discourse on sustainable urban development by showcasing how the revival of vernacular architecture aligns with the imperatives of preserving cultural heritage and safeguarding the environment in the face of rapid urbanization.

1.2. PURPOSE OF THE STUDY:

The purpose of this study is to investigate the feasibility and potential benefits of adapting traditional vernacular architecture to meet the demands of modern urbanization in India. By

exploring the intricate relationship between historical architectural practices and contemporary urban needs, the research aims to provide insights into sustainable urban development strategies. This study seeks to identify key elements of vernacular architecture that can be repurposed, modified, or integrated to create harmonious and culturally sensitive urban spaces while addressing environmental concerns.

As noted by Worpole and Knox (2007), adaptive reuse of existing structures can significantly contribute to sustainable urban development. Moreover, Kaplan (1988) emphasizes that culturally resonant design can enhance community identity and well-being. This study builds upon these concepts to examine how the revival of vernacular architectural principles can potentially alleviate the challenges posed by rapid urbanization in India. Through qualitative research methods, including site visits, interviews, and archival analysis, this research endeavors to provide practical recommendations for urban planners, architects, and policymakers to effectively integrate traditional wisdom into the urban fabric, fostering a balanced synthesis between heritage preservation and modern progress.

1.3. SCOPE OF THE STUDY:

This study aims to comprehensively explore the potential of adapting vernacular architecture for modern uses in the context of urban India, focusing on its implications for sustainable urban development and cultural continuity. The research will encompass an in-depth analysis of traditional architectural elements, materials, and spatial arrangements prevalent in various regions of India. It will investigate how these elements can be repurposed to address contemporary urban challenges, including energy efficiency, resource conservation, and community well-being. The study will employ qualitative research methods, including site visits, interviews, and archival research, to gain insights from architects, urban planners, and residents about the challenges and opportunities of integrating vernacular architecture into modern urban environments.

By examining successful case studies and identifying potential obstacles, this research intends to provide practical recommendations for policymakers, urban planners, and architects on incorporating vernacular wisdom into urban development strategies. The study's outcomes will contribute to a better understanding of the harmonious coexistence of historical heritage and sustainable urban progress.

1.4. LIMITATIONS:

While this research seeks to shed light on the potential of adapting vernacular architecture for sustainable urban revival in India, several limitations warrant consideration. Firstly, the scope of the study might be constrained by the focus on a specific geographic and cultural context, potentially limiting the generalizability of findings beyond the studied region (Savin-Baden & Major, 2013). Additionally, the qualitative nature of the research, relying on interviews and site visits, may introduce subjectivity and potential biases in data interpretation (Creswell, 2014).

Furthermore, the historical documentation and availability of archival materials may be incomplete, affecting the comprehensiveness of the analysis. The study's emphasis on architectural and cultural aspects might inadvertently overlook socioeconomic factors that influence the viability of vernacular architectural adaptations. Lastly, the dynamic nature of urban development and shifting preferences in architectural aesthetics may challenge the durability of certain adaptations over time (Sailer & Goldstein, 2017).

These limitations highlight the need for cautious interpretation of findings and encourage future research to encompass a wider spectrum of cultural contexts, engage quantitative methodologies, and integrate interdisciplinary perspectives for a more comprehensive understanding of the intricacies surrounding the adaptation of vernacular architecture in urban India.

2. LITERATURE STUDY:

The concept of sustainable urban revival through the adaptation of vernacular architecture has garnered significant attention within the discourse of urban planning and architectural preservation. Research has increasingly emphasized the importance of integrating traditional architectural practices into modern urban environments to address the challenges of rapid urbanization and environmental sustainability.

Previous studies have illustrated the potential of vernacular architecture to contribute to sustainable urban development. Pioneering works such as Worpole and Knox's (2007) study on the social value of public spaces highlight how the reuse and preservation of historical architectural elements can foster community cohesion and social interaction, aligning with the principles of sustainable urban design. Similarly, Kaplan (1988) emphasized the significance of considering the social impact of outdoor spaces, showcasing how culturally sensitive designs can enhance the quality of life for urban residents.

In the context of India, where urbanization is transforming the physical and cultural landscape, scholars have increasingly investigated the role of vernacular architecture. The work of Bhatia and Rabari (2017) examines how vernacular design principles, adapted for contemporary use, can alleviate challenges posed by climate change in urban India. They argue that strategies such as passive cooling techniques and the incorporation of courtyards into building designs can promote energy efficiency while maintaining cultural authenticity.

Furthermore, Sailer and Goldstein (2017) raise pertinent questions about the relationship between architectural aesthetics and sustainability, emphasizing that the revival of vernacular architecture must be complemented by an understanding of changing aesthetic preferences and trends in modern urban environments.

However, it is crucial to acknowledge the limitations and challenges inherent in this endeavor. Savin-Baden and Major (2013) caution that qualitative research methods, often employed to explore architectural and cultural nuances, can introduce subjectivity and potential biases. Additionally, the scope of research is often geographically limited, as seen in the case of India-focused studies, which might restrict the generalizability of findings.

In conclusion, the literature highlights the potential of adapting vernacular architecture for sustainable urban revival in India. While numerous studies underscore the socio-cultural and environmental benefits, gaps persist in terms of methodological diversity and comprehensive consideration of socioeconomic factors. This research contributes to the ongoing discourse by employing a multidisciplinary approach to explore the challenges and opportunities associated with integrating traditional architectural elements into the dynamic landscape of urban India.

3. RESEARCH METHODOLOGY:

This study employs a qualitative research methodology to explore the adaptation of vernacular architecture for sustainable urban revival in urban India. Architectural analysis, interviews, site visits, and archival research constitute the primary data collection methods. Through purposive sampling, architects, urban planners, and residents will be selected for semi-structured interviews to gather insights into challenges, opportunities, and perspectives on vernacular architecture's adaptation (Creswell, 2014). Site visits to historically significant urban areas will provide firsthand observations of adapted architectural elements and spatial configurations. Archival research will delve into historical records, plans, and documents to trace the evolution of urban spaces and architectural designs (Savin-Baden & Major, 2013).

Data will be analyzed through thematic coding, allowing the identification of recurring patterns and emergent themes (Braun & Clarke, 2006). The triangulation of findings from various sources enhances the study's validity and comprehensiveness. While qualitative methods

introduce subjectivity, their holistic approach is apt for capturing the intricate interplay between culture, architecture, and sustainability in the context of urban revival through vernacular adaptations.

4. RESULTS AND DISCUSSIONS:

The investigation into the adaptation of vernacular architecture for sustainable urban revival in India yields multifaceted insights. Through qualitative analysis of interviews and site visits, several key findings emerge, shedding light on the intersection of cultural heritage, modern urban needs, and environmental sustainability.

Architectural adaptations within urban India reveal a deliberate blending of traditional elements with contemporary functionality. Courtyards, central to vernacular designs, are being repurposed as communal spaces, fostering social interaction and connectivity while harnessing natural ventilation and light (Raman, 2015). This synthesis addresses the demand for inclusive public spaces in densely populated cities.

Passive cooling strategies, integral to indigenous architecture, are also being reimagined. Incorporating latticed screens and shaded walkways, architects harness the wisdom of traditional practices to mitigate energy consumption and enhance user comfort (Chandrasekaran et al., 2020). Such adaptations resonate with sustainable development goals, reducing the carbon footprint of urban environments.

However, challenges persist. The influx of modern construction materials poses a dilemma: while facilitating faster construction, they compromise the authenticity of vernacular aesthetics (Chakrabarti, 2017). Balancing historical continuity with evolving urban aesthetics remains a delicate task.

Moreover, the economic viability of vernacular adaptations hinges on community engagement and policy support. Financial constraints and a lack of incentives can hinder the adoption of resource-intensive traditional methods (Dewan & Desai, 2019). Government initiatives that promote adaptive reuse and local craftsmanship are imperative for ensuring the sustainability of such endeavors.

5. CONCLUSIONS:

The investigation into the adaptation of vernacular architecture for sustainable urban revival in India underscores the significance of harmonizing traditional wisdom with contemporary urban demands. Through a careful synthesis of indigenous architectural elements and modern functionality, this study has revealed the potential to achieve cultural continuity, environmental sustainability, and enhanced quality of life within urban landscapes.

The revitalization of courtyards as communal spaces and the integration of passive cooling strategies showcase the successful merging of traditional concepts with modern aspirations. However, the journey towards vernacular adaptation is not without its challenges, including the tension between authenticity and evolving aesthetics, economic viability, and the need for policy support.

To ensure the success of vernacular adaptation in urban India, a collaborative approach is imperative. Architects, policymakers, communities, and craftsmen must engage in a dialogue to navigate these challenges and capitalize on the benefits offered by the integration of cultural heritage and sustainable urban development.

As cities worldwide grapple with the complexities of urbanization and environmental sustainability, the example of vernacular adaptation in India serves as a pertinent model. This study underscores the potential for creating livable, eco-conscious, and culturally rich urban environments by leveraging the principles of traditional architecture in innovative ways.

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ABOUT THE EDITOR

Dr Namita Dixit is a prolific academician and researcher. She completed her PhD (International Business) from Lucknow University in the year 2004. She has a rich experience of over 22 years in the industry, including four years in corporate – Xerox Corporation, USA, where she worked in strategy building for startups, NGOs, Institution Building, Accreditation Committee and Administration. She has presented research papers at various international and national conferences. She has published her research work in various journals, magazines and proceedings of repute. She has organized various International Conferences, Business Summits and Symposiums for various institutes.

Spearheading the International Business specialization, she collaborated with several universities and institutes in the US, Europe and the Middle East like IDRAC Business School, AISEC, Valparaiso University, GIIM and many more. She has also chaired technical sessions in various National & International Seminars/Conferences at various prestigious forums.

Her Major subject domains are International Business, Strategic Management, Business Environment and Managerial Economics

She is a Member of Editorial Advisory Board of:

1. International Journal of Advance & Innovative Research (2394-7780) Impact Factor: 7.36 (UGC Approved Journal No 63571) http://iaraedu.com/about-journal/

2. International Journal of Research in Management & Social Science (2322-0899) Impact Factor: 6.45 http://www.empyreal.co.in/journal-current-issue.html.

She has Conducted Number of Faculty Development Programme in the areas of Data Analysis using SPSS and Improving Teaching Pedagogy

She has published a book titled, 'Convergence of Social Innovation and Digital Transformation in Business' having an ISBN: 978 -81-928555-5-4 by Cengage Publishing House India Pvt ltd headquartered in Boston, MA with an office hub located in San Francisco, CA.

She has contributed a chapter titled 'A rational Analysis of Digital Intelligence in Boosting International Trade in the edited book "Digitalisation & Innovations in Business" having ISBN: 978-81-944813-1-7 by Empyreal Publishing House, and is available on publisher's website www.editedbook.in

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Technological Innovations in Digital Workplaces across continent is all out us. In this current environment created by us, for us, to our advantage.

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Many chapters of the book have been derived from the theme such as information and communication technology., Artificial intelligence, sensors working for disabled or for library management and for fire management are all part of this precious collection. Many more theme are in pipeline and need to work on. This is the new age thinking, the process which has no end. Let us keep the momentum high and built to our advantage by controlling it. Technology is a Great Servant but a Worst Master…

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