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Role of Teachers in Building the Concept of Sustainable Development: Success or Failure

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Amber Jamshaid^{1*}
Tayyibah Roohi¹
Amna Ramzan¹

Abstract

Sustainable development anticipated a rich challenging and thought-provocative construct in the social sciences. The main purpose of this paper is to identify and explore the role played by primary school teachers in build the idea of Sustainable development. This paper was projected to identify and explore how a teacher can successfully execute the concepts of sustainable development by the teaching of students' minds at the primary level. The paradigm of the study was positivism with quantitative methodology and survey method was utilized for data collection. All the Primary school teachers of Lahore division were constituted as the population of the study. Through multistage sampling technique 352 primary school teachers were selected as participants of the study. A self-developed sustainable development questionnaire with four major factors (*Teachers awareness, pedagogy, Curricular & Co-curricular Activities*) having Cronbach's alpha value = .93, used to measure the role of teachers in building the sustainability concept at primary grades. The results indicates a significant means score difference among the sustainable development scores and sector (private and Public) school teachers about their role for Sustainability. Further results also reconnoiter the significant difference ($p=.04$) between the mean score of the female and male teachers in building SD concept in the student's mind.

Keywords: sustainable development, social, environmental, economic indicators

Introduction

The idea or notion of SD Sustainable development became popularized

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after the publication of a report which was presented by “*World Commission on Environment and development*” recognized as sustainable future (Brundtland, 1987).

“Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs”(Brundtland, 1987).

Sustainable development encourages a solid and increasing connotation between individual activities and environment so that Environmental, Societal, and economical requirements could be fulfilled. The Secretary-General of UN, in 1983 assigns a task to “*The World Commission on Environment and Development*” to “re-examine critical environmental and development problems around the world and formulate realistic proposals to address them (Agyeman, 2005). That idea was concluded in the Brundtland description “Our Common Future” in 1987, which specifically aims to specify the needed pathway for Sustainability on every stage and also helped to convey the concept of sustainable development into forefront on global level, this report made the world alerted about the urgency of making progress to the truly sustainable development without harming the environment and natural possessions (Brundtland, 1987). The World United Nations Environment Programme (UNEP), “*The World Wide Fund for Nature (WWF) and The World Conservation Union in 1991*” *Caring for the Earth* paying their attention to the practice of “living Sustainably” “described as

“A kind of development that provides real improvements in the quality of human life and at the same time conserves the vitality and diversity of the Earth. The goal is a development that meets these needs in a sustainable way”(Union & Unep, 2013).

The Period of ESD “*Education for Sustainable Development*” declared by the United Nation was an attempt to reorient educational practice, policies and investments to deal with the concept of sustainability (Wals, 2014). During the Decade, ESD contributed to enabling the individuals to cope up with the challenges of the present and future and motivate the

decision-maker to make use of full adjustments for the betterment of the viable world. *“When Education for sustainable development emerged as a component of the educational agenda in the international arena, it was related with the considerable shift in the educational discussion about the purpose and nature of education and with the necessity to respond to crises caused by the recent idea of progress”* (Pavlova, 2013).

As Huckle (1996) discussed that how ESD invites us to talk about the assumptions of educational leading discourse, especially those objectives, teaching methods and contexts which supports initiating people into the skills & concepts required for judgment technological and scientific solutions to environmental matters without addressing their root causes (Huckle, 1996; Huckle & Wals, 2015)

2. Sustainable Development in Pakistan

From the time of 1990`s the Pakistani government has paid their additional priority objectives in promoting equitable and sustained development, especially over the last few years government plans to develop Pakistan`s sustainable development strategies in their own context to manage the issue at the national level. In1992, it was the time when heads of different countries signed Agenda-21 on the occasion of Earth Summit in Rio-de-Janeiro (USA), Pakistan develops its National Conservation Strategy (NCG), which depicts as a part of SD and determine environmental improvements agenda for the country (Pearson & Degotardi, 2009). As described by literature the Pakistani government reforms relating to environment-friendly initiatives, like government of Pakistan has initiated National Cleaner Production Program to facilitate the tanneries and industries to deal with ecological problems (S. J. I. Khan, Awan, & Khan, 2012). The authors who has supported the reforms of government,concerning environmental conditions that the government of Pakistan consider Sustainable development Goals, a lot more extensive in degree than active Millinium Developmental Goals So, as indicated by Khan (2018) Pakistan has intended to efficiently keep tabs on Pakistan's development on sustainable development goals and inform policymaking and actions at the state level through exploration, discourse, open strategy commitment trainings and involvement of stakeholders in policy-making (Zaidi, Mirza, Hou, & Ashraf, 2018). The national ownership at all levels

will be guaranteed at all levels and the government will be encouraged and facilitate during the process of development of nationally defines sets of indicators that are most appropriate to Pakistan's national needs and priorities (Saeed, 2019). Schooling is observed as a significant agent of revolution in expressions of changing lives, behaviors and common mindsets (S. Khan & Khan, 2018). The role of education in exploration of Sustainable development is imperious, at the point when education for sustainable development (ESD) rose as a component of instructive plan, it was related with important shift in the instructive discussion about the reason and nature of instruction and with the necessity to react to emergencies brought about by the contemporary impression of development (Franchett et al., 2019).

3. Teacher's Role for ESD

Being an educator is not only to perform a job that contains a number of tasks to play: it means operating inside the education organization, which is not entirely organized and never will be (Beccegato, 2001). The research argued that:

In spite of arguments that people's "beliefs" are important influences on the ways they conceptualize tasks and learn from experience . . . little attention has been accorded to the structure and functions of teachers' beliefs about their roles, their students, the subject matter areas they teach, and the schools they work in (Nespor, 1987).

Explaining the concept of Education for sustainable development was a challenge for teachers during the recent decade (Jaspar, 2008). The varied extent of discussion about this notion can be seen as: the implications of sustainable development in educational setting, the suitable parity of harmony, citizenship, human rights, promotion of social values, development schemes in effectively stated educational programs, and methods for coordinating the civilisations, the sociologies and expressions of the human practise into what to be expected and prepared as a part of education (Gadotti, 2016). Some opposed that education for sustainable development jeopardised influence whereas some of others considered in the instance of inviting that schools and educational istitutios should take a

lead to promote sustainability by involving educators (Sinakou, Boeve-de Pauw, Goossens, & Van Petegem, 2018). Teachers assume a key job inside the pertinent socialization of youth for SD, It's imperative that, unrelatedly of the educational material that an educator is responsible, the teacher's overall duty can be viewed as the embellishment of socially and sincerely well-adjusted people (Sinakou et al., 2018). The teachers should support the young students to feel strong about them; to demonstrate their feeling and confidence, to esteem themselves as well as other individuals (Rieckmann, 2018).

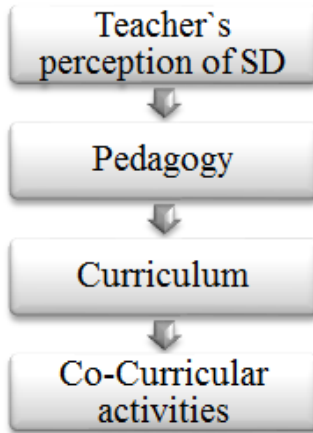
4. Significance of the Study

The following paper would be helpful for teachers, school organization, stakeholders and society to recognize the actual role of teachers as an agent of sustainable development, moreover, it would explore the new scopes for decision-makers and prospective teachers to discover the new patterns for emergent demands of sustainability. This paper would also help to explore that how teachers are getting along to make their students learn about sustainable development, how they are utilizing their capacities and ability, what teaching methodologies they consider most applicable, how helpful they found implemented curriculum and the significance of Co-curricular activities to construct the SD ideas, and how these variables can be utilized to clarify the SD concepts.

5. Purpose of the Study

This paper specifically analysis the figure of primary school teachers; those specialized teachers who take the responsibility to offer SD patterns to their pupils, repairing instruction content for knowledge, arrange activities for sustainability concept building and collaborating with school management to achieve the desired outcome. The role of teacher-as-facilitator is critical in the teaching-learning situation and in monitoring a learning procedure which involves significant inquiry and formation of common identity in sustainability. At the same time, the role of the teacher is content-neutral, not as a value-neutral. Certainly, it might be assumed that no instruction is ever valued impartial (Rands, 2009). In this research, the researcher seeking to define and develop an understanding of what role teachers are playing in order to build the SD concepts at the primary level. From reviewing the

literature, I have identified the four fundamental factors with reference to identify the Role of Educators As an agent of Sustainable development and these factors are:



By keeping in mind, the above discussion of the literature the given were the aims of study in hands:

1. To explore the perception of primary teachers about their role as an agent for sustainable development at the primary level.
2. To identify the difference between primary school teacher's perception regarding their responsibilities as SD concept builder based on gender and sector.

5.1 Research Hypothesis

The following study attempts to test the following hypothesis:

1. There is no significant difference between male and female school teacher's perception about their role for sustainable development.
2. There is no significant difference between the public and private school teacher's perception about their role for sustainable development.

6. Research Design

The study follows a positivist paradigm and descriptive in nature. For data collection, the quantitative methodology was employed. A self-devised questionnaire was used to explore the perception of teachers and identify

the extent to which they are doing their efforts in promoting the values of Sustainable development at the primary level.

6.1 Population

The primary institute teachers of district Lahore constitute the target population of the study. There were 2817 primary teachers from the public sector and 1275 teachers from private sectors. The researcher acquired this information from the authorized website of the School Education department and information about private school teachers from the Education Office Hall Road Lahore. The accessible population was 4092 primary teachers of District Lahore.

Table 1

Number of Schools in Lahore

	Male	Female	Total
Number of Schools	348	268	616
Number of Teachers	1178	1639	2817

Source: Punjab schools education department web

Table 2

Gender Wise Number of Schools

Category	Schools (Boys)	Schools (Girls)	Total
Schools	158.		158.
Teachers	1275.		1275.

6.2 Sample of the Study

Random sampling technique was used to get a true demonstrative sample from the available population. In Lahore district we have 4092 registered primary school teachers from both the sectors, taking help from the sample-size calculator¹ at the 5% margin of error about the parameter estimation at 95% confidence level, researcher select 352 primary teachers from the target population. The nominated sample of the current study illustrated in the given table:

Table 3
Sector Wise Distribution of Primary Teachers

	Frequency	%	%	Total %
Public	255	72.4	72.4	72.4
Private	97	27.6	27.6	100.0
Total	352	100.0	100.0	

Table 4
Gender Wise Division of Teachers

	Freq.	%	%	Total %
Male	126	35.8	35.8	35.8
Female	226	64.2	64.2	100.0
Total	352	100.0	100.0	

6.3 Instrument

By taking indicator from literature a questionnaire was developed, with four main factors named as, “Teacher’s Perception” measuring their knowledge, awareness, competencies about SD concepts; “Pedagogy”(what kind of teaching methodologies they have been using and concenter most useful) , “Curriculum” (to what extent the implemented curriculum is helpful in concept building)and “Co-Curricular activities” (how much they consider co-curricular activities are important in concept clearance). These four major factors further contain subfactors which are the three basic pillars of SD (Social, Environmental And Economics). The questionnaire was devised in the national language to make it more comprehensive and easier to answer.

6.4 Internal Consistency of the Instrument

To quantify the internal consistency, the questionnaire was pilot tested and the values of Cronbach’s Alpha for the factors are:

Table 5

Factors	No of Items	Cronbach’s Alpha
A. Teacher’s perception	01 to 07	.740

B. Pedagogy	08 to 19	.896
C. Curriculum	20 to 30	.797
D. Co-Curricular activities	31 to 43	.906
E. Total	43	.932

7. Analysis and Interpretation of Data

The procedure for analyzing data enables me to comprehend the collected information. The most common assumption about analysis is that it means interrogating and organization of data in a way that permits the researcher to identify themes discover relationships and draw explanation or generate theory from data (Richter et al., 2017). The obtained dataset was analyzed through SPSS version 21.

7.1 Data Normality

To ensure that obtain data was normally distributed, Shapiro-Wilk's test ($p > 0.05$) was applied, typical Q-Q plots and visual review of histogram demonstrate that the data were approximately normally distributed for both the ends.

Table 6

Data Normality Test

Sector	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig	Statistic	Df	Sig
Public	.065	242	.014	.988	242	.035
Private	.071	110	.200*	.987	110	.393

7.2 Descriptive Statistics

Descriptive Statistics just like mean and standard of variable provides an overview of the given data. Likert scales questions were used which enables therespondents to choose the best answer.

Table 7

Descriptive Statistics of Key Variables

Key variables	N	Min	Max	Mean	SD	Variance
---------------	---	-----	-----	------	----	----------

Teacher`s Awareness.	352	13.00	32.00	23.9375	4.11537	16.936
Pedagogy,	352	24.00	60.00	44.7528	8.17813	66.882
Curriculum.	352	17.00	53.00	35.6477	6.18847	38.297
Co-curricular Activities.	352	24.00	64.00	48.6392	9.14760	83.679
Total Factors	352	88.00	192.00	149.3068	21.46254	460.641

The table no 7 depicts the mean values of the teachers responses about their perception about Sustainable development is 23.93 indicate that they possess the clear vision about SD concepts, And mean value = 44.75 indicate that a large number of teachers use different techniques to teach about the Sustainability concepts to their students., Mean response value of all teachers about presence of sustainability concepts in the implemented curriculum = 35.64, shows that there is a value able amount of content which helps teachers to clarify the concepts about SD, Further mean response value of teacher responses= 48.63 indicate that they consider the co-curricular activities supportive in order to promote sustainability values among students.

7.3 Correlation

Bi-Variate Pearson product-moment correlation coefficient was performed to explore the association between the four major factors of the study. To guarantee that there is no violation of the assumption of linearity and normality preliminary analysis was performed as,

Table 8
Correlation between Factors

Variables	1	2	3	4	5
1. Teacher awareness	1	.350**	.523**	.366**	.623**
2. Pedagogy.		1	.396**	.714**	.838**
3. Curriculum.			1	.465**	.725**

4. Co-curricular.	1	.881**
5. Total	.	1

** . “Correlation is significant at the 0.01 level” (2-tailed).

And the results reveal that a medium positive correlation found among the pedagogy and teacher`s perception $r = .35$, $r = .52$ shows a large correlation between curriculum and teachers perception, $r = .39$ indicate a medium correlation between pedagogy and the curriculum. $r = .62$ demonstrate that there was a large correlation between co-curricular activities and teacher`s perception, A large correlation was also found between pedagogy and co-curricular activities with $r = .83$ and furthermore, the value of $r = .72$ indicate a large correlation between co-curricular activities and curriculum with the $n = 352$, ($p < .0005$).

7.4 Independent Sample T-Test

The role of teacher s was further explored on the bases of dissimilar variables like gender and sector.

7.5 Comparison on the Bases of the Sector

The independent sample t-test was applied to calculate the mean score differences between the public and private sector and the values are:

Table 9

Independent Sample T-Test on the Bases of Sector

	Public (255)		Private (97)		T	Df	P
	M	S. D	M	S. D			
TRSD	156.07	15.15	160.74	14.60	-2.71	350	.007

The above values indicate a significant difference between the level of awareness of teacher from the private and public sector about their role for sustainability, so we reject the null hypothesis. As for private sector ($M = 160.74$, $SD = 14.60$) and for public ($M = 156.07$, $SD = 15.15$), $t(350) = -2.71$, $p = .007$, 95% CI, with the difference in Mean = -4.60, -8.06 to -1.28.

7.6 Comparison on the Bases of Gender

Further teacher`s role for SD was compared on the bases of gender the independent sample t-test was applied to identify the mean score difference between female and male teacher`s role for sustainable development and the values are:

Table 10

	Male (126)		Female (226)		t	Df	P
	M	S. D	M	S. D	-5.85	350	.000
TRSD	152.33	14.54	161.44	14.37			

The above table reveals a significant difference between the perception of female and male teacher regarding their role for sustainability, For Male Teacher (M=152.33, SD=14.54) and for female teachers we have (M=161.44, SD=14.37), $t(350) = -5.85$, $p = .000$, 95% CI, with the magnitude of difference in mean = -9.11, -12.17 to -6.05.

8. Results & Findings

The findings determined by the results are reported as the set of data was approximately normally distributed and Shapiro-Wilk`s test indicates ($p > .05$) (Razali & Wah, 2011), Furthur by reviewing the histogram, Q-Q plots and boxes demonstrated that data were normally distributed. The relationship between four major factors was examined using Pearson product-moment Correlation Coefficient. To make sure that there was no destruction of the supposition of linearity, homoscedasticity, and normality, a preliminary analysis was performed, a positive correlation was found among four factors. The questionnaires were distributed among the female (64.2%) and Male (38.5%) ,while sector wise distribution was as private sector teachers were (27.6%) and public sectors teachers were (72.4%) frequency distribution can be seen as female (226) and male (126), further independent sample t-test, was applied to identify the mean score difference among the perception of female and male, private and public school teachers, and a significant difference was found among the perception of the male and female school teachers, as for female teachers (M=161.44,

SD= 14.37) and for male (M=152.33, SD=14.54), $t(350) = -5.85, p = .000$, 95% CI, with the magnitude of difference in mean = -9.11,-12.17 to -6.05. similarly significant difference was also found for the perception of private and public sector teacher, as for the private sector (M=160.74, SD=14.60) and for the public sector (M=156.07, SD=15.15), $t(350) = -2.71, p = .007$, 95% CI, with the magnitude of difference in mean = -4.67,-8.06 to -1.28. therefore it can be concluded that as compared to male teachers, female teachers from both sectors the female primary teachers from both sectors possess a clear vision and idea about their role as a promoter of SD values at primary level.

9. Discussion

As this research aimed to explore the role of teachers as an agent of sustainable development with respect to their perception about the notion, their pedagogy, how helpful they consider implemented curriculum is, and with help of co-curricular activities. Although major findings are given in the results section there are some important conclusions which we draw like,

From the point of view of those teachers who are involved in sustainable development and environmental exercise, these findings are surprising. We expected a higher level of familiarity of people with issues of sustainability in educational programs. From the outcomes revealed here, we presume that our language for sustainability (counting, for example, abbreviations, for example, EE, SD, and ESD) was essentially not a piece of most scholastics' vocabulary. Without a doubt, many of the teachers utilized the language in the simplest ways and held well known environmental perspectives, (for example, the significance of re-cycling paper). This discovering keep running here and there counter to the proposal of Walls and Jickling who state that " sustainability talk possibly unites various groups in the society scanning for a typical language to examine environmental issues" (Jickling & Wals, 2012). However, participants of this study show a significant amount of understanding and awareness about their role as an agent of SD while removing the language barrier, also indicating in results section that the female primary teachers are found to be more clear about their role for sustainability, a considerable amount of attention should be given toward

the training of teachers especially male teachers who are the key agents to promote the values of SD.

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Appendix

Questionnaire

Teacher`s Role in Building the concept of Sustainable Development at primary level”

“Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs”(Brundtland, 1987)

The present study aims at identifying and exploring the role of teachers in building the concept of sustainability at primary level. Your valuable response in this connection would be highly venerated.

Name _____

Age _____

School_____

Qualification_____

Designation/post _____ Gender Male
Female

Experience _____ sector Public Private

Subject you taught_____

Answer key

		Not at all 1	To a little extent 2	To some extent 3	To moderate Extent 4	To a large extent 5
Environment	Teachers Attitude toward sustainability	1	2	3	4	5
	You have adequate or sufficient knowledge / understanding about the notion of sustainability					
	There is a need to know more about SD issues before you teach your student.					

There is a need of teaching SD at primary level?					
You find it interesting to know about the recent progress in Education for sustainable development.					
You incorporate sustainable development practices into your own life					
SD concepts should be taught as a separate subject instead?					
There are sufficient physical facilities in your school necessary for building the concept?					
You assess or evaluate those concepts which you have been taught?					
You are equipped with all the necessity facilities in classroom to elaborate the SD concepts to the students.					
Pedagogy					
Lecture method is useful to tell the students about environmental issues					
Activity base learning is a mean toward sustainable development Understanding.					
Role plays/ games are helpful to describe the Environment changes and preventions?					
You explain the concept of natural resources in classroom.					
You explain the meaning of waste of natural resources (water, trees, etc).					
You describe the consequences of that waste of resources in your instruction.					
Is this beneficial to make the student aware about recycling process.					

	Practical examples/demonstration are necessary to clarify the concept of recycling					
	Paper recycling is the most easy and interesting process to teach through activity.					
	Use of Av aids can increase the interest of students regarding SD learning.					
Economy	You teach your student how to save money and what is the purpose behind it.					
	You teach your students about the advantages of saving and its utilization.					
	You use some kind of story telling or other attractive activities which makes students motivated to save money.					
Social	You care about equality /individual differences in your class?					
	You oppose racism or ethnical prejudice in your class?					
	You tried to inculcate the concept of justice among your students through practical examples.					
	You motivate your students to show respect and care for others.					
Environment	Curriculum					
	You consider there is sufficient content in the implemented curriculum about environmental issues?					
	The content in curriculum provokes the curiosity about gardening/ planting or save nature?					

	Are there any literature /content emphasizing on recycling process and elaborate how can we recycle things?					
	You consider the current curriculum consist of adequate literature about pollution, and pollution prevention?					
Economics	The recent primary curriculums succeed to motivate the student to save money /save resources?					
	There is enough literature helpful to clarify the basic concept of money saving in front of students?					
	There is content regarding effective use of money in primary curriculum					
Social	Implemented curriculum promote the promising ethical features among the students (truthfulness, honesty, helping others)					
	Recent primary curriculum is free from the discrimination, racism, and prejudicial content?					
	Primary Curriculum contains the clear vision of justice, laws and order.					
	Implemented Curriculum satisfies the need of individual learners.					
Environment	Co-curricular Activities					
	There is a need of extracurricular activities in promoting the concept of sustainability at primary level.					
	Arrangement of field trips helps in developing the environmental issues among students					
	Plan a planting competition or activity is helpful in school garden or outside the institute to highlight the need of environmental awareness.					

Economics	Group activities arranged by the teacher are necessary to promote recycling.					
	You prepared presentation/demonstration regarding pollution, or pollution reduction methods					
	Prepare some dramatic presentation, puppet show, or story telling section to emphasize the need of money saving.					
	You teach the students how to spend their money effectively.					
Social	You Promote equality in your class through your own behavior.					
	Group formation is useful technique to enhance student`s learning and peer discussion.					
	You Appreciate ethical behavior in classroom from the students.					
	You Arrange activities in class to make the students aware about the concept of justice.					
	There is a need to arrange sports gala or other competition to promote social interaction between students.					

Thank you for taking the time to complete this questionnaire. The answers you have given will be very useful in helping us to assess the current sustainable development practices within the learning and skills sector.

Automatic Generation of Teachers' Course Preferences Using Document Clustering

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Abstract

In this research work, automated course preferences of teachers were generated using document clustering. Data regarding teachers' course preferences and course outlines were collected and preprocessed for further analysis. Two separate clustering solutions were generated for teachers and courses datasets. The clustering solution for teachers contained clusters of similar faculty members grouped together on the basis of their course preferences and courses taught by them in previous years. The clusters generated for courses contained the lists of course outlines of a similar nature. Good quality clusters for both teachers and courses were generated using K-means clustering method in CLUTO software package. The generated clustering solutions were then mapped for automated generation of course preferences for each teacher present in the dataset. Precision, Recall and F-measure values were reported which indicated promising results.

Keywords: course allocation, data mining, document clustering, higher education, recommender system, teaching quality, teaching management

Introduction

Data mining is an actively growing field of computer science that deals with facts and statistics to generate knowledge and uses it to solve complex real-life problems. In this research work, automated generation of teachers' course preferences using data mining techniques was achieved with an aim to assist the higher management of universities in effective course allocation. Course allocation to teachers is a complex problem that every university's higher authorities such as deans and CODs face at the start of

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every semester. It is a very challenging situation for them to allocate courses in such a way that every teacher is satisfied and also possess enough expertise in the assigned courses. Teacher's expertise and preference for courses have a strong impact on infusing quality knowledge into students. This research work will help authorities in Higher Education Institutes (HEIs) in assigning courses to faculty members in a better way keeping in view their preferences and their respective department's needs.

We collected 45 different course outlines of the subjects related to Computer Science (CS) and Software Engineering (SE) degree programs. These course outlines were downloaded from the official website of the Higher Education Commission (HEC) of Pakistan. Moreover, the data of teachers related to the courses taught by them and course preferences provided by them was also collected.

The proposed solution is based on document clustering which is a data mining technique used to organize a large collection of unlabeled documents into homogenous groups, automatically. These groups are referred to as clusters. Each cluster comprises of objects that are similar in nature. Document clustering is done on the basis of descriptors (groups of words that represent the content of a cluster). Due to the ongoing transition of the world towards a paperless environment and the dominance of web in our lives, the importance of textual document clustering has increased. Document clustering helps in better organization of documents that directly or indirectly improves information retrieval. Moreover, it also helps in handling an enormous collection of documents in order to produce semantically and readily understandable knowledge patterns (Liu, WANG, XU & Guan, [2006](#)). In this research work, we created two separate datasets in the form of textual documents for teachers as well as courses. Teachers' dataset contained information about faculty members regarding courses taught by them in previous years and the preferred list of courses they provided in the previous year. Similarly, courses' dataset included the list of standard course outlines. We used the software package CLUTO: A Clustering Toolkit to discover the teachers' and courses' clusters.

CLUTO provides two standalone programs for document clustering known as *vcluster* and *scluster* (Karypis, [2003](#)). *Vcluster* supports matrix format dataset, while *scluster* supports graph format dataset as input. In this

research work, *vcluster* program was applied on courses' and teachers' preprocessed datasets to generate clustering solutions along with the information about discriminant and descriptive terms. CLUTO provides different parameters to control a clustering solution such as cluster method, similarity function, criteria function and number of clusters (k).

Hence, we obtained two types of clusters. The first were the clusters of teachers containing the groups of faculty members who taught courses of a similar nature and provided similar course preferences. The second were the clusters of courses containing groups of similar course outlines of the degree programs of CS and SE. In order to establish a link between the two sets of clusters, they were mapped onto each other based on the discriminant terms of each cluster from the teachers' as well as courses' clustering solution. Once the one-to-one mapping of teachers' and courses' clusters was finalized, each member of the teachers' cluster could be recommended courses from the relevant course cluster. For the evaluation of the proposed system, the previous year's course preferences comprising the actual data provided by teachers of the Software Engineering (SE) department of University of Management and Technology (UMT) were used. Precision, Recall and F-measure values were also reported.

2. Literature Review

Data mining techniques have been used in the field of education to solve different problems such as timetable scheduling, faculty performance evaluation, students' feedback analysis, etc. Karimpour & Mavizi, (2016) reviewed course timetable scheduling problems with an aim to provide a solution in such a way that it meets each lecturer's satisfaction level and also minimizes the loss of resources in the department. In their proposed methodology, each department allocates courses to teachers locally and then , clustering algorithms are applied to group all common lecturers. Traversing techniques are applied to find unused resources within departments. After the execution of clustering and traversing processes, the mapping action is performed based on the principles of common constraints on redundant resources.

(Singh, 2017) tried to solve the course timetabling problem using genetic algorithm. He explored different selection methods such as roulette

wheel, ranking selection and tournament selection to perform crossover and mutation on selected chromosomes.

(Ganguli & Roy, [2017](#)) used a heuristic approach named graph coloring to solve the course timetabling problem. Graph coloring approach was applied on multiple datasets to obtain optimal solutions. Among all optimal solutions, only those solutions were shortlisted which satisfied all hard and soft constraints.

(Kaur & Kaur, [2014](#)) introduced a new approach for solving course timetabling problem that has the capability of solving general constraints satisfaction problems. The authors used k-means clustering algorithm and rule based classifier techniques to get an optimal solution of course timetabling problem.

Faculty performance is evaluated on the basis of factors such as student feedback, management feedback, institutional support in terms of finance, research activities and managerial support (Pal & Pal, [2013](#)). Hidden patterns are identified with the help of classification algorithms and 'Naïve Bayes' yields the highest accuracy. Results have shown that potential productivity of the faculty can help higher authorities to evaluate teachers' motivation, growth and decline details.

(Dhanalakshmi, Bino & Saravanan, [2016](#)) performed opinion mining on students' feedback data collected via survey. Supervised machine learning algorithms were applied using the RapidMiner tool. Results showed that in terms of recall and accuracy, Naïve Bayes yields the best results, whereas K-nearest neighbor shows the highest precision. From the data comprising students' feedback, teaching and learning were classified as positive and negative by keeping in account the features which needed improvement.

There is a huge amount of information available in an electronic form. This is why text document clustering is considered a rapidly growing area of research these days. (Jensi & Jiji, [2014](#)) surveyed different optimization techniques regarding text document clustering. There are algorithms available, which effectively navigate and organize information as well as provide localized search results. By applying high speed and high quality optimization algorithms, a global optimal clustering solution can be obtained. (Abualigah, Khader & Al-Betar, [2016](#)) introduced multi-objective

based technique which combines similarity measure and refine text document clustering methods. They measure the performance of the proposed technique by using k-means text clustering approach. Experimental research was carried out on seven text document datasets. They demonstrated that text document clustering is the right mining tool for unsupervised text clustering as it categorizes different documents in the same cluster. (Hassan, Karim, Kim & Jeon, [2015](#)) stated that the existing techniques related to document clustering rely on generic measures of similarity and mostly ignore the semantics of terms present in the documents. According to the authors, document clustering algorithms should generate clusters that are semantically relevant. Therefore, in their paper they proposed an algorithmic framework named Clustering by Discrimination Information Maximization (CDIM). The clustering solution yielded by CDIM is described by extremely discriminating terms.

(Dařena & Přichystal, [2018](#)) discovered the topics that were implicitly hidden in the newspaper articles and had a direct impact on the movement of the stock prices of the corresponding companies. Topics of the documents were categorized based on the combinations of specific words in the documents. Machine learning based classification was used for finding and quantifying the association. An accuracy of 70% was achieved for the stock price movement predictions. A human expert was applied feature selection for the categorization of topics to facilitate the labelling of assignment.

Course assignment to faculty members is a very crucial task as students' productivity and future is associated with it. Keeping in view the importance of effective and appropriate course assignment to teachers, this work provides a recommended list of courses that a teacher can preferably teach.

3. Methodology

This section addresses the process of data collection i.e. preprocessing, data files preparation for CLUTO and document clustering in CLUTO. The mapping of teachers' clusters on the courses' clusters for the automated generation of course preferences is also discussed. Figure 1 summarizes this entire process.

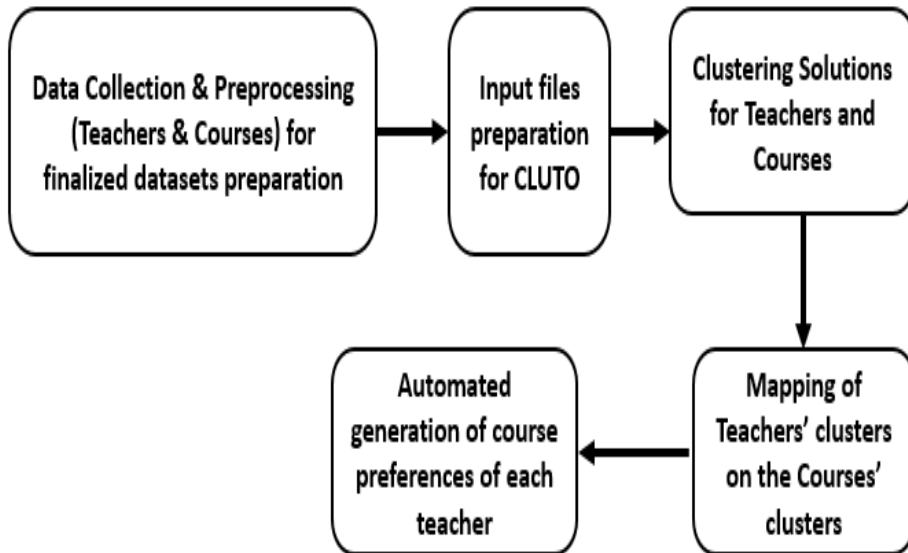


Figure 1. Process flow of automatic generation of teachers' course preference using document clustering algorithms in CLUTO

3.1 Dataset Collection and Preprocessing

For automated generation of course preferences, we gathered data related to both courses and teachers to constitute our dataset. To gather data related to courses, we collected course outlines of core as well as technical /elective courses from the official website of the Higher Education Commission (HEC) of Pakistan related to Software Engineering (SE) and Computer Science (CS) degree programs for the year 2016-2017. The collected course outlines were presented in the form of unstructured textual documents.

Just like the collection of course outlines, we gathered the data of teachers related to courses they taught in the previous years and course preferences given by them in the previous year (2018) from the Software Engineering (SE) department of University of Management and Technology (UMT), Lahore, Pakistan. Table 1 shows a sample of the dataset related to faculty members.

Table 1

Examples of courses taught in previous years and preferences given by teachers in the previous year (2018)

TID	Courses taught in previous years	Preferred courses of 2018
2	Formal Methods in Software Engineering, Data Structures and Algorithms, Discrete Structures, Operating Systems	Artificial Intelligence, Data Structures and Algorithms, Introduction to Computing, Object Oriented Programming, Programming Fundamentals, Software Engineering, Compiler Construction, Computer Networks, Formal Methods in Software Engineering, Operating Systems
4	Distributed Systems, Secure Software Development, Web Technologies, Project Management	Distributed Systems, Secure Software Development, Object Oriented Programming, Programming Fundamentals, Web Technologies
6	Networking, Operating Systems	Computer Networks, Operating Systems
8	Big Data Programming, Information Retrieval, Data Mining, Machine Learning	Machine Learning, Database Systems, Data Warehousing, Natural Language Programming, Big Data Programing, Information Retrieval
10	Compiler Construction, Design Patterns and Refactoring, Programming Fundamentals	Data Structures and Algorithms, Object Oriented Programming, Software Engineering, Compiler Construction, Design Patterns and Refactoring, Database Systems

After collecting the relevant information regarding courses and teachers, we performed the following preprocessing steps to get a cleaned dataset.

- a) Individual course outlines were integrated into a single text file referred to as courses' dataset.

- b) The gathered information about each faculty member as shown in Table 1, was integrated into a single text file referred to as teachers' dataset.
- c) Stop words and special characters are removed.
- d) Stemming and lemmatization steps were performed.

3.2 Input Files Preparation for CLUTO

In order to perform document clustering using CLUTO, we need to generate three separate input files against courses' as well as teachers' dataset as described below.

a) *.mat file*: A sparse matrix format file. This file contained information regarding the frequency of each unique term present in the document. The header line of *.mat* file contained additional information regarding the number of rows, columns and non-zero entries. In our case, the number of rows showed the total number of course outlines / faculty members, while the number of columns represented the total number of unique terms present in courses' / teachers' dataset. The number of non-zero entries showed the total number of all the terms with a frequency greater than or equal to one from both datasets.

b) *.rclass* file: This file contained actual labels assigned manually to each record for the purpose of evaluation and better understanding of results. In total, seven class labels were assigned to course outlines as well as faculty members. These labels included *SE* (Software Engineering), *MWAD* (Mobile and Web Application Development), *CS* (Computer Science (Programming)), *ML* (Machine Learning / Artificial Intelligence), *Netw* (Networking), *Secu* (Security), and *Data* (Database).

c) *.clabel* file: This file contained the list of all the unique terms present in the dataset. We created two *.clabel* files containing all the unique terms from courses' as well as teachers' dataset files.

3.3 Discovery and Mapping of Clusters

After creating the input files (*.mat*, *.rclass*, *.clabel*) as mentioned above for both courses' and teachers' datasets, we performed document clustering to discover different clusters for courses and teachers separately. To generate clustering solution in CLUTO, we need to provide input

parameters such as number of clusters (k), cluster method (clustering algorithm), criteria function and similarity function along with the three input files (*.mat*, *.rclass*, *.clabel*) (Karypis, 2003). Different settings of these parameters were experimented to reach a high purity (close to 1) and low entropy (close to 0) clustering solution. Clustering solution of CLUTO yielded additional information about the descriptive and discriminating terms of each cluster. Discriminating terms are keywords on the basis of which documents in a cluster can be distinguished from the documents present in other clusters. Descriptive terms are the list of common / repeatedly occurring words in the documents within a cluster.

For the mapping of teachers' clusters onto courses' clusters, we took into consideration the discriminating terms of each cluster (teachers' and courses'). In simple words, the clusters of courses and teachers were mapped onto each other on the basis of similar discriminating terms for automatic generation of teachers' course preferences. Section 5 discusses the mapping of courses' clusters on teachers' clusters in detail.

4. Results

This section will discuss the clustering solutions obtained for both courses' and teachers' datasets in CLUTO.

4.1 Clustering Teachers and Courses in CLUTO

To cluster both teachers and courses, we generated many clustering solutions by taking $k = 15, 16, 17, 18$; cluster methods such as *repeated bisection*, *direct*, *agglomerative*; criteria functions including *G1*, *H1*, *E1*, *I1*, *I2*; and similarity functions such as *cosine*, *Euclidean distance*, *correlation coefficient*. Please refer to the official manual of CLUTO for more details regarding input parameters (Karypis, 2003). After obtaining different clustering solutions, it was observed that for $k = 16$ (k is the number of clusters), cluster method = *direct*, criteria function = *I2* and similarity function = *cosine*. We achieved good clustering solutions for both teachers' and courses' datasets by getting maximum purity and minimum entropy values.

Figure 2 and Figure 3 depict the clustering solutions we obtained for both courses' and teachers' datasets by setting the input parameters mentioned earlier.

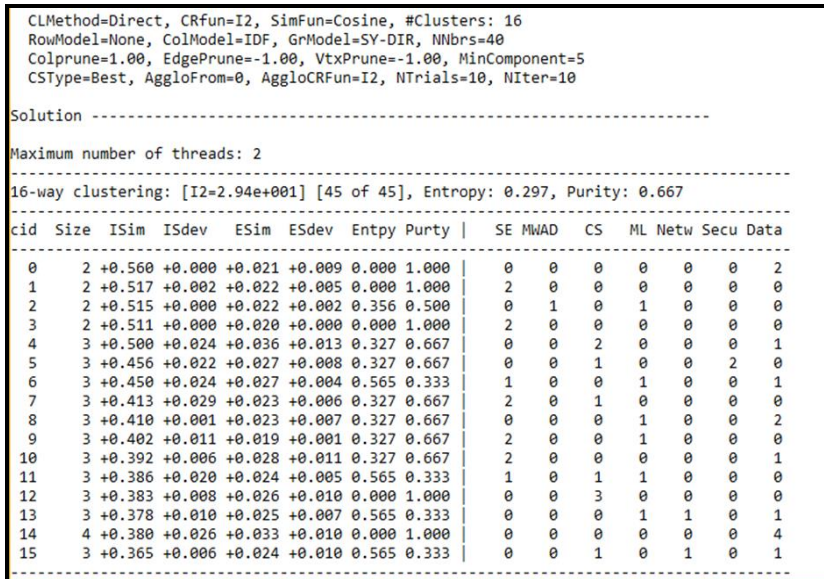


Figure 2. Clustering solution for courses' dataset for k = 16, cluster method = direct, criteria function = I2 and similarity function = Cosine

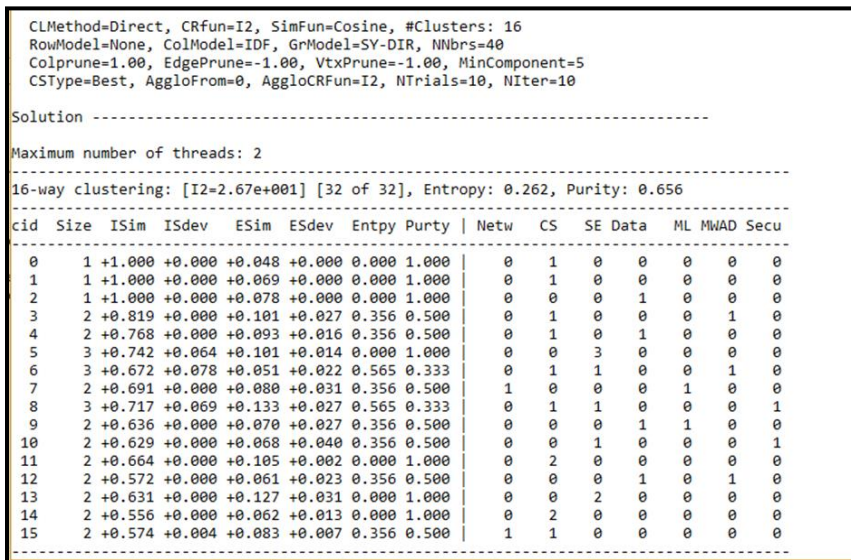


Figure 3. Clustering solution for teachers' dataset for k = 16, cluster method = direct, criteria function = I2 and similarity function = Cosine

As shown in the Figure 2 and Figure 3, an average value of *Entropy* 0.297 and *Purity* 0.667 for the courses' clusters and an average value of *Entropy* 0.262 and *Purity* 0.656 for teachers' clusters shows that reasonable quality clusters for $k = 16$ were generated. *Entropy* and *Purity* show the computed values of *Entropy* and *Purity* of each cluster for courses' (Figure 2) and teachers' (Figure 3) datasets. *Purity* close to 1 and *Entropy* close to 0 shows that the labels assigned manually and by the *vcluster* program of CLUTO are exactly the same, which implies that the actual and expected clustering solutions are the same. Similarly, the value of *Purity* close to 0 and *Entropy* close to 1 indicates that the actual and the expected clustering solutions are somehow different from each other (Karypis, 2003). *SE* (Software Engineering), *MWAD* (Mobile and Web Application Development), *CS* (Computer Science (Programming)), *ML* (Machine Learning/Artificial Intelligence), *Netw* (Networking), *Secu* (Security), and *Data* (Database) were the labels assigned originally to course outlines and faculty members. The value present against each label showed the number of course outlines (Figure 2) and faculty members (Figure 3) present in a cluster assigned with the respective label. For example, in Figure 2, cluster 0 has 2 objects (course outlines) which were assigned the label *Data*. The values of *Entropy* and *Purity* clearly depict that the actual as well as expected clustering solutions are the same. Similarly, as shown in Figure 3, cluster 14 has 2 objects (faculty members) which were assigned the label *CS*. The values of *Entropy* and *Purity* clearly depict that the actual as well as the expected clustering solutions are the same.

As discussed in Section 3, CLUTO also reports a list of discriminating as well as descriptive terms of each cluster. On the basis of the clustering solutions obtained for courses and teachers, the next step was mapping the clusters of teachers onto the clusters of courses for the generation of teachers' course preferences. This mapping was done on the basis of similar discriminating terms present in each cluster of courses and teachers.

Table 2 shows some sample teachers' cluster ID (T-cid) and the top discriminating terms present in the respective clusters of teachers along with their ID information.

Table 2

Top Discriminating Terms of Sample Teachers' Clusters and the Teachers Included in those Clusters

T-cid	Top Discriminating Terms (Teachers)	Teachers' IDs
3	Object, Oriented, Fundamentals, Algorithm, Analysis	3,17,22
5	Security, Algorithm, Requirement, Quality, Mining	8,15,21
6	Mobile, Design, System, Information, Security, Requirement	16,18,24
8	Fundamentals, Advance, Designs, Administration, Spatial	12,10,29
15	Human, Image, Vision, Web, Compiler	31,20

Similarly, Table 3 shows some sample courses' cluster ID (C-cid) and the top discriminating terms present in the respective clusters of courses along with the courses' ID information.

Table 3

Top Discriminating Terms of Sample Clusters of Courses and the Courses Included in those Clusters

C-cid	Top Discriminating Terms (Courses)	Courses' IDs
3	Intelligence, Language, Chomsky, Refactoring, Database	31,38,40
6	Consuming, Mobile, Language, Security, System	20,32,41
8	Configuration, Testing, Evolution, Identification, Geography	17,28,30

12	Processing, VLSI, Automata, Electronics, Context	15,25,6
14	Heuristics, Quality, Recurrence, Evaluation, Requirement	18,19,27,29

5. Mapping of Teachers' and Courses' Clusters to Generate Preferences

Automatic generation of course preferences of teachers was done on the basis of discriminant features identified from the clusters of teachers as well as courses. Mapping was done on the basis of at least two or more discriminant features from both types of clusters (teachers and courses). This ensured the relevance of teachers with courses and vice versa. Table 4 shows the common discriminating terms from both types of clusters along with the T-cid, C-cid, teachers' ID and courses' ID information.

Table 4

Mapping of Teachers on Courses on the Basis of Common Discriminating Terms from Teachers' and Courses' Clusters

T-cid	C-cid	Teachers' ID	Courses' ID	Common Discriminating Terms from T-cid and C-cid
0	12	1	15,25,6	Processing, VLSI
1	7	26	26,10,13	Object, Analysis
2	13	5	3,33,36	Operations, Mining
3	7	3,17,	26,10,13	Analysis, Algorithm, Object, Oriented
4	7	2,19	26,10,13	Stacks, Algorithm
5	14	8,15,21	18,19,27,29	Quality, Requirement
6	6	16,18,24	20,32,41	Security, System, Mobile
7	12	11,13	15,25,6	Automata, Electronics
8	4	12,10,29	12,11	Administration, Spatial
9	13	23,28	3,33,36	Natural, Assembly
10	5	4,32	8,34,35	Testing, Software
11	0	6,9	24,42	Refactoring, Security
12	6	25,30	20,32,41	Mobile, Security
13	1	14,27	1,16	Network, Management

14	12	7	15,25,6	Processing, VLSI
15	9	31,20	5,9,14	Image, Vision

The mapping of courses onto teachers showed the automatic generation of course preferences of teachers in Table 4. As an example from Table 4, T-cid 3 is mapped on C-cid 7 on the basis of common discriminating terms including analysis, algorithm, object, and oriented. Thus, the courses having course IDs 26, 10 and 13 are the automated course preferences of teachers having teacher IDs 3 and 17.

6. Evaluation and Discussion

On the basis of the generated course preferences for teachers, we made a comparison of the actual course preferences given by teachers in the previous year (2018) with the preferences generated automatically (shown in Table 4). Table 5 shows the results. For validation, we computed the Precision (P) and Recall (R) for each TID as well as Average Precision, Average Recall and F-measure of the results with the help of the following equations ((1) – (5)).

$$P = \text{Right automated course preferences of TID} / \text{Total automated course preferences of TID} \quad (1)$$

$$\text{Average Precision} = \sum P / \text{Frequency of teachers} \quad (2)$$

$$R = \text{Right automated course preferences of TID} / \text{Total course preferences of 2018 of TID} \quad (3)$$

$$\text{Average Recall} = \sum R / \text{Frequency of teachers} \quad (4)$$

$$FM = 2 * ((P * R) / (P + R)) \quad (5)$$

On the basis of the computed values of Average Precision, that is, 0.72, Average Recall, that is, 0.67 and F-measure, that is, 0.69, we can conclude that the automated preferences are in accordance with the preferences originally provided by teachers to a reasonable extent.

By applying the proposed methodology, we successfully generated automated course preferences of each teacher present in the dataset using document clustering. In addition to the generated course preferences, the mapping of teachers onto courses shown in Table 4 and the statistics presented in Table 5 can be used to recommend new but relevant courses to each faculty member as well. For example, as shown in Table 5, TID 1 provided a list of 4 preferred courses in 2018. By applying the proposed

methodology, we generated 4 course preferences, out of which 3 were in accordance with the old preferences whereas the remaining 1 was actually a new but relevant course that can be recommended to TID 1. Teacher can prepare this course for future offerings. This will increase the number of courses a teacher can teach while helping the department to augment its resources as well.

TID shows the teachers' ID, AP shows the number of actual course preferences of 2018, PP shows the predicted course preferences, MP shows the number of matching course preferences, P stands for the Precision value and R stands for the Recall value.

Table 5

Comparison of the Predicted Course Preferences with Old Course Preferences Given by Teachers in 2018

TID	AP	PP	MP	P	R	TID	AP	PP	MP	P	R
1	4	4	3	0.75	1	17	6	4	4	1	0.66
2	3	3	2	0.66	1	18	8	4	4	1	0.375
3	5	5	3	0.66	0.8	19	7	5	5	1	0.714
4	3	3	2	0.66	1	20	8	5	4	0.8	0.625
5	6	3	3	1	0.5	21	6	3	2	0.66	0.5
6	4	4	3	0.75	1	22	5	3	1	0.33	0.6
7	3	3	2	0.75	1	23	4	3	1	0.33	0.75
8	3	4	3	0.75	1.33	24	6	4	3	0.75	0.66
9	5	4	3	0.75	0.8	25	8	4	3	0.75	0.5
10	5	4	2	0.5	0.8	26	8	5	4	0.83	0.625
11	7	4	2	0.66	0.57	27	7	2	1	0.66	0.285
12	3	3	3	1	1	28	6	3	3	1	0.5
13	4	3	2	0.83	0.75	29	5	3	3	1	0.6
14	8	3	2	0.66	0.37	30	4	4	3	0.75	1
15	4	4	3	0.66	1	31	3	3	2	0.66	1

16	6	4	4	1	0.5	32	5	4	4	1	0.8
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Average Precision = **0.72**Average Recall = **0.67**F - Measure = **0.69**

The application of our research is not limited to the CS / SE / IT fields. The designed methodology can be applied to any field of education in an HEI. For experimentation only, we took into consideration the data of SE faculty.

7. Conclusion and Future Work

In this research work, automatic generation of course preferences was done for teachers on the basis of courses taught by them in previous years and course preferences given by them in the previous year. As a sample for testing, data of teachers from the Software Engineering department of UMT was collected to prepare the teachers' dataset. Likewise, the data of 45 distinct HEC (Pakistan) approved course outlines was taken into account for the preparation of the courses' dataset. Document clustering using CLUTO was applied to the preprocessed datasets of courses and teachers. For $k = 16$, we obtained reasonable quality clusters against teachers' and courses' datasets. For courses' clustering, we achieved an average *Entropy* of 0.297 and average *Purity* of 0.667, respectively. Similarly, for teachers' clustering we achieved an average *Entropy* of 0.262 and average *Purity* of 0.656, respectively. We also compared the old preferences of courses with the automated ones and obtained average Recall value of 0.72, average Precision value of 0.67 and F-measure of 0.69, respectively. In addition to the generation of automated course preferences, we also recommended relevant new courses to the faculty members they may prepare for future.

It can be concluded that the automated assignment is reasonably accurate and is in accordance with teachers' skills as well as course preferences. A teacher's expertise and preference of courses have a strong impact on delivering quality education to students. Hence, the proposed methodology can help the higher authorities of HEIs in course assignment to faculty members.

As a future extension of this research, we can do course allocation by adding the feedback given by students to each teacher for each course taught by him / her, previously. We are planning to design and develop a working system that performs automatic allocation to teachers of courses on the basis of their preferences of time and courses as well as skills and feedback given by the students.

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Conflict Management Styles Used by Teachers at Public and Private Universities of Lahore

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Abstract

This study aimed to investigate the prevalent Conflict Management Styles (CMSs) among teachers at public and private sector universities of Lahore. For this purpose, a survey was conducted using Rahim Organizational Conflict Inventory Roci-II form C. This inventory was pilot tested and its reliability was 0.86. The sample comprised 446 teachers selected using two-stage random sampling technique from six public and private sector universities of Lahore. The findings revealed that accommodating and collaborating styles were practiced by university teachers and these particular styles mostly prevailed among them. There was no meaningful difference found between teachers from public and private universities; however, few differences were found on the basis of other demographic variables.

Keyword: Accommodating style, collaborating style, Conflict Management Styles (CMSs), University teachers

Introduction

Conflict includes the existence of opposing interests and beliefs among individuals and groups, as well as disagreement at the workplace among individuals and organizations. Conflict is a known social phenomenon in relations and business agreements. Most of the time people take it negatively and consider it as the reason of disturbance, although it may be helpful in managing different situations and problems in a good manner (Singh, 2013). Conflict is an interactive process manifested in disagreements, incompatibility, or dissonance between social entities such as individuals, groups, and organizations. Different people perceive it differently; sometimes people consider it as a process or an action; although

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in some situations people use conflict in behavioral terms to achieve their goals by opposing each other (Rahim, [2010](#)).

Most of the time conflict may cause disturbance and unhealthy environment at the workplace; however, it also promotes creativity and organizational success (Ustuner & Kis, 2014). In 2002, Rahim introduced conflict as an interactive process which is helpful in making disagreement and its demonstration. Exclusive social preferences of opposing parties can be the reason of conflict in organizations. According to Cacioppe and Mock ([1984](#)), conflict is a multidimensional phenomenon which is linked with scarce resources, perception of disharmony and circumstances of interdependence because it generates substantial contradiction about the way how to handle its consequences. . There are some effects of conflict which have both positive and negative dimensions (Mantovani, [1999](#)). There are different sources and levels of conflict known as substantive and affective conflicts, where substantive conflict is concerned with task related or business issues involved in a given situation and affective conflict is associated with emotions and feelings of conflicting parties (Rahim, [1983](#)).

Conflict is categorized into intrapersonal and interpersonal conflict related to personal, group and organizational conflict (Rahim, [2002](#)). Intrapersonal conflict is conflict among individuals which can be classified as goal related and role related. On the other hand, interpersonal conflict deals with the situation in which two parties oppose each other. Needs, values, and attributes of individuals can affect the relationship in organizations causing interpersonal conflict (Jayatilleke, [1972](#) & Koehn, 2002). Intragroup and intergroup conflicts create problems, so do intrapersonal and interpersonal conflicts. These conflicts are based on scarce resources and task dependence in order to achieve structural benefits related to goals (Simons & Peterson, [2000](#)).

Conflict management is the technique used to reduce and eliminate problems and disturbances, either in organizations or in relations. Most of the time conflict is harmful to relations and organizational structure; although occasionally conflict affects the relationship positively and constructively, such as to enhance integration in relations, parties, and organizations (Dogan, [2016](#)). Conflicts with positive effects are labelled as functional conflicts and those with negative effects are labelled as

dysfunctional conflicts (Din, Khan, Rehman & Bibi, [2011](#); Cacioppe & Mock, [1984](#)). According to Armstrong ([2001](#)), analytical and systematic steps are incorporated into management techniques which improve the efficiency and effectiveness of managerial decisions and helpful for managers to tackle their areas of management. In [1983](#), Bercovitch introduced conflict management to find out acceptable and satisfactory solutions of the conflict. In Mantovani's ([1999](#)) point of view, conflict management deals with attitudes or situations of parties and how they try to use different techniques and methods of settlement. Adkison ([1979](#)) said that successful, competitive and cooperative coordination is important at the workplace to manage attitudinal and behavioral components fostering conflicts.

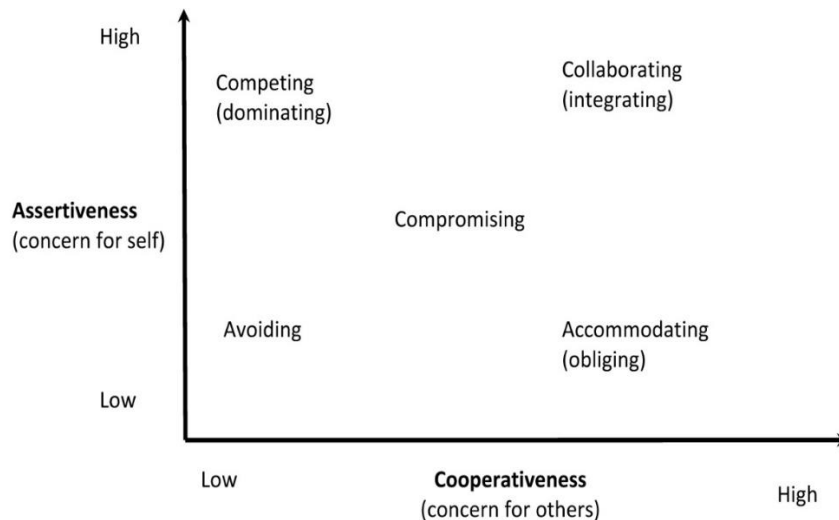


Figure 1

Rahim and Bonoma ([1979](#)) differentiated the styles of handling conflict on the basis of two basic dimensions. The first is the concern for self and the second is the concern for others. The concern for self is the degree to which a person focuses on his or her own concerns. Contrarily, the concern for others focuses on the degree to which a person satisfies the concern of others, as mentioned in Figure 1.

Researchers have studied Conflict Management Styles (CMSs) in different perspective and five styles have been identified by them (Rahim, [2002](#); Yu & Chen, [2008](#)). The first is collaborating style in which people try to solve their problems through mutual collaboration and identify their differences to devise a optimal solution. People share their concerns with each other to avoid miscommunication and encourage open communication to solve problems in order to achieve strategic and constructive solutions (Ud Din, et al, [2011](#)).

Accommodating style is also known as obliging style in which people neglect their personal intentions, needs, and concerns to satisfy others. They strive to minimize dissimilarities and highlight their commonalities and common concerns to satisfy others (Rahim, [2010](#)). In this style, decisions are based on other's people concerns due to lack of creativity and collaboration. (Gross & Guerrero, [2000](#)).

It is assumed that competing style follows a pattern which is contrary to the accommodating style because it focuses on personal concerns instead of others. Dogan, ([2016](#)), Yu and Chen ([2008](#)) say that when people neglect the feelings and needs of others to satisfy their own desires or to defend their own positions, they are actually following the competing style of conflict management in order to manage their conflicts. Immediate actions and decisions are often based on the competing style; when people impose unnecessary decisions which may create conflicting situations to fulfil their own concerns without considering others' perspective. This is why this style is also known as forcing and dominating style.

Avoiding style is totally different in terms of managing and balancing personal and other peoples' concerns because this style allows people to escape conflicting situations. This style does not take into consideration any concerns, whether others' or personal concerns, for the reason that dissatisfaction or frustration occurs on the basis of avoiding the situation (Gross & Guerrero, [2000](#)). People are no more interested to work with the people who avoid conflicts as such people are not willing to find any solution to the concerned problem. Sidestepping situations or withdrawal is associated with this style; people try to postpone the problem until unless a better situation is provided (Singh, [2013](#)).

When solutions to complex problems or well-organized replacements to these problems are required, then they focus on the compromising style in order to manage the conflict. This style focuses on others' satisfaction and may involve middle ground positions, swapping reductions and splitting changes (Ozgan, [2011](#)). According to Su'udy ([2009](#)), this strategy is based on people and result orientation because it offers cooperation at a moderate level.

The current study is beneficial for teachers, administrators, and supervisors to manage their conflicts at the workplace as well as in their interpersonal relationship.

1.1 Objectives

The objectives of the study are as follows:

1. To explore the prevalent CMSs used by the teachers of public and private universities in Lahore.
2. To find out the differences in the use of CMSs on the basis of demographic variables.

1.2 Research Question

1. Which CMSs are used by the university faculty to resolve their conflicts?

2. Hypothesis

The following hypotheses were formulated to meet the objectives,

Ho1. There is no significant difference in CMS of male and female faculty members.

Ho2. There is no significant difference in CMS of government and private sector university teachers.

Ho3. There is no significant difference in CMS on the basis of designation.

Ho4. There is no significant difference in CMS on the basis of teaching experience.

Ho5. There is no significant difference in CMS on the basis of qualification.

Ho6. There is no significant difference in CMS on the basis of age.

3. Methodology

The study was descriptive in nature and a survey was conducted to explore the use of CMSs among university teachers in Lahore. The population of the study was limited to three private and three public universities. Based on the feasibility report, 446 teachers were selected using two-stage random sampling technique. In the first stage, six universities were selected and in the second stage, ten percent of teachers from each university were selected as sample.

Rahim Organizational Conflict Inventory-II (ROCI-II) form C (Rahim, 1983) was adapted to obtain information regarding CMSs of university teachers. The instrument was pilot tested on 30 public and private university faculty members. Reliability coefficient was calculated and the value of Cronbach's Alpha coefficient was 0.86 for ROCI-II. Cronbach's Alpha coefficient of the inventory determined the alpha value of each style, which was 0.68 for the collaborating style, 0.71 for the accommodating style, 0.60 for the competing style, 0.63 for the avoiding style, and 0.70 for the compromising style.

After data collection, descriptive and inferential statistics were computed during data analysis through SPSS and *t test* and ANOVA were applied.

3.1 Analysis

Table 1
Frequency Distribution

Characteristics of faculty		Frequencies	Percentage
Gender	Male	151	42.3
	Female	206	57.7
Sector	Public	230	64.4
	Private	127	35.6
Department	Arts group	290	81.2
	Science group	43	12.0
	Business group	24	6.7
Designation	Lecturer	157	44

Qualification	Assistant Professor	138	37.8
	Associate Professor	62	18.2
	PhD	121	33.9
	MPhil	179	50.1
Age	MA	57	16.0
	Below 30	183	51.3
	31-40	124	34.7
	41-50	38	10.6
	Above 50	12	3.4

Table 1 displays the frequency distribution of university teachers.

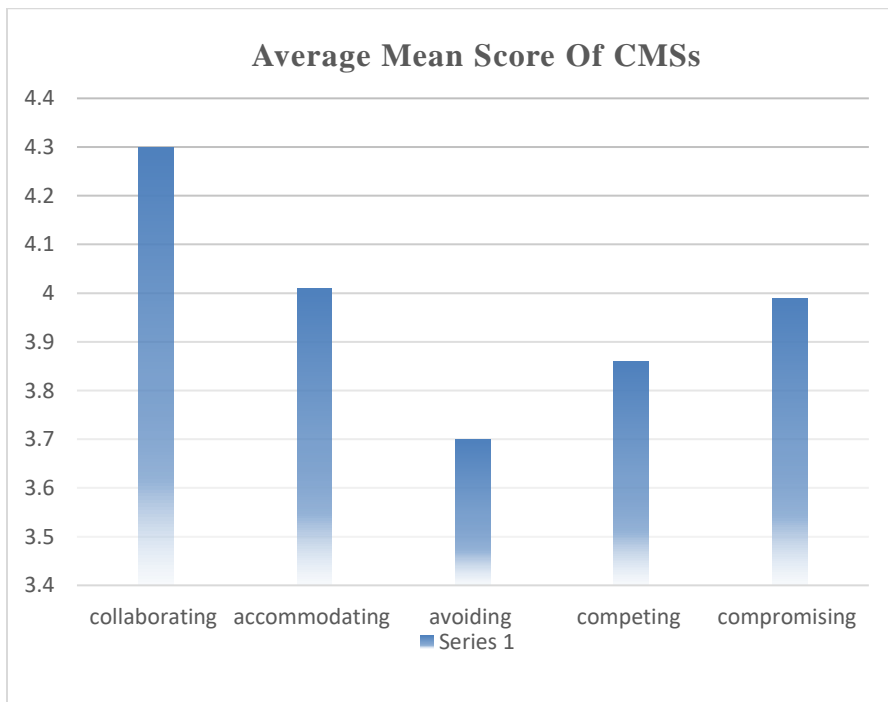


Figure 2.

Figure 1 shows the results of CMSs on the basis of average mean scores. Collaborating style has the highest mean score, followed by accommodating, compromising, avoiding and competing styles.

Table 2
T-Test on the Basis of Gender

Variable	Group	N	Mean	SD	Df	t-value	p-value
Collaborating	Male	151	29.10	2.73	355	.684	.49
	Female	206	29.30	2.72			
Accommodating	Male	151	24.02	2.84	355	.600	.54
	Female	206	24.20	2.69			
Competing	Male	151	18.45	3.89	355	.277	.78
	Female	206	18.58	4.72			
Avoiding	Male	151	22.94	3.36	355	1.14	.14
	Female	206	23.46	3.33			
Compromising	Male	151	15.77	2.06	355	1.74	.08
	Female	206	16.14	1.90			

Ho1. There is no significant difference in CMS of male and female faculty members.

Table 2 intends to showcase the mean score difference between male and female faculty members. Independent sample t test was applied to calculate the difference. Null hypothesis was accepted because there was no significant difference found on the basis of gender. Hence, the results showed that females were not different from males in using Conflict Management Systems to manage problematic situations. The magnitude of differences in mean was very small.

Table 3
T-Test on Sector

Variable	Group	N	Mean	SD	Df	t-value	p-value
Collaborating	Public	230	29.36	2.60	355	1.30	.19
	Private	127	28.96	2.92			
Accommodating	Public	230	24.33	2.65	355	1.90	.05
	Private	127	23.75	2.91			
Competing	Public	230	18.28	4.12	355	1.42	.155
	Private	127	18.97	1.79			
Avoiding	Public	230	23.41	3.39	355	1.29	.195
	Private	127	22.93	3.26			

Compromising	Public	230	16.02	1.96	355	.477	.633
	Private	127	15.92	2.02			

Ho2. There is no significant difference in CMS of teachers from both public and private sector universities.

According to Table 3, independent sample t test was applied to explore the mean score difference between teachers of public and private sector universities in their use of CMSs. Based on the results, null hypothesis was accepted for collaborating, competing, avoiding and compromising styles because the mean score difference was not significant for public and private sector universities. The spread of scores shows that only accommodating style was different in public sector universities. Overall, the magnitude of mean difference was very small.

Table 4
Comparison of CMSs and Designation

		Sum of squares	Df	Mean square	F	Sig
Collaborating	Between group	17.086	2	8.543	1.150	.318
	Within group	2630.432	354	7.431		
Accommodating	Between group	4.964	2	2.482	.325	.723
	Within group	2703.09	354	7.636		
Competing	Between group	89.868	2	44.934	2.356	.096
	Within group	6751.012	354	19.071		
Avoiding	Between group	56.586	2	28.293	2.544	.080
	Within group	3937.723	354	11.124		
Compromising	Between group	7.957	2	3.979	1.010	.365

	Within group	1393.998	354	3.938
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Ho3. There is no significant difference in CMS on the basis of designation.

Table 4 showcases ANOVA results on the basis of the designation and CMS of faculty. University teachers were divided into three groups according to their designation (group 1: lecturer; group 2: assistant professor; group 3: associate professor). There was no significant difference found for the three designations and the null hypothesis was accepted. Hence, all the designated faculty members used the same style to manage their conflicting situations.

Table 5
ANOVA Application on Teaching Experience

Styles		Sum of Squares	Df	Mean Square	F	Sig.
Collaborating	Between Groups	14.851	4	3.713	.496	.738
	Within Groups	2632.668	352	7.479		
Accommodate	Between Groups	6.269	4	1.567	.204	.936
	Within Groups	2701.804	352	7.676		
Competing	Between Groups	188.636	4	47.159	2.495	.043
	Within Groups	6652.244	352	18.898		
Avoiding	Between Groups	135.949	4	33.987	3.101	.016
	Within Groups	3858.359	352	10.961		
Compromising	Between Groups	6.854	4	1.713	.432	.785
	Within Groups	1395.101	352	3.963		

Ho4. There is no significant difference in CMS on the basis of teaching experience.

Table 5 shows the application of ANOVA to explore the relationship between teaching experience and CMS. Faculty members of universities were divided into five groups as per their experience (group 1: 1-5; group 2: 6-10; group 3: 11-15, group 4: 16-20, group 5: above 20). Null hypothesis was rejected for competing and avoiding styles because for these styles there was found a significant difference. The results showed that more experienced teachers used competing and avoiding styles. However, null

hypothesis was accepted with reference to collaborating, accommodating and compromising styles because there was no significant difference found with reference to these styles.

Table 6
ANOVA Application on Qualification

Styles		Sum of Squares	df	Mean Square	F	Sig.
Collaborating	Between Groups	15.575	2	7.788	1.047	.352
	Within Groups	2631.943	354	7.435		
Accommodating	Between Groups	7.511	2	3.756	.492	.612
	Within Groups	2700.562	354	7.629		
Competing	Between Groups	11.738	2	5.869	.304	.738
	Within Groups	6829.141	354	19.291		
Avoiding	Between Groups	13.190	2	6.595	.586	.557
	Within Groups	3981.118	354	11.246		
Compromising	Between Groups	2.520	2	1.260	.319	.727
	Within Groups	1399.435	354	3.953		

Table 6 indicates the significant mean score difference among faculty members on the basis of the relationship between qualification and CMS. ANOVA was applied to explore the relationship. Faculty members of universities were divided into three groups as per their qualification (group 1: PhD; group 2: M. Phil; group 3: M.A). Null hypothesis was accepted because there was no statistically significant difference at $p < .05$ for the three designated groups of faculty members in different universities.

Table 7
ANOVA Application on Age

Styles		Sum of Squares	Df	Mean Square	F	Sig.
Collaborating	Between Groups	87.343	3	29.114	4.014	.008

	Within Groups	2560.175	353	7.253		
Accommodate	Between Groups	16.560	3	5.520	.724	.538
	Within Groups	2691.513	353	7.625		
Competing	Between Groups	203.325	3	67.775	3.604	.014
	Within Groups	6637.555	353	18.803		
Avoiding	Between Groups	60.248	3	20.083	1.802	.146
	Within Groups	3934.060	353	11.145		
Compromising	Between Groups	19.681	3	6.560	1.675	.172
	Within Groups	1382.274	353	3.916		

Ho6. There is no significant difference in CMS on the basis of age.

Table 7 showcases the results of ANOVA application to explore the relationship between age and CMS of university teachers. Faculty members of universities were divided into five groups according to their age (group 1: below 30; group 2: 31-40; group 3: 41-50, group 4: above 50). Null hypothesis was rejected because the spread of the results shows that university teachers significantly differed in their use of collaborating and competing styles. The results also showed that young teachers were more collaborating as compared to old teachers and people above 40 were more competitive. However, null hypothesis was accepted with reference to accommodating, avoiding and compromising styles used by the faculty members of public and private sector universities.

4. Findings and Discussion

Findings revealed that collaborating and accommodating styles were the first priority of university teachers. This is also confirmed by Farooqi, Faridee, Batool, and Yahya, (2016) who uncovered the use of these styles among teachers. Findings also revealed that female faculty members were not different from male faculty members in using CMSs at university level. However, according to Din, Khan, and Bibi (2012), males and female teachers differ in using obliging and dominating strategies. According to them, male teachers used the obliging style and female teachers like to follow the dominating style.

Furthermore, it was found that the use of accommodating style to resolve conflicts was more common among public sector university teachers as compared to private sector teachers. This may be supported by Markovits, Davis, Fay, and Dick's (2013) argument that public and private sector employees work under different employment conditions and organizational contexts and these differences directly or indirectly influence their professional attitude. It is assumed that teachers use different styles according to the situation or problem they face because they are not bound to follow any style to deal with other people. Moreover, these styles directly affect the performance of teachers (Farooqi et al., 2016).

Designation was not found to have any effect on faculty members' choice of using various CMSs. However, differences in the use of avoiding and competing styles on the basis of designation were reported by Ud Din, Khan, and Bibi (2012).

Regarding the teaching experience of faculty members, a significant difference was found in using competing style and avoiding style. Experienced faculty members mostly used avoiding and competing styles of conflict management. This finding is supported by Ud din, Khan, Rehman, and Bibi (2011).

No significant difference was found in the use of CMS on the basis of the qualification of faculty members. Regarding the age of faculty members, a significant difference was found only in the use of collaborating and competing styles. Young faculty members were found to be more collaborating and competing as compared to aged faculty members. This is also confirmed by Ud Din, Khan, & Bibi (2012).

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The Impact of Meaningful Work on Employee Identity; Mediating Role of Employee Resilience

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Abstract

The current study focused on the effects of meaningful work on employee identity with a mediating role for employee resilience. Data were collected from a sample of 154 employees currently working in the service sector (call centers) of Lahore, Pakistan. The study was quantitative and cross sectional in nature. Deductive approach was used in this research. The collected data was analyzed using SPSS and AMOS. CFA was used to check the model fit and employee resilience mediation effect analyzed by Preacher and Hayes' (2004) mediation analysis. Convergent validity was measured through factor loading and AVE value for verification of indices; whereas reliability was approved through Cronbach's alpha application. The findings of the study revealed that meaningful work plays a significant role in employee resilience which enables them to cope with challenging situations and thus maintain their identity. In the service sector, where employees continuously deal with customers, resilience becomes the key to attract / retain potential customers along with employee's satisfaction. Limited number of studies are available on this topic to understand how meaningful work and employee resilience affect employee performance in the context of the service sector (call centers) employees working in Lahore, Pakistan.

Keywords: employee identity, employee resilience, meaningful work, service sector

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Introduction

In today's dynamic environment, organizations have to maintain competitive advantage over other. For this purpose, they need to focus on firm's growth by giving value to their resources. Employee identity is related to an individual's point of view about how s/he views herself / himself as part of an organization in the long term (Ashforth & Mael, [1989](#)). Identity is the process of differentiating oneself from other individuals (Ybema et al., [2009](#)). Organizations should adapt to the changing environment for their sustainability and resilience helps in adaptation to that environment. It helps to cope with external changes and adapting to environmental changes to benefit the respective organization by adapting to environmental changes (Malik & Garg, [2017](#)).

Resilient employees are the prime resource of an organization; as they cope up with challenges to perform at a better level (Cooke, Cooper, Bartram, Wang, & Mei, [2016](#); Maddi & Khoshaba, [2005](#)). Different researchers have studied different variables with reference to their relationship with employee resilience, such as organizational citizenship behavior (OCB), work engagement, job security and stress (Cooke et al., [2016](#); Malik & Garg, [2017](#)). Resilience can be the end product of maintaining a good relationship, being positive and being meaningful (Fit for Work, 2017). Meaningful work also prompts positive self-evaluation of one's life and eventually is helpful in coping with challenges (Nezlek & Gable, [2001](#); Gable, Reis, Impett, & Asher, [2004](#)). Employees in the service sector of Pakistan are quite concerned about their appreciation and identity. As service providers, they enjoy a high demand and expect that their role should be rewarded in both financial and non-financial terms. Through meaningful work, they perform valuable services, handle negative events and become resilient against them. People who put in extensive efforts and handle - negative events for the sake of an organization, they expect and demand their identity in return. Few studies have been conducted on employee identity. Hence, this study will be helpful in filling the existing gap in the literature. The main objective of this study is to determine the effect of meaningful work on employee identity via the mediating role of employee resilience. Researchers have suggested that meaningfulness plays a vital role in an individual's personality (Lysova, Allan, Dik, Duffy,

& Steger, [2018](#)). Employees' affective commitment is improved through meaningfulness at work and innovativeness is enhanced by providing meaningful work to employees (Johnson & Jiang, [2017](#))(Cai, Lysova, Bossink, Khapova, & Wang, [2018](#)). Coutu ([2002](#)) directed future researchers to observe the correlation of meaningful work with resilience.

1.1 Scope of the Study

This study highlights the importance of the effect of meaningful work on employee identity. The results of the current study offer directions for organizations which will help them to maintain their employees' work outcomes in order to gain competitive advantage. The work outcomes can be improved by providing meaningful work for employees in order to enhance their resilience, which will ultimately influence their identity.

1.2 Statement of the Problem

The current researchers and practitioners suggest that resilience plays a positive role in developing and maintaining a good relationship and remain meaningful in an organization. Employee identity is related to an individual's point of view about how s/he views himself / herself as part of an organization in the long term (Ashforth & Mael, [1989](#)). Employees in service sector of Pakistan are quite concerned about appreciation and identity. The question arises that how does meaningful work help employees in the service sector to gain their identity by being resilient.

1.3 Research Questions

- What effect meaningful work has on employee identity?
- To what extent employee resilience mediates the relationship between meaningful work and employee identity?
- Is there any significant relationship between meaningful work and employee resilience?

2. Literature Review

2.1 Meaningful Work

Pratt and Ashforth ([2003](#)) defined meaningful work as the extent to which an individual gives importance to his work. Meaningful work is the

extent up to which a staff member faces a situation that is generally productive, valuable as well as worth the time spent on it (Hackman & Oldham, 1976). Arnold, Turner, Barling, Kelloway, and McKee (2007) argued that employees prefer their job productivity over job security as they want to be triumphant in their profession. Arnold et al. (2007) further reported that employees who have personal connection with their profession don't easily quit their jobs. They don't prefer monetary outcomes as their priority is their professional achievement, not financial outcomes.

Steger, Dik, and Duffy (2012) mentioned three levels of work productivity including personal, interpersonal and the leadership / organizational level. It has been observed that success in profession gives a sense of purpose to life (Michaelson, 2005; Rosso, Dekas, & Wrzesniewski, 2010) that results in motivation and good outcomes. Grant (2007); Pratt and Ashforth (2003); Rosso et al. (2010) argued that for each individual meaningfulness has its own sense and their respective productivity is directly proportional to it. Pratt and Ashforth (2003); Rosso et al. (2010); Steger and Dik (2010) stated that multiple conflicts representing a change in scheme reveal the true value of one's position, their time and personal interest regarding profession (Pratt & Ashforth, 2003). Therefore, the prevailing trend is that organizations promote meaningful work and employee identity as it results in win-win situation for both employees and their respective organization (Deloitte, 2017).

Meaningful work is independently important and yields positive results (Pratt & Ashforth, 2003; Rosso et al., 2010; Steger et al., 2012). Lips and Morris (2009) postulated four foundations of productive work. The first is developing yourself, the second is joining hands with others or adopting teamwork, the third is providing assistance to others, and the last is self-expression, in essence, to understand and bring forth to attention the insinuated problems that tend to occur within these dimensions.

2.2 Employee Resilience

Crane (2017) defined employee resilience as a positive outcome of being capable enough to face risk and adverse circumstances and making effective decisions in a stressed environment. According to Davies (2016), employee

resilience is the ability of employees to persist during challenges and adversarial conditions. Resilience is defined as the response in situations where an individual is facing a risk or threat, positive adaptation, and the ability to continue routine functioning even under risk or threat of harm (Bardoel, Pettit, De Cieri, & McMillan, [2014](#)). Fit for Work (2017) also supported the above arguments and further stated that resilience is a two-way function in which employees and employers play their respective roles. Employers provide a healthy psychological environment and employees remain positive and constructive towards the situation to develop resilience (Fit for Work, 2017).

Besides being as a personality trait, employee resilience has been categorized as an employee's workplace behavior, the ability of organizations to support and influence resilient workplace behavior and the development of resilient behavior even in the absence of crises or adversity (Näswall, Kuntz, Hodliffe, & Malinen, [2015](#)).

Shin, Taylor, and Seo ([2012](#)) argued that employee resilience can be developed and influenced through well-being interventions. They also found that employee resilience imparts organizational resilience. Thus, by promoting employee resilience organizational resilience can be achieved.

Scholars have studied the relationship of employee resilience with other variables such as organizational citizenship behavior (Paul, Bamel, & Garg, [2016](#)) and learning organization (Cooke et al., [2016](#); Malik & Garg, [2017](#)). Developing employee resilience can be helpful to reduce job insecurity as well as stress management (Shoss, Jiang, & Probst, [2018](#)).

2.3 Employee Identity

Identity is the process of differentiating oneself from other individuals (Ybema et al., [2009](#)) which adds value to organizational structure (Deetz, [1994](#)). Organizations need to develop and maintain their identity or reputation and for this purpose, organizations pursue employee identity which is eventually beneficial for both parties (Barker, [1998](#)).

Employee identity is related to an individual's point of view about how s/he views himself / herself as part of an organization in the long term (Ashforth & Mael, [1989](#)). Based on literature review, it can be understood that

identification refers to the values organizations recognize, and employee identity is concerned with the individual’s articulated interests and perspective shared by stakeholders (Dutton, Dukerich, & Harquail, 1994).

According to Foucault (1985), a prominent feature of successful and competitive organization’s is obsession with employee identity. It should also be noticed that organizations might attempt to control their employee’s identifications (Alvesson & Willmott, 2002). However, employees can nullify this effect by handling the situation cognitively (Symon & Clegg, 2005). Employee identity is related to an individual’s point of view about how s/he views himself / herself as part of an organization in the long term (Ashforth & Mael, 1989). Identity is the procedure of differentiating oneself from other individuals (Ybema et al., 2009).

2.4 Theory and Hypotheses

We took theoretical support from the Social Identity Theory (Tajfel, 1979) to explain our research model which states that groups give a strong sense of pride and self-esteem to individuals and they also give them a sense of social identity. Broaden and build theory (Fredrickson, 2004) was used to explain the mediation of employee resilience between meaningful work and employee identity.

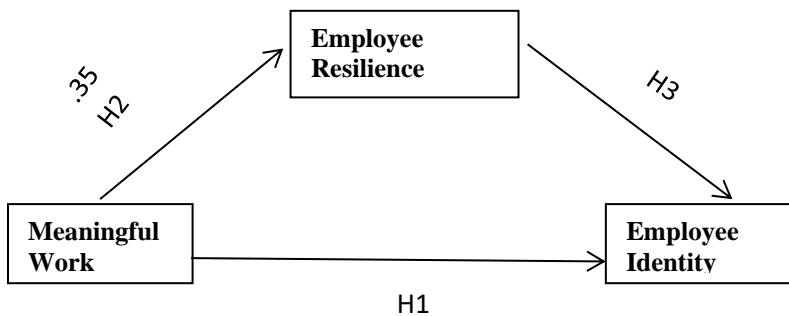


Figure 1. Linking Meaningful Work and Employee identity through Employee Resilience (Conceptual Framework)

Figure 1 summarizes our conceptual framework

Meaningful work permits staff members to know their worth and to build themselves accordingly in order to achieve success. Hence, meaningful work makes an individual realize that their actions have consequences, it makes them understand that they are important in the social aspects of life (Elliott, Colangelo, & Gelles, [2005](#)). Hackman and Oldham ([1976](#)) proposed that it is task variety that frames the ability to achieve meaningful work that is productive work and it also provides recognition and importance, criticism as well as the opportunity of self-governing.

In the above discussion, employee resilience is the specific behavior of employees which they show when they respond to the available alternatives of policies and practices at the workplace (Erica Servile 2003). Discussion and hypotheses developed with the help of literature review about meaningful work playing a positive role in boosting employee resilience are given below.

H1: Meaningful work is positively related to employee resilience.

Resilience is the ability of an individual to respond to changes. Employee resilience is an individual level variable and when studied deeply, its impact shows a direct link with employee identity. As changes take place in an organization, increased resilience is helpful to cope with changes effectively (Näswall, Kuntz, Hodliffe, & Malinen, [2013](#)). On the other hand, identity can be built from within an organization. It means that internal events are responsible to generate employee identity.

H2: Employee resilience is positively related to employee identity.

2.5 Mediating Role of Employee Resilience

Researchers have argued that resilience plays an important role in adapting to challenging situations. It helps to boost employees' behavior in dynamic and stressful working conditions. It has been also considered as the quality to "bounce back" in adversity (Malik & Garg, [2017](#)). Torres and Fyke ([2013](#)) proposed that it can be developed through contextual and iterative processes. Thus, meaningful work has the positive impact of boosting individuals, making them recognize their strengths and build themselves accordingly in order to achieve success and their identity. It enables individuals to recognize that their actions have important

consequences in the social aspects of life (Elliott et al., [2005](#); Rosenberg & McCullough, [1981](#)). When employees feel confident, they are able to cope with external changes. In accordance with broaden and build theory (Fredrickson, [2004](#)), we propose that resilient employees are able to perform better, develop their identity and impart their role successfully to meet organizational goals. Internally resilient resources can be effective in coping with external changes and performing in a better way, which eventually creates competitive advantage.

H3: Meaningful work is positively related to employee identity.

H4: Employee resilience mediates the positive effect of meaningful work on employee identity.

3. Research Design

3.1 Research Strategy

All three constructs were measured on a five point Likert scale ranging from 1= Strongly Disagree to 5= Strongly Agree. Meaningful Work was measured through Ashmos and Duchon ([2000](#)) scale, which consists of seven items. An example of an item is “I experience joy in my work”. The value of Cronbach’s alpha for seven items was 0.860. Employee Resilience was measured using Fred Luthans scale. An example of an item is “when I have a setback at work, I have trouble recovering from it, moving on”. The reliability of this scale was achieved after removing item 1 which was reverse coded. The value of Cronbach’s alpha for these five items was 0.713. Employee Identity was measured using Selenta and Lord ([2005](#)) self-concept scale. An example of an item is “I often compete with my friends”. The value of Cronbach’s alpha for five items was 0.896. This study was deductive in nature.

3.2 Sample and Sampling Method

Convenient sampling technique was used in this study which is a non-probability sampling technique. It includes a heterogeneous mixture of individuals.

3.3 Sample Size

Using the rule of thumb to multiply the number of questions with 5, questionnaire included at least 28 questions. A sample size of 154 employees from the service sector of Lahore was selected for this study. (Hair, Black, Babin, Anderson, & Tatham, [1998](#)).

3.4 Data Collection

Primary data was collected for this study through questionnaire. Initially, relevant material for secondary research was searched online using the Google search engine. The researchers also consulted different journals and relevant articles' findings. They approached the respondents directly in their offices. It is a cost effective and an efficient procedure to obtain generalizable results (Stacks, [2010](#)), for getting relevant information. The investigation poll contained two steps. Step 1 requested the member to provide the foundation data, for example, sexual orientation, age, and program to identify his / her demographic background. Step 2 was intended to quantify the responses on 5-point Likert scale where they need to rate their reactions extending from 1 (unequivocally differ) to 5 (firmly concur). A cross-sectional data along with a quantitative research technique was used to fulfil the aims of the research (Gravetter & Forzano, [2009](#)).

3.5 Organization Overview

In the economic world, the service sector is vast and remains the fastest growing sector of the economy in developed countries. This research was conducted on call centers (which are a part of the service sector) of Lahore, Pakistan. These sectors are directly involved with customers and represent their respective organizations. This direct coordination plays its role in building up employee resilience and eventually in building employee identity. It is important for organizations to focus on employees to get better results through meaningful work.

3.6 Data Analysis and Interpretation

Prior to any data analysis, we conducted CFA to check the model fit using AMOS 21. We used the Statistical Package for Social Sciences (SPSS) 21 for data analysis. In order to confirm the mediating effect of employee resilience, Preacher and Hayes' ([2004](#)) mediation analysis

was used. Convergent validity was measured through factor loading and AVE value verification of indices, whereas reliability was calculated through Cronbach’s alpha. The results are shown below in Table 1. It can be observed from the respective table that the values of Cronbach’s alpha, composite reliability and AVE are higher than 0.7. Hence, both validity and reliability were approved.

Table 1
Composite Reliability and Cronbach's Alpha

	Cronbach's alpha	Composite reliability	AVE
Employee Resilience	.71	.73	.50
Employee Identity	.89	.90	.52
Meaningful Work	.86	.86	.51

The overall reliability of our variables was .769 which shows good internal consistency of items. The reliability of individual variables is as follows,

Table 2
Reliability Statistics among the Study Variables

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
Meaningful Work	.860	.860	7
Employee resilience	.713	.712	6
Employee identity	.896	.897	15

The purpose of this study was to investigate the mediating role of employee resilience in the relationship between meaningful work and employee identity. Table 2 shows reliability statistics among meaningful work, employee resilience and employee identity.

Table 3

Descriptive Statistics of the Study Variables

	N	Minimum	Maximum	Mean	Std. Deviation
RES	154	1.00	5.00	3.7052	.71882
MNW	154	1.00	5.00	3.7004	.77247
IDNT	154	1.00	5.00	3.7805	.66601
Valid N (listwise)	154				

Table 3 shows descriptive analysis of constructs. Means of all three constructs are above the scale’s mid-point. In general terms, employee identity has the highest mean, followed by employee resilience and meaningful work.

Table 4

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.043	154	.200*	.989	154	.287

*. This is a lower bound of the true significance

a. Lilliefors Significance Correction

Table 5

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.612 ^a	.375	.371	.52823	1.752

a. Predictors: (Constant), MNW

b. Dependent Variable: IDNT

Table 6
Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.827	.209		8.742	.000		
MNW	.528	.055	.612	9.551	.000	1.000	1.000

a. Dependent Variable: IDNT

Table 7
Correlations

		RES	MNW	IDNT
RES	Pearson Correlation	1	.381**	.610**
	Sig. (2-tailed)		.000	.000
	N	154	154	154
MNW	Pearson Correlation	.381**	1	.612**
	Sig. (2-tailed)	.000		.000
	N	154	154	154
IDNT	Pearson Correlation	.610**	.612**	1
	Sig. (2-tailed)	.000	.000	
	N	154	154	154

** . Correlation is significant at the 0.01 level (2-tailed).

We conducted the analysis to check assumptions of normality, multicollinearity, and auto-collinearity. The results indicated that the data was normally distributed (Shapiro-Wilk = 0.287). Moreover, the

analysis indicated that there was negligible multicollinearity among the predictor variables as the value of the variance inflation factor (VIF=1.00) between 0 and 10 was negligible. These results also highlighted that there was negligible auto-collinearity (Durbin-Watson=2.017) between observations, such as Durbin-Watson values between 1.75 and 2.25 remained in an acceptable range. Table 5 explains the regression analysis, which is statistically significant with R² for the overall model (0.357). Based on prior research (Ojode et al., 2013), we conducted CFA analysis to evaluate model fit. The result of model fit measures indicated a good fit. Model fit measures such as χ^2 statistics to calculate the degree of freedom, CFI, GFI, and RMSEA were used for the measurement of model fit. Model fit is achieved when the values of CFI and GFI result in greater than 0.90, while RMSEA is less than 0.60 and the degree of freedom (df) is less than 3. The CFA analysis results indicated a good model fit to data ($\chi^2/df= 1.420$; CFI=0.923; GFI=0.820; RMSEA=0.052). GFI value is usually affected by sample size and the consensus is not to use this measure (Sharma, Mukherjee, Kumar, & Dillon, 2005). Hence, correlation was found in alignment with the hypothesis.

4. Hypothesis Testing

H1: Meaningful work is positively related to employee resilience.

H2: Employee resilience is positively related to employee identity.

H3: Meaningful work is positively related to employee identity.

H4: Employee resilience mediates the positive effect of meaningful work on employee identity.

The PROCESS add-on for SPSS developed by Preacher and Hayes (2004) version 2013 was used to test the mediation effect.

Table 8
Mediation Analysis

	Effect	SE	P Value
IV → Mediator → DV			
Total effect	.53	.05	.00

Direct effect	.38	.05	.00
Indirect effect	.14	.04	<i>Sig</i>

For indirect effect LLCI and ULCI values are stated below.

	L.C.L	U.C.L
Indirect effect	.79	.24

The results revealed that meaningful work was positively associated with employee resilience ($\beta=0.35$ and $p<0.05$) significantly as stated in H1 and this hypothesis was accepted.

H2 stated that employee resilience has a significantly positive impact on employee identity ($\beta=0.38$ and $p<0.05$) and it was also accepted. H3 proposed that meaningful work is positively related to employee identity ($\beta=0.52$ and $p<0.05$) and this hypothesis was also accepted.

The findings of the mediation represent that employee resilience mediates the positive effect of meaningful work on employee identity. The results also support our H4 as well. The mediating role of employee resilience between independent and dependent variables was positive and statistically significant (.1445 and LLCI=.0786 and ULCI=.2383). As zero didn't fall between LLCI and ULCI, so we can conclude that mediation exists in the model and employee resilience mediates the positive effect of meaningful work on employee identity. Thus, H4 is supported. Mediation results are also shown in the figure below.

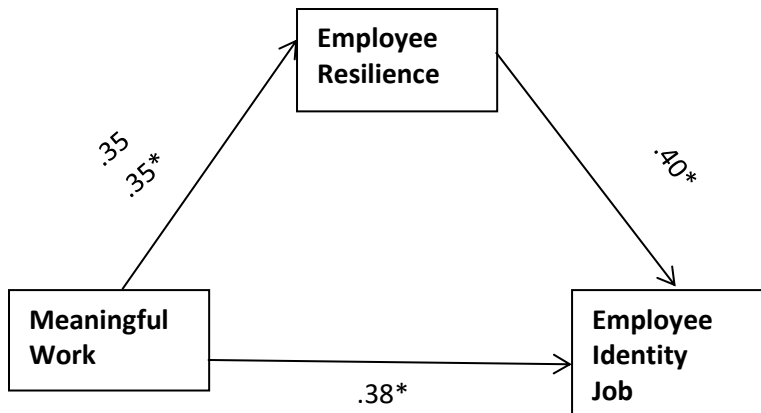


Figure 2. Mediation output

5. Conclusion and Discussion

The current study focused on the effect of ‘meaningful work’ on ‘employee identity’ with the variable ‘employee resilience’ mediating between them. The findings of our study contribute to the existing literature on dependent and independent variables of this study by explaining the mediating effect of employee resilience. The results indicated that meaningful work played a significant role in enhancing employee resilience which enabled employees to cope with challenging situations and thus maintaining their identity. In other words, if an organization focuses on providing meaningful work, it makes employees resilient and their behavior leads to positive outcomes. Resilience is becoming an important factor in today’s challenging and versatile work environment (Blasdel, [2015](#); Winwood, Colon, & McEwen, [2013](#)). It has become essential for organizations to focus more on meaningfulness at work. American Psychological Association Conference (2016) revealed that resilience is essential for survival in a chaotic work environment. In the service sector, employees continuously deal with customers and fulfilling customers’ needs is essential for organizations. In this scenario, resilience becomes the key to attract and retain potential customers. It is not only essential from the customers’ point of view but is also essential for the self-satisfaction of employees. If employees are satisfied and confident

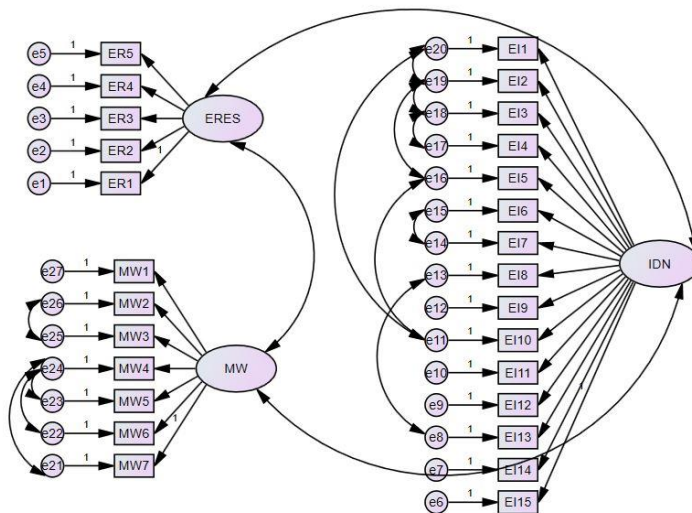
enough to cope with stressful conditions, they feel proud of themselves and self-confidence develops in them.

5.1 Limitations and Future Directions

This research work was limited to the study of call centers in Lahore, Pakistan and other cities in the country were not included in this survey. Research limited to Lahore only cannot be expanded nationwide and generalized; therefore, to achieve the desired benefits this research can be replicated in other cities and countries. Firstly, we think future studies should be conducted in other cultures. Cross-sectional analysis was used in the current research but it is recommended here that similar research should be conducted in a longitudinal mode. Secondly, due to time limitations only limited constructs were examined. Hence, more information should be collected through future studies to verify the reliability of data. The sample size was small for this study. We also faced some other limitations, such as issues like truthfulness and subjectivity. This research was quantitative in nature and future researchers can examine the same framework and correlation, qualitatively.

Appendices

CFA Output



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The Impact of Agricultural Mechanization Development Project on the Yield of Wheat Crop: A Case Study of Punjab, Pakistan

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Abstract

In the past, a traditional method known as iron triangle (time, cost, quality) was used to evaluate the success of projects. A project was assumed to be successful if it had been completed within time, did not overrun its allocated budget and its outcomes satisfied the predetermined criteria. However, to evaluate the impact of any project, considering merely its success is not enough. The outcome of this project in terms of products should also be considered. Therefore, this study was conducted to evaluate the effectiveness of the program “Agricultural Mechanization Development Project” which was recently implemented in Punjab, Pakistan. For this purpose, Punjab province was categorized into three zones on the basis of agro-climatic conditions. Two districts were randomly selected from each zone. Face to face structured interviews were conducted to collect primary data from beneficiary farmers (n=210). Regression analysis was applied to evaluate the significance of mechanization. The improvement in technical efficiency through the use of implements has a significant effect on the production of wheat crop. It is suggested here that ‘Agricultural Mechanization’ and other such programs can be considered efficient tools to fight poverty, bring improvement in socio-economic conditions and promote income generating activities among rural communities.

Keywords: agricultural mechanization development project, project success, yield of wheat crop

Introduction

Pakistan’s agricultural contribution to GDP is 19%, with an annual growth rate of 3.81%. Agriculture provides employment for 42.3% of the labor

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force and 62% of the rural population (Ministry of Finance, 2018). It has multiple roles in the economy and these roles include food security, poverty reduction, industrial revolution and growth of the country.

Agriculture sector is dominated by crops namely wheat, rice, sugarcane, cotton and maize. The contribution of these major crops in GDP is about 7%. Pakistan is the 9th largest wheat producing country in the world. Despite its importance, agricultural production in Pakistan is less than other countries of the world. In Pakistan, the yield of sugarcane is 40% lower, wheat and cotton is 20% lower, rice is 40% lower and milk production per animal is 90% lower than the global benchmark (Pakistan, Bureau of Statistics, 2018; Pakistan. Ministry of Finance, 2018; Iqbal et al., 2015). One of the core reasons behind the low agricultural productivity in Pakistan is the lack of farm mechanization (Iqbal et al., 2015).

Moreover, several agricultural scholars have concluded that the problem of low productivity could largely be related to low technical efficiency (Amare & Endalew, 2016; Verma, 2008). Agricultural production can be improved with better seed bed preparation, managing the timeline of operations and precision in the distribution and placement of seed and fertilizer. In Pakistan, farmers continue to practice the traditional farming methods with very little technical and management improvements (Badar, Ghafour, & Adil, 2007). The comparison of farm power used per acre in Pakistan and neighboring countries is given in Table 1 below.

Table 1

Comparison of Horsepower Used per Hectare

Japan	7.00 hp per hectare
China	3.88 hp per hectare
India	2.50 hp per hectare
Pakistan	1.50 hp per hectare

(Iqbal et al., 2015)

Keeping in view the current perspective of farm mechanization, the Punjab government has devised a policy that centers on the development of

rural areas. Various development projects such as the “Green Tractor Scheme”, provision of laser, land leveler units and the distribution of improved seed among the farming community in Punjab have played a significant role in boosting agricultural production in the province.

In the same way, “Agricultural Mechanization Development Project” was implemented during 2015-16 and 2016-17 to strengthen the agriculture sector. The project aim was to provide implements namely rotavator, disc harrow, seed drill and chisel plough to the farmers at 50% subsidized rates in order to augment farm productivity and profitability.

It is apparent that inspite of the huge investment, the development sector projects receive critique mostly in developing countries. They are often completed after the planned schedule, overrun cost and mostly do not achieve the set objectives (Khan, Turner & Maqsood, 2013).

In the past, a conventional tool known as iron triangle (time, cost, scope) was used to determine the success of any project. However, in the current scenario, project success should not be viewed merely within the narrow domain of time, cost and scope (Baccarini, 1999). Project success is a multidimensional construct that includes both short term (project management success) and long term achievements of the project by measuring its effectiveness and impact on project beneficiaries (product success) (Johari, 2010; Müller & Jugdev 2012). The mechanization project was executed in Punjab by fulfilling the basic criteria of project success, and it was completed within its allocated time and budget. However, recent studies have argued that the traditional way of measuring project success is not enough. Indeed, it is the need of the hour that the performance of this development project may be assessed based on a more holistic purview.

4. Literature Review

Iqbal et al., (2015) stated that agricultural mechanization involves the use of machines for the development of land, land reclamation, sowing of crops, harvesting of crops, threshing of crops, watering of fields, removal of weeds, application of pesticides and other such farm activities. Actually, mechanization is the use of machines to complete farm operations in time, which ultimately increases the yield, reduces the cost of production and crop losses and improves the quality of the production.

Adnan et al., (2015) argued that farm mechanization is based on technological expertise to ensure augmentation in productivity through timely introduction of field operations and enhancing the quality of grain. The study also revealed that agricultural mechanization helps farmers to fight against soil erosion, land degradation and effective land preparation to cultivate the crops (Maurice, Yantii & Akampirige, 2017).

Rehman et al., (2015) conducted a study in wheat areas which manifested that the yield of wheat was higher in mechanized areas as compared to traditional farming areas; whereas, the variable cost was higher in traditional farming. The gross margin was higher in mechanized farming.

Ali, Mughal, Khan & Masood (2018) concluded that more effective and accessible farm mechanization is liable to contribute in agriculture and economic revolution. Farm mechanization is cost effective over the past poorly planned systems that were unsuccessful to fulfill the consumer's demand and relatively abandoned by researchers and policymakers. The use of farm machinery is crucial to various farm operations specifically land development, harvesting and threshing of crops as well as off-farm functions, for instance rural transport and road construction. However, forced farm mechanization is mostly linked with the displacement of tenants and local labor in conjunction with environmental deterioration. The demand of agricultural mechanization varies both within and across the countries, depending on the socioeconomic characteristics of the farming community, population density, prevailing agro-ecological conditions and market access. The supply of farm implements and machinery through improper government schemes is inefficient and also have unpleasant effects for the private supply chain improvement in mechanization.

Ghosh (2010) stated that farm mechanization depends on a number of demographic, socioeconomic and agronomical factors. Efforts should be made to strengthen such factors for the efficient use of modern farm machinery. Local customs, conservative habits, age of the farmer, lack of financial support from the government, less technical support from extension services, low literacy rate and the lack of support from credit providing institutions are the major hurdles in properly benefiting from the use of modern farm machinery, especially for small and medium farmers. The above research concluded that the young generation rather than the old

farmers are more willing to accept and use modern techniques and machines at their farms. The ground realities demand the renewal and expansion of innovative institutions such as financing agencies, cooperatives and self-help to provide financial and technical support for small and marginal farmers so that they gain maximum benefits from modern mechanization in the agriculture sector.

3. Materials and Methods

A survey was used to collect data related to the production of wheat crop in Punjab. Moreover, data was collected regarding the demographic characteristics of farmers and technological factors having an effect on the yield of wheat crop. A structured, pre-tested and validated questionnaire was used for the collection of the required information.

The non-experimental research design was used in this study. This design is mostly used to carry out impact studies as recommended by World Bank in which a comparison of a situation is done before and after the implementation of the intervention as depicted in Figure 1.

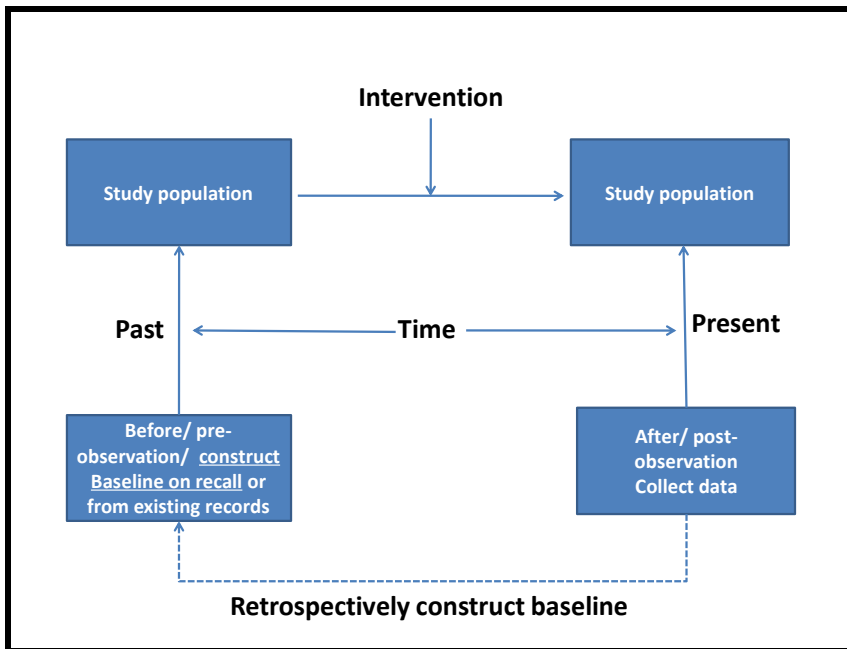


Figure: 1 Pre/Post intervention impact

Since the population of this study was not homogenous all over the province because of the variations in socioeconomic conditions, size of land holding and the nature of crop cultivation, so stratified random sampling technique was used. In this method, the heterogeneity in the population is reduced to achieve greater accuracy in estimates. Proportionate stratified sampling was applied in which the number of elements from each stratum were selected in relation to its proportion in the total population as depicted in Table 2.

Table 1

Breakdown of the Sampled Districts of the Study

No.	Zone	District	Total No. of respondents	Sampled Proportion	No. of Sampled respondents
1.	Barani zone	Attock	41	0.17	35
2.		Chakwal	29	0.12	25
3.	Mixed cropping zone	Sheikhpura	73	0.30	63
4.		Faisalabad	29	0.12	25
5.	Cotton zone	Muzaffargarh	32	0.13	28
6.		Multan	39	0.16	34
	Total		243		210

Wheat crop is cultivated all over the Punjab. Accordingly, the province was divided in three zones namely zone one (barani zone), zone two (mixed cropping zone) and zone three (cotton zone), as depicted in Figure 2. Total six districts were randomly selected, two from each zone, including Attock, Chakwal, Sheikhpura, Faisalabad, Multan and Muzaffargarh.



Figure 2. Breakdown of zones in district Punjab

Almost 210 sample size was calculated through rule of thumb as recommended by Cohen, (1988), which makes the overall 15% of the total population of the study area at 95% confidence interval Data were collected through interviews from randomly selected beneficiary farmers. The reliability of the instrument was tested by applying reliability statistics. The value of Cronbach’s Alpha was 0.963 as depicted in Table 3. Face validity was verified by agriculture experts, whereas content validity was verified by pre-testing of questionnaire.

Table 3
Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.963	.963	11

In the first part of the questionnaire, the socioeconomic characteristics of farmers were assessed. In the second part, the usefulness of the given implements was assessed through descriptive analysis. In the third part, paired t-test was applied to estimate the impact of the development scheme on the yield of wheat crop. Finally, in the last part, the relationship of

demographic characteristics of farmers and technological factors on the yield of wheat crop was assessed by applying regression analysis.

4. Results

Table 4
Paired Samples Test

	Paired Differences					T	Df	Sig. (2- tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Yield of Wheat after - Yield of Wheat before	2.181	3.207	.221	1.745	2.617	9.856	209	.000

Table 5
Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients Beta	T	Sig.
	B	Std. Error			
1 (Constant)	.766	.324		2.361	.019
Age of Farmer	-.029	.005	-.169	-6.261	.000
Education	.071	.020	.068	3.539	.000
Farming Experience	.019	.047	.007	.393	.694
Use of Fertilizer	.064	.040	.023	1.585	.115
Technical Knowledge	.687	.046	.625	15.095	.000
No. of Implements	.066	.028	.054	2.376	.018
Use of Certified Seed	.101	.043	.035	2.345	.020
Farming Size	.092	.034	.083	2.727	.007

a. Dependent Variable: Increase in the Yield of Wheat Crop

5. Discussion

The results have shown that there was a significant increase in the yield of wheat crop. The mean increase was 2.181 mounds per acre. This figure

depicts that the ‘Mechanization Development Project’ had a positive impact on the yield of wheat cultivated in the Punjab province.

Moreover, the survey predicted that the yield of wheat crop depended on diverse factors such as the age of farmer, educational level of farmer, size of land holding, farming experience, use of farm machinery, use of certified seed and use of chemical fertilizers. The results showed that educational level, technical knowledge, use of farm implements, use of certified seed and size of farm had a positive and significant impact, whereas the age of farmer had a negative impact on the yield of wheat crop (Ghosh, [2010](#); Lamidi & Akande, [2013](#); Maurice et al., [2017](#); Owombo, Akinola, Ayodele & Koledoye, [2012](#); Rasouli, Sadighi, & Minaei, [2010](#); Yamin, Tahir, Nasir & Yaseen, [2011](#)). Moreover, the results indicated that the use of chemical fertilizer and farming experience of the farmers had no significant impact on the production of wheat crop in sampled districts of Punjab province.

It is evident from the results that the educational level of farmers not only develops their efficiency but also enhances their ability to understand and adopt innovative farming techniques and practices. Better seed bed preparation through the use of machinery enhances the germination rate and the number of spikes per plant, which ultimately increases per acre yield of the wheat crop (Amare & Endalew, [2016](#))

It is also apparent from the results that the age of farmer has a negative impact on the yield of wheat crop, which indicates that aged farmers are less active and take less interest in the adoption of modern farming practices and advanced technology. Contrarily, the educational level of farmers has a positive and significant impact, as educated farmers have a broader vision regarding innovative technologies and farm practices. Additionally, the use of certified seeds has a great impact on the production of wheat, as certified and hybrid seeds have more vigor and a greater yield capacity as compared to domestic seeds (Badar et al., [2007](#)).

The results of this study manifest that the use of farm machinery has an enormous impact on the yield of wheat crop. It stipulates that more access to agricultural machinery assists farmers in their farm expansion and also facilitates them to overcome their labor constraints at peak crop seasons.

Resultantly, farm operations and practices are completed in time through the use of farm machinery, which conserves the moisture available in the soil. Consequently, better land preparation increases the efficiency of applied inputs which ultimately increases the yield of wheat crop (Hormozi, Asoodar & Abdeshahi, [2012](#); Amare & Endalew, [2016](#)). It is apparent that mechanized farmers are relatively more vibrant and invest more in purchasing improved seed varieties; therefore, they get a high yield. Similarly, mechanized agronomic practices and the use of improved inputs have a positive and significant impact on the yield of wheat crop which is analogous to the results of various studies (Akdemir, [2013](#); Amare & Endalew, [2016](#); Lamidi & Akande, [2013](#); Thepent & Chamsing, [2009](#); Owombo et al., [2012](#); Rahman, Miah & Hossain, [2011](#); Rizwan, Chauhdary, Khan & Arsalan, [2017](#); Verma, [2008](#); Yamin et al., [2011](#)).

Besides, it is worth mentioning that the level of farmers' contacts with the staff of agricultural extension during project execution increased the awareness pertaining to farm machinery, technical knowledge, innovative technology, improved seed varieties, new techniques of crop sowing and advanced methods to eradicate weeds, which ultimately increased the farm production. It was also observed that there was greater adoption of innovative techniques and practices at farms when there were frequent visits of extension agents. Therefore, an amalgam of all these factors contributed in the greater yield of wheat crop (Khan, [2017](#); Owombo et al., [2012](#)).

6. Conclusion and Recommendations

The analysis proved that farming operations and the practices of respondent farmers were improved by timeliness of operations. The improvement in technical efficiency through the use of farm machinery given in the development scheme increased the yield of wheat crop. The use of farm machinery had a positive impact on the production of wheat crop in the study area which depicts that greater access to agricultural machinery helped farmers to overcome their labor constraints during peak seasons. This was due to the fact that farm operations and practices were completed in time through the use of machinery which conserved the moisture available in the soil, warranted better land preparation and increased the efficiency of applied inputs, which ultimately increased the yield of crops.

It is concluded here that ‘Agricultural Mechanization Development Project’ had a significant impact on the yield of wheat crop. Therefore, this project and other such programs can be considered efficient tools to fight poverty, improve socioeconomic status and enhance income generating activities among rural communities. Keeping in view the current paradoxical economic situation of the country as well as internal and external challenges, the dependency on the agriculture sector will further increase in order to improve the pace of national economic growth. Therefore, immediate actions are required to accelerate the productivity and profitability of this sector, both in horizontal and vertical directions. Moreover, Government of the Punjab should chalk out a comprehensive agricultural mechanization policy. Various programs and projects may be initiated in collaboration with different research and training institutes to enhance the awareness about farm mechanization among the farming communities.

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Questionnaire

(Thank you for participating in this survey. The purpose of this study is to assess the impact of Agricultural Mechanization Development project on the yield of wheat crop in Punjab)

Date of interview:		Time of interview:	
Location:		Name of District:	

1.	Name of Respondent	
2.	Contact No.	
3.	Age of respondent	
4.	Education Level	
5.	Farming experience	
6.	Size of land holding	

Please provide your opinion on the following questions based on your experience and select any one from the five given options.

1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

		1	2	3	4	5
7.	Do you think that farming experience has an impact on the yield of wheat crop?					
8.	Do you think that the age of farmer has an impact on the yield of wheat crop?					
9.	Do you think that off-farm source of income has an impact on the yield of wheat crop?					

10.	Do you think that the educational level of farmer has an impact on the yield of wheat crop?					
11.	Do you think that the family size of the farmer has an impact on the yield of wheat crop?					
12.	Do you think that the size of land holding has an impact on the yield of wheat crop?					
13.	Do you think that the use of implements has an impact on the yield of wheat crop?					
14.	Do you think that the use of chemical fertilizer has an impact on the yield of wheat crop?					
15.	Do you think that technical knowledge of farmer has an impact on the yield of wheat crop?					
16.	Do you think that use of certified seed has an impact on the yield of wheat crop?					
17.	Do you think that the availability of labour has an impact on the yield of wheat crop?					
18.	Do you think that the use of pesticides has an impact on the yield of wheat crop?					
19.	Do you think that the availability of credit has an impact on the yield of wheat crop?					
20.	Do you think that the visits of extension staff have an impact on the yield of wheat crop?					
21.	Do you think that the availability of irrigation water has an impact on the yield of wheat crop?					
22.	Do you think that the size of land holding has an impact on the yield of wheat crop?					

	Yield of wheat crop before project (mounds/acre)	Yield of wheat crop after project (mounds/acre)
23.		



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