

Knowledge Management for Research Sustainability of Academic Researchers in India-An Overview and Theoretical Framework

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Abstract

Objectives: Knowledge Management (KM) is an integration of numerous endeavors and fields of study. This paper provides a theoretical framework for characterizing attributes of academic researchers and techniques available to knowledge management. It provides an overview of a few key terms and concepts, describes the framework, provides examples of how to use it, and explores a variety of potential application areas the area of research. **Methodology:** The study is based on primary and secondary sources. It includes extensive literature review, survey-based research, interpretative structural modeling. The sample unit was post graduate colleges affiliated to deemed universities and Savitribai Phule Pune University in Pune City. The sample frame was randomly chosen. The sample extent was Pune city defined by Pune Municipal Corporation (PMC). The sample size was 30 academic researchers. Sample Element was academic researchers with a designation of professor and Associate professor. To ascertain the relationship among the various variables and propose a conceptual framework Isometric Modeling Technique (ISM) proposed by Warfield in 1973 is used. This model is further analyzed using MIC MAC analysis. **Findings:** The findings suggest that the term knowledge management is familiar to most of the professionals and there are positive outcomes contributing to quality research though the ways of knowing and degrees of their understanding are varied. When combined with academic research and research sustainability developing a sense of intellectual capital amongst academicians can sustain the growth of education. **Application/Improvements:** The insights gained will shed light on positive outcomes of adopting knowledge management for research sustainability for academic researchers in India and the conceptual framework developed in the paper will help the policy makers and academicians for decision making. Research sustainability practices and academic research can be the key for personal and professional development of academicians.

Keywords: Academic Researcher, Knowledge Management, Research Sustainability, Strategy

1. Introduction

In the corporate sector knowledge management is more than just a buzz word. It is required for value addition in academics by academia to actively showcase the experience and judgment. Knowledge management facilitates learning in an organization and knowledge maturing process is the base for better understanding in an

organization¹. Interactions and expectations can be utilized to bridge policy gaps and to influence the interaction between policy makers and researchers². Per research done earlier from belief to culture in knowledge management³ and organizational arrangement in knowledge management⁴ and IT support⁵ are important factors associated to knowledge management.

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The view of organizational knowledge is ‘information entrenched in regular processes which allow action’. Knowledge is a natural human quality, residing in the living mind because a person must recognize, deduce and internalize knowledge⁶. Firms and organizations need to control knowledge for sustainable viable advantage for knowledge management⁷. Knowledge can be codified in various ways and it is different from information as it requires an addition of truth, belief, concept and judgment⁸. Knowledge management system is needed for developing the knowledge grid. It identifies the known and the unknown to us. Knowledge can be reused and can save work and time to sustain in research and academics. Managing intellectual capital for sustainable advantage in a highly competitive world for academicians as researchers is indispensable. Critical knowledge in the passive minds must be gathered for a radical change. Initially knowledge was considered to be depictions of the world that consist of things and events, and the confront of a cognitive system. To the cognitivist, knowledge was explicit, proficient of being coded and stored, and simple to relocate.

Organizations started acknowledging the key role of knowledge management in the late 1990’s and knowledge management received substantial interest. But the potential benefits of implementation were not very high⁹. Potential applicability and acceptance of knowledge management was clear and obvious. Several knowledge management theories were found in literature defining it as formation and improvement of organization linked knowledge¹⁰. Theoretically knowledge management and organizational performance relationship is established as an attitude of passivity for execution of organizational knowledge management. Although the percentage of organizations with knowledge management programmes is nearly zero, approximately all of them have put into practice proposals that fall within its scope¹¹.

1.1 Knowledge Management a Conceptual Analysis

Knowledge plays a key role in the information revolution. Knowledge Management can influence the organizational competitive advantage. Direct impacts can be explicitly linked to organizational visualization and approach. Indirect impacts are drawn from activities associated with organizational vision, or strategy. There can be indirect impact on sustainable competitive advantage,

and economy of scale and scope¹². The “resource-based view” advocated that resources must have value. Recently, research has centered on infrastructure capabilities as a source of competitive advantage.

Methods to balance the use tacit and explicit knowledge at work and practical, proven ways to understand the use of presented knowledge and to create a sharing environment for all forms of knowledge¹². Knowledge Management as an activity has become very vital for developed countries and developing countries leading to sustainability. It is a dynamic force changing at global level. Knowledge is inclusive of data based on which facts and information is created. The observations of¹³ revealed that most of the researchers used Google for everything, that they were confident that they could manage on their own, and that they relied heavily on immediate access to electronic information. Knowledge management does not have any universally accepted definition. In simple terms knowledge management focuses on individuals set of minds working in an organization. To be competitive it is very important for an organization to allocate intellectual capital strategically for the development and to have success. The organization needs to begin managing knowledge for which knowledge maturity process should be made clear. Generating an appropriate ecosystem in which there have to be the intellectual construct in academia can lead to positive contributions for knowledge management.

The SECI model consists of four modes of knowledge conversion: socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit), and internalization (explicit to tacit). It explains how tacit and explicit knowledge is generated, transferred, and recreated in organizations¹⁴. While it was first proposed within the context of business organizations, the model can easily be applied to education, as explored by (Lin, T. C., & Huang, C. C. 2008) Socialization is sharing of tacit knowledge through observation, replication, application, and participation¹⁵. The socialization process reflects interaction on a social level. Externalization is the way of changing tacit knowledge into explicit concepts¹⁵.

1.2 Knowledge Management Process Elements

Creating knowledge is a continual dynamic process. In an organization knowledge enters and exists through the process of assimilation and dissemination. Knowledge

management process integrates theories about organizational culture, organizational structure, organizational behavior and knowledge base system which consequently lead to theories of knowledge support infrastructures. Knowledge can be manipulated as it's a human process. In¹⁶ stated that a cultural value has great impacts on the behavior and attitude of the members of an organization. Knowledge management is motivated by intellectual capital theory, intellectual property theory and organizational strategy research.

A better understanding of the means by which academic research is transformed into a form which is understandable to its intended users will allow bridging the gap between academia and practice. In order to bridge the gap between academic research and practice, it is necessary to explore the direct scholarly knowledge of academic researchers and to identify the mechanisms through which research can be translated and transmitted to practice. Academician's research is truly relevant research which plays an inevitable role to transform knowledge and disseminate it through proper channels for practical use. The attributes of academic publications and the articulation of knowledge. There are a number of factors associated with academic publications and research. The theoretical foundation on the importance of Knowledge Management practices for academic researchers is at a growing stage in India. Knowledge management is an emerging field in the academic environment. Exploring academician's perceptions of knowledge management concepts and its applications is necessary to enhance performance in academic research.

1.3 Knowledge Management as an Academic Agenda

Knowledge management is an integral part of organization for managing intellectual resources efficiently. KM is the best possible outcome being pervasive and invisible in nature¹⁷. Knowledge management in educational institutes is a great combination of intellectual output of the academic researchers. Knowledge management strategy has great potential and significance for academic researchers. The generated information can be used for the growth of academic institutes and society at large. Academic researchers can take the initiative towards the development of knowledge base. In India, academic institutes and universities have started focusing on creating knowledge base through research. The main idea driving KM is that

knowledge must be managed like an asset. There is a large group of ways in which academic researchers can build a strong knowledge base through research activities like conferences, seminars, articles, project reports, books and thesis etc. The trend for research tools, especially those that contribute to KM, is towards more information. Body of knowledge present in peer-reviewed and indexed journals is utilized in the development of book/textbook content. Difference appears between practitioners and practitioner-researchers due to their publication rate and not by how deliberately each incorporates these steps into routine work habits¹⁸. Patents and publications of universities are the evident fact of research outcome.

Thus, academic researchers can act as the translation agents through which academic literature can be enhanced. In addition to peer-reviewed journals, academic researchers utilize other sources, including personal research, experts' opinions, personal experience, conferences, books, and informal discussions with students and peers. In¹⁹ explored how academic researchers disaggregate and reaggregate information through research. Journal article disaggregation refers to the ability to access and manipulate individual components of a document, such as its figures, conclusions or references.

Unless information is used and applied with an experience then adds value in to it, till then it does not become knowledge. Knowledge includes insight and wisdom of employee and could be used for decision making. It is also embedded in work processes, teams. At every organization level, use and sharing of knowledge motivates researchers overall for development of education system and plays a vital role in betterment of institutions. This research work focuses on how academic researchers can contribute positively towards knowledge management leading to research sustainability. Academic researchers can create the direct and indirect knowledge transfer through different ways. The central idea of research sustainability work is to create, codify and share knowledge. The biggest change among Universities is because of increased utilization of electronic methods for searching, sharing, and storing scholarly content, as well as for utilizing library services. However, the attitude towards the effective implementation of knowledge management within the organizations needs to be positive. The following are the factors identified based on expert opinion and literature review: Academic Capital (V1), Academic

Table 1. Identified Variables

Factors	Variables
Academic Capital	V1
Academic research	V2
Knowledge management	V3
Research sustainability	V4
Sustainable education	V5

Research (V2), Knowledge Management (V3); Research Sustainability (V4); Suitable education (V5)

Please see **Table 1**

2.1 Academic Capital (V1)

Academic experience with the right amount of education is termed as academic capital. Universities culture is changing at a rapid phase with the increase in technological changes²⁰. They have examined advantages and disadvantages of academic capitalism, technology transfer strategies²¹. Faculty engagement in entrepreneurial capitalism, and changing faculty values, norms, and beliefs. Davies, Douglas and Douglas²² have contributed to the understanding of academic culture and its result on the execution of a quality development method. Academic managers in universities may discover its suggestions helpful if planning a parallel completion.

The academic capital transforms the knowledge which is like an umbrella concept, including the organizational culture, particular to education sector. Intellectual capital measurement contributes to rendering the university very responsible²³. Human capital should be able to improve mutual understanding and shared belief and facilitate tacit knowledge diffusion.

In the works of²⁴ there was a focus on differences from researcher to researcher, human capital, structural (organizational) capital, and customer (relational) capital. However, most references to academic capital point solely to professional teachers and researchers within higher education. In 2009, Michael Burawoy defined academic capital as being predictable from an individual's curriculum, and to value certain academic qualities more than others research.

2.2 Academic Research(V2)

Sustainability aims at addressing variety of research and solution oriented teaching approaches²⁵. Sustainability

should be widely discussed in the academic community, reconnected to the academic agenda for sustainable development, and should become a key focus for research²⁵. The existing global change research agenda is to embrace novel participatory and problem-oriented approaches and to offer a commanding tool for integrating knowledge and examining the future in an ordered way²⁶. There is an integrated link between knowledge to transformational action to solve sustainability problems through research and development^{27,28}.

Sustainability competencies comprises of skills, abilities, capabilities, qualification and other concepts in academics²⁹. If competencies are applied in sustainability then complexes of knowledge, skill and attitude will enable solving sustainability problem^{30,31}. University research is essential for sustainable development; in order to thrive novel ways of carrying research are essential. Recently the field of sustainability and higher education is defined comprehensively by the university research for sustainable development³².

2.3 Knowledge Management (V3)

Knowledge management gained substantial interest after the 1990's in different fields. The association developed between knowledge management and organizational performance, as means of formation and continuance of sustainable competitive benefits, has been frequently raised to rationalize such awareness³³.

Successful knowledge management focuses strongly in the realm of organizational behavior³⁴. Degree of creativity is achieved because of storage and transfer along with involvement human interpretation. Knowledge management not only covers the organizational perspective and practices very naïve, but also more of peer-to-peer philosophy of "sharing" and "transferring" knowledge. Knowledge management is mainly related with facilitating objective-oriented learning in organizations¹.

2.4 Research Sustainability (V4)

In³⁵ examined academic branding and its impact on the future of researchers and also stated the significance of the rapid development of so-called "academic brands" in Marketing for the process of academic research and for the work and the careers of researchers.

For effective research for sustainable development, changes are needed in how academic institutions are

managed, organized, and funded³⁶. These radical changes will gradually evolve a change in the existing structure³⁷. Academic institutions can take to make an effective enabling environment for research related to sustainable development. Systems framework discovers how fundamental system wide variations of the university system can be activated³⁸.

2.5 Sustainable Education (V5)

Recent years have seen an increase of interest in learning and learning processes in academic environments. With the ever accelerating research academicians need to expand their knowledge at a rapid pace. Institutions of higher education play an inevitable role in the search for a more sustainable future. Sustainability issues are tackled by universities in an effective manner. Sustainability education is correlated to research. Universities can optimize their responsibility as agents of change with regard to sustainability by implementing a 'whole-of-university' approach to sustainability. The research oriented approach requires providing explanations to sustainability problems; building trust among students, managers and academics; and providing important learning experiences for students³⁹. An inclusive mission for education should be to educate students so that they can become knowledgeable, responsible, socially skilled and contributing citizens⁴⁰.

Education for Sustainable Development permits every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. Education for Sustainable Development requires many fold changes in the way education is today. UNESCO (2005-2014). Education for Sustainable Development means integrating key sustainable development issues into teaching and learning for example social science research, management research and scientific research. It also requires research oriented teaching and learning methods that inspire and empower learners to alter their behaviour and take action for sustainable development. Education for Sustainable Development consequently encourages competencies like critical thinking, imagining future circumstances and making decisions in a mutual way. Sustainable Development can only flourish in a peaceful environment. In order to ensure that this gets materialized great attention has to be given to research and education. Academicians and students should be empowered through education to contribute towards community development⁴¹⁻⁴³.

3. Research Methodology

The study is based on primary and secondary data collected from different sources. It includes extensive literature review, survey-based research, interpretative structural modeling from Ebsco, Emerald, Scopus, Jstor, Thomson Reuters and Google Scholar. After identifying the factors, a survey was carried out to validate them in the Indian context. Questionnaires, consisting of a construct of eight factors, were administered personally to experts for expert opinion. The reliability was tested by calculating the coefficient of reliability, cronbach's α , using the Statistical Package for Social Sciences. The sample was chosen in such a way that the respondents belonged to a wide spectrum of educational institutes.

The sample unit was post graduate colleges affiliated to deemed universities and Savitribai Phule Pune University in Pune City. The sample frame was randomly chosen. The sample extent was Pune city defined by Pune Municipal Corporation (PMC). The sample size was 30 academic researchers. Sample Element was academic researchers with a designation of professor and Associate professor. The sample duration was four months. Cross sectional, data were collected from academic researchers in Pune city.

The respondents were asked to rate the factors on a scale of 1 to 5.30 responses were received from experts and tabulated in Microsoft Excel. Their mean scores were calculated and the top five factors having the highest mean score was selected.

To ascertain the relationship among the various variables isometric modeling technique (ISM) proposed by Warfield in 1973 is used. This model is further analyzed using MIC MAC analysis.

3.1 Identification of Variables

The preliminary five variables based on literature review have been discussed in detail in the previous section of literature review.

3.2 Structural Self-interaction Matrix

For development of Structural Self-interaction Matrix (SSIM), Expert opinion was used for defining contextual relationship among variables, in line with objectives of the study. The following four symbols have been used to

denote the direction of the relationship between the two variables (i and j):

- 1) V is used for the relation from i to j (i.e. if variable i “will help achieve” variable j).
- 2) A is used for the relation from j to i (i.e. if variable j “will be achieved” by variable i).
- 3) X is used for both direction relations (i.e. if variables i and j “help achieve each other”).
- 4) O is used for no relation between i and j (i.e. if variable i and j are not related).

Applying the concept to the eight variables, the SSIM is as follows: (Table 2)

Table 2. Structural Self Interaction Matrix(Authors contribution)

i j → ↓	V5	V4	V3	V2	V1
V1	X	X	X	A	
V2	X	V	X		
V3	X	A			
V4	X				
V5					

(V1-Academic Capital, V2-Academic Research, V3-Knowledge Management, V4-Reseach Sustainability, V5-Sustainable Education)

3.3 Reachability Matrix

The following substitution rules were used to prepare the direct reachability matrix:

- if the (i, j) entry based on expert opinion in the SSIM is V, then the (i, j) entry in the reachability matrix is assigned the value of 1 while the reverse (j, i) entry becomes 0;
- if the (i, j) entry based on expert opinion in the SSIM is A, then the (i, j) entry in the reachability matrix is assigned the value of 0 while the reverse (j, i) entry becomes 1;
- if the (i, j) entry based on expert opinion in the SSIM is X, then the (i, j) entry in the reachability matrix is assigned the value of 1 while the reverse (j, i) entry also becomes 1; and
- if the (i, j) entry based on expert opinion in the SSIM is O, then the (i, j) entry in the reachability matrix is assigned the value of 0 while the (j, i) entry also becomes 0.

Based on the reachability matrix the driving and dependence power is further derived. (Table 3)

Table 3. Reachability Matrix (Authors contribution)

i j → ↓	V1	V2	V3	V4	V5	Driving Variables
V1	1	0	1	1	1	4
V2	1	1	1	1	1	5
V3	1	1	1	0	1	4
V4	1	0	1	1	1	4
V5	1	1	1	1	1	5
Dependent Variable	5	3	5	4	5	

(V1-Academic Capital, V2-Academic Research, V3-Knowledge Management, V4-Reseach Sustainability, V5-Sustainable Education)

3.4 Level Partitions

Based on the reachability matrix, the antecedent set and reachability set is determined. The intersection of the 2 sets is then determined which helps to identify the different levels of hierarchy. (Table 4)

Thus, from Table 3, it is clear that variable 5 forms level 1 of the model ie. Sustainable education (V5).

From Table 4, it is clear that variables 1 and 3 form level 2 of the model ie. Academic Capital (V1) and knowledge management (V3) form level 2 of the model.

Table 5 discusses the level partitioning level

From Table 5, it is clear that variables 2 and 4 form level 3 of the model ie. Academic Research (V2) and academic sustainability (V4) form level 3 of the model.

Table 6 discusses the level partitioning level 3

Table 7 discusses the level wise variables

Table 4. Level Partitioning Level 1

i j → ↓	Reachability Set	Antecedent Set	RS ∩ AS	Level
V1	1,3,4,5	1,2,3,4,5	1,3,4,5	
V2	1,2,3,4,5	2,3,5	2,3,5	
V3	1,2,3,5	1,2,3,4,5	1,2,3,5	
V4	1,3,4,5	1,2,4,5	1,4,5	
V5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	Level 1

(V1-Academic Capital, V2-Academic Research, V3-Knowledge Management, V4-Reseach Sustainability, V5-Sustainable Education)

Table 5. level partitioning level 2(Authors contribution)

i J→ ↓	Reachability Set	Antecedent Set	RS $\cap$ AS	Level
V1	1,3,4	1,2,3,4	1,3,4	Level 2
V2	1,2,3,4	2,3	2,3	
V3	1,2,3	1,2,3,4	1,2,3	Level 2
V4	1,3,4	1,2,4	1,4	

(V1-Academic Capital, V2-Academic Research, V3-Knowledge Management, V4-Research Sustainability)

Table 6. level partitioning level 3(Authors contribution)

i J→ ↓	Reachability Set	Antecedent Set	RS $\cap$ AS	Level
V2	2,4	2	2	Level 3
V4	4	2,4	4	Level 3

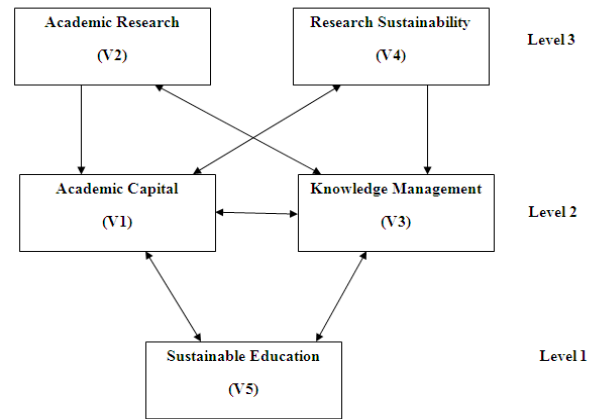
Table 7. Level wise variables (Authors contribution)

Level	Nomenclature	Variable
1	V5	Sustainable education
2	V1	Academic Capital
2	V3	Knowledge Management
3	V2	Academic Research
3	V4	Academic sustainability

3.5 Building the Isometric Model

After partitioning the levels, relationships between various factors are depicted by drawing a node for each variable and connecting those nodes by arrows as per the direction of relationship. The diagram is examined and validated for transitivity, which is clearly described in methodology and it is then converted into an ISM model. It is translated as **Figure 1**

Figure 1 brings out a very high positive correlation between the variables. Sustainable education emerges as the starting point for the model. There exists direct relation between academic capital, knowledge management and sustainable education. Academic research concept started with the aim to see it progress and grow over the years. The emergence of sustainable education as an important factor is therefore in way endorsing knowledge management and academic research. The model paves way for an important interpretation: Caring for education and managing knowledge can both survive today in a mutually compatible environment.

**Figure 1.** ISM Model (Authors contribution).

To support sustainable activities academic researchers have to initiate the development of a strong knowledge base which will be beneficial to develop a network. It is the present need of an organization to transform and recreate themselves by destroying the existing knowledge system and by inventing new ways of thinking and doing. Research sustainability is the right way to build knowledge. This approach clearly links research, educational, operational and outreach activities and connects students and academicians in each. By encouraging a mutual space within the curriculum for students, academics and managers to significantly mirror on university's performance regarding sustainability.

4. MICMAC Analysis

MICMAC is an abbreviation of Matrice d'Impacts croisés-multiplication appliqué and classment (Cross-Impact Matrix Multiplication to Classification). It is used to examine the Driving Power and Dependence Power of the variables; based on which they have been classified into four categories viz. Autonomous, Linkage,

Table 8. MICMAC Matrix

Factors	Variables	Driving Variables	Dependent Variables
Academic Capital	V1	4	5
Academic research	V2	5	3
Knowledge management	V3	4	5
Research sustainability	V4	4	4
Sustainable education	V5	5	5

Dependent and Driving variables. The same is shown in **Table 8**

The cluster of variables by Mic Mac Analysis is shown in **Figure 2**

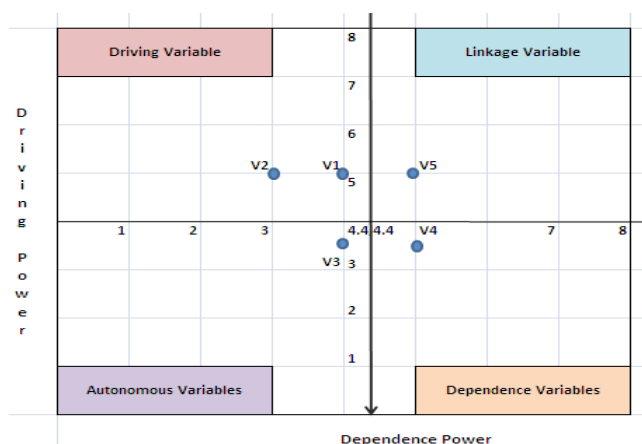


Figure 2. Cluster of variables, Mic Mac analysis (Authors contribution).

5. Conclusions

The findings suggest that the term knowledge management is familiar to most of the academicians and there are positive outcomes contributing to quality research though the ways of knowing and degrees of their understanding are varied. The insight gained sheds light on positive outcomes of adopting knowledge management for research sustainability for academic researchers in India. Knowledge only diffuses when there are learning processes whereby human beings develop new capacities for effective action, with internal learning communities in place that offer psychological safety and trust. Lack of communication within an organization made evident by continually reinventing the same wheel is one sure sign that the knowledge base is not being utilized and built upon. From research in education sector theories can be developed Knowledge and its management involve effort on many fronts to be successful. Whether framed in terms of a process and its context or in terms of market efficiency and effectiveness, knowledge management offers fertile avenues for research.

The academic and education community will have a major role in the implementation sustainable education. The contribution of the academic community is central in developing sustainable education through research and knowledge and applying them in the preparation,

establishment and testing of the appropriate frameworks. Academicians build up programs and projects for sustainability research education. Sustainability research depends to a major extent on regular academic skills such as decisive thinking, effective writing, and the skilled presentation of research outcome. They should foster basic academic skills among students and should raise the bar of academic performance.

5.1 Limitations

The research limits itself to the deduction and understanding of the concept of theoretical framework however it does not probe the nitty-gritty's of the elements at a microscopic level. The suggested model includes understanding the factors at a Macro Level. The current outcome is based on intense literature review and expert opinion.

5.2 Scope for Further Research

Following is the offered suggestions for further research:

- A similar study may be conducted with a large sample.
- It can be further extended by using structural equation modeling to validate the conceptual framework.

5.3 Contribution to Body of Knowledge

The originality and uniqueness of the research lies in:

- First study that provides a theoretical model
- The research confirms the relationship between

Implications for Academicians-

Finding of the study would enable academic researchers to update the quality parameters with respect to academic research by integrating elements of knowledge management. The paper provides a systematic approach for academic research and sustainability and can utilize this information for updating and evaluating the existing elements of knowledge management in educational institutes.

Implication for Educational Institutes-

Quality of research is currently is a concern for educational institutes.

From organizational and managerial point of view, the study determines the importance of implementing

knowledge management to improvise the overall quality of academic research for academic researchers in education. This study brings notice to how academic research can be correlated to knowledge management to attain sustainability.

The results of the study will strongly influence policies of educational institutions.

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