Can Spiritual Intelligence Influence Research Performance in Higher Education? Framework for Human Resource Development in Higher Education

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Abstract: *Research performance impacts the sustainability and growth of the higher education system. The effective instructional designs, intellectual development and innovations are fundamentally based on the research model and artifacts. Since research infrastructure, research skills and job satisfaction are valued as necessary considerations in higher education system for achieving research excellence, the notion that spiritual intelligence can have an impact on research performance is highly feasible. However, this view is one that has not yet been investigated. This study addressed this gap by exploring and examining the potential relationship between spiritual intelligence and research performance in higher education and also by probing the impact of spiritual intelligence on research performance. An investigative approach engaged 1137 participants for surveys on research performance and spiritual intelligence. The qualitative and quantitative data were gathered and analyzed to identify whether spiritual intelligence had any impact on research performance and if so which spiritual intelligence skills, dimensions, traits or attributes could influence an academician's research performance. The study was conducted for a period of three years in India covering major universities and institutes of repute. The research found that those who engaged themselves in spiritual practices and relied on spiritual resources were more likely to have high research performance level. This finding was further supported by the fact that the participants in the study who scored highly in spiritual intelligence assessment tests also had high research performance output. This paper covers these findings and it provides details of the impact of spiritual intelligence on research performance. In addition to this, it also explores the relationship between spiritual intelligence and research performance in higher education.*

Introduction

The research performance contribution of organizations like higher educational academic institutions relies significantly on their "human intellectual capital". For academic institutions, faculty research contributions are salient in optimizing student learning model and institutional growth. Organizations, cognizant of "human intellectual capital" in ensuring competent learning and growth models are looking at the measures and options to assess their employees'

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research performance and are also ready to invest and establish platform for research explorations and adaptations. Harrison (1997) advocated that human resource development (HRD) is specifically associated with the individual's development. Stokes et al. (2016) in their research work found out that HRD is driven by self-development initiatives. Nowadays organizations are agile and dynamic in nature and thus to excel and attain sustained growth HRD becomes a key driver (Griffin, Phillips & Gully, 2016). Survey of research literatures would reveal that many studies have been conducted in relation to intelligence and its consequent effect on job performance, satisfaction, stress and leadership. A shared ultimate goal of these studies is to assess and explore the contributory factors of the different types of intelligences which can impact the performance of employees. There is a huge gap in the practices being followed by the organizations for developing human resource (Wilson, 2014). The present study focuses on a specific type of intelligence i.e. spiritual intelligence and investigates the dimensions of the spiritual intelligence and their impact on the research performance among the faculty members of higher education. Intelligence quotient (IQ) has long been recognized as the key factor behind logical and rational reasoning and problem solving skills thus it acts as a basic requirement for a researcher to explore research arenas. IQ caters to the material and mental pursuits of a researcher and fails miserably to answer the call of creativity in the human spirit (Gavrila, 2005). Research involves a great deal of learning and learning itself is an emotional process as one needs to be open minded and emotionally balanced for a true learning and real understanding. Therefore, a researcher's Emotional Quotient (EQ) should be effective to pursue the research as EQ allows a person to judge what situation he/she is in and to behave appropriately within the boundaries of that situation, allowing the situation to guide the person (Selman et al., 2005). Mayer and Geher (1996) interpreted that some forms of emotional problem-solving require emotional openness as well as general intelligence. Kanyama (2014) analyzed the effect of the average level of intelligence on different measures of the quality of institutions. It follows that the countries with higher levels of human capital have better quality institutions than the countries with low levels of human capital. This research is somehow limited on overall analysis, as it does take into account the importance of spiritual intelligence of human capital within national institutions. Spiritual intelligence/quotient (SQ), on the other hand, enables people to take personal responsibility of meaning, and value of life therein and to create new access to achieve and to use it (Zohar and Marshall, 1999). It transforms them to make best use of whatever situation they are in. It gives people opportunity to delve into the deeper recesses of mind and provides integrity and intelligence of the self. It also fosters in them a wholesome and holistic idea of life.

IQ and EQ have been accepted as having direct impact on the performance of an individual. IQ relates to the rational thinking and logical interpretation whereas EQ guides people to behave appropriately in different scenarios. SQ, on the other hand, allows one to be creative, to change the rules and to alter situations. SQ empowers a person with coping skills and helps him/her to resolve complicated

issues of life. Such a person is able to contribute meaningfully and at the same time uses humility, compassion and vision to guide others. Ahmed et al. (2016) have developed a holistic HRD model but the research work neither provides any empirical validation nor presents any applicability in the human resource management, assessment and development in the academic institutions or otherwise. In the academic sector intellectual development takes a front seat. However, if some concentration is given to SI intellectual capacity may yield better results (Becerra et al., 2016). Neither IQ nor EQ, separately or in combination, is enough to explain the full complexity of human intelligence (Selman et al 2005). Thus, the notion that spiritual intelligence can have an impact on research performance is highly feasible. However, this view is one that has not yet been investigated (Donnelly, 2017). This study addressed this gap by exploring and examining the potential relationship between spiritual intelligence and research performance in higher education and it also attempted to capture the impact of spiritual intelligence on research performance. Since a lot of stress today is on research potential that a university teacher should possess, hence exploring SQ with relation to research performance will be beneficial for the academic institutions (Popescu, G.H., 2016). Further, a proper analysis of SQ may objectively connect to the teacher's inner life which is the seat of reason and thus it may act as a catalyst for improved research performance (Slávik & Zagoršek, 2016). A proper involvement of academic institutions towards assessing SQ of the university teachers would help in the establishment of a link between objective and subjective learning and thus lead to an overall development of the mental-emotional-spiritual faculties of the.

The paper is structured in the following manner: in Section 2 a detailed literature review is presented to study the state of the art research in spiritual intelligence and performance. Section 3 illustrates the proposed Spiritual Intelligence and Performance Dimensions (SIPD) framework. In Section 4 research methodology is described. Section 5 focuses on analysis and discussion. Finally, the paper concludes the findings of this investigation.

1. Literature Review

To establish an adequate understanding of spiritual intelligence and performance dimensions' framework, this section reviews spiritual intelligence and performance perspectives and then creates the spiritual intelligence and performance dimensions (SIPD) framework.

1.1. Spiritual Intelligence Perspectives and Definitions

Spiritual Intelligence calls for multiple ways of knowing and the integration of the inner life of mind and spirit with the outer life of work in the world. It can be cultivated through questioning, inquiry and practice. Spiritual experiences may also contribute to its development, depending on the context and

meaning of integration. (Vaughan 2002). Robert Emmons (2000) defines spiritual intelligence as "the adaptive use of spiritual information to facilitate everyday problem solving and goal attainment". Emmons regarded SQ as a frame which contains prominent ability of solving problems by spiritual resources. In 1999, Danah Zohar and Ian Marshall (1999) detailed out the whole construct of SQ in their book Spiritual Intelligence – *The Ultimate Intelligence*. Zohar, later elaborated the twelve dimensions of SQ for determining the leadership qualities in the work force. Spiritual intelligence is described in Tony Buzan's *The Power of Spiritual Intelligence* as an "awareness of the world and our place in it" (Buzan 2001). Katheleen Noble identifies spiritual intelligence as an innate human potential (Kathelene, 2000; Kathelene, 2001). Frances Vaughan offered the following description of SQ: "Spiritual intelligence is concerned with the inner life of mind and spirit and its relationship to being in the world" (Vaughan, 2002). SQ is necessary for discernment in making spiritual choices that contributes to psychological wellbeing and overall healthy human development (Vaughan 2002). Hence, one can see that SQ is crucial for the growth of an individual. Spiritual intelligence implies a capacity for deep understanding of existential questions and insight into multiple levels of consciousness. Cindy Wigglesworth (2012) defines " spiritual intelligence as the ability to act with wisdom and compassion, while maintaining inner and outer peace, regardless of the circumstances". David and Teresa (King and Teresa 2009) have also undertaken research on spiritual intelligence and have defined spiritual intelligence as a set of adaptive mental capacities based on non-material and transcendent aspects of reality. It may be understood from the above discussion that by disregarding SQ, it is difficult to assess performance capabilities of an individual. Without measuring SQ of a person, his/her actual performance cannot be deciphered. Here a proper study and understanding of the term "Performance" is also needed. A detailed discussion on performance is done in the subsequent paragraphs

1.2. Performance Perspectives and Definitions

Performance is a key parameter for evaluation of different aspects in the world today. Performance plays an important role in judging the credibility of an individual. The term performance is used in almost all the sectors. It is referred to as academic performance, job performance, and corporate performance depending upon the determinants of a respective sector. This review focuses on understanding the concept of performance and its determinants. In higher education it is not enough to be a good teacher. For an all-round development of an academician, the researcher inside the teacher should also grow and flourish. It is because of the fact that teaching and research go hand in hand for effective and efficient dissemination of knowledge. This paper gives a brief insight on various dimensions of performance that exist across almost all the jobs and have been identified to be equally applicable in the field of research also.

The paper sees performance as a multidimensional concept (task and contextual) and dynamic concept (learning process and temporary changes). The objective of this review is to relate the determinants, dimensions and concepts of performance to the perspective of research. A considerable research has been carried on individual performance and job performance but very little research has been done to clarify the term 'performance' itself (Sonnentag and Frese, 2002).

Campbell (Campbell, 1990) suggested three main determinants – declarative knowledge, procedural knowledge and skill, and motivation for performance components. A researcher should have declarative knowledge about the topic he/she is pursuing for research. He/she should have considerable knowledge, principles and ideas about the subject. He/she should also have the procedural knowledge of how to go about the research process which includes data collection, use of tools and methodology etc. And finally he/she should have the key determinant motivation that keeps him/her focused on the research. Campbell (Campbell, 1990) proposed an eight factor model of performance based on factor analytic research that attempts to capture dimensions of job performance existent (to a greater or lesser extent) across all jobs. A closer look of each of these factors makes it applicable in the research field too. Since a researcher is entitled to and responsible for the whole research process, all the eight factors play an important role though some to a lesser extent than the others in determining one's performance. Some of these factors are - job specific task proficiency, task specific behaviour, written and oral skills, factor of demonstrating effort, factor of maintaining personal discipline factor and so on.

The views of Borman and Motowildo (1993; 1997) on performance as a multidimensional concept have been found to be more acceptable. In the multidimensional concept, Borman and Motowidlo (1993; 1997) distinguish between task and contextual performances. Task performance refers to an individual's proficiency with which he or she performs activities which contribute to the organisational 'technical' core. This contribution can be both direct (e.g. in the case of production workers), or indirect (e.g., in the case of managers or staff personnel). Contextual performance refers to activities which do not contribute to the organisational technical core but which support the organisational, social, and psychological environment in which organisational goals are pursued (Borman and Motowidlo, 1993). Contextual performance includes not only behaviours such as helping co-workers or being a reliable member of the organisation, but also making suggestions to improve work procedures.

Research Performance is an important construct for evaluating and assessing the academic achievements in universities. Correlating it with spiritual intelligence will bring in a new perspective in the field of human performance. So far SQ has been studied mostly in isolation. Moreover, no one has so far tried to relate it to the performance of an individual in the job sector.

2. Spiritual Intelligence and Performance Dimensions (SIPD) Framework

This paper attempts to study the impact of SQ on Research Performance of a university teacher. Based on the aforementioned literature review, it proposes five dimensions of spiritual intelligence and two dimensions of research performance. Research performance is an important construct for evaluating and assessing the academic achievements in universities. The responsibility of building and developing research activities lies primarily with the university teachers and research scholars. A number of dimensions are employed to evaluate the individual research performance in universities. Some of these dimensions include research projects, publications, patents, consultancies, awards and honors etc. Keeping the theory of Borman and Motowidlo (1993; 1997) as the basis, the research performance of university teachers is divided into task performance and contextual performance (see Figure 1).
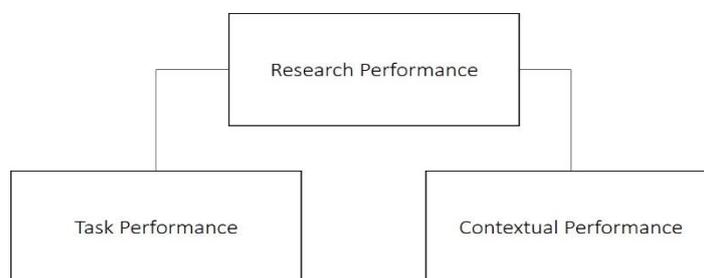

Figure 1. Research performance framework

The authors have identified four factors of contextual performance (CP). These factors are based on the inputs given by Borman and Motowidlo (1993; 1997). A short description of each of these factors is as under (Upadhyay, 2012):

Coordinating and cooperating in projects as peers or team leaders (CCP)

A lot of coordination and cooperation is needed in different types of research projects, particularly, when a project involves funding and a collective effort of a team. This is commonly evident in research consortiums where a group, consisting of diverse people, from different universities, collaborates and works together. In such cases it is behaved from a faculty member, who may either be the Principal Investigator or otherwise to properly coordinate and contribute towards successful completion of the project.

Combining knowledge and experience with research (CKE)

It is imperative for a faculty member to use his/her acquired knowledge and experience for success of the research work. It is observed that the faculty members try to diversify and explore new possibilities. In such a situation banking upon past experience and acquired knowledge, ease out the complexities of research work.

Helping others to view the problems from different angles (HPA)

A faculty member engrossed in his/her research work fails to sometimes view and acknowledge problems objectively and sometimes lacks perspectives to view it differently. Helping such a faculty member to understand the problem from a different angle forms the demonstrative factor of contextual performance.

Providing useful suggestion/support in non-duty assignments or projects (PNP)

Despite not being a part of the project, if a faculty member agrees to provide suggestions and support, he/she contributes ultimately to the overall growth of that project, organization and environment. Suggestions and support based on expertise, if provided even for non-duty assignments always lead to growth and development.

For research performance, in addition to the aforementioned factors of contextual performance there are around six important factors that are quantifiable and add to the task performance of an individual. These includes (Upadhyay 2012): projects (PRO), consultancies (CON), patents (PA), PhD thesis supervision (DTS), publications (PUB) and awards and honors (AH).

The author suggests five broad categories or dimensions of SQ. These dimensions can be effectively used to test the SQ of an individual. These dimensions, Figure 2, are as follows (Upadhyay and Parashar 2013; Baba 2007):

Figure 2. Spiritual Intelligence framework

Feeling of Oneness (FOO)

Feeling of oneness represents connectedness with other beings. This eliminates the narrow and one sided notions of separateness. Feeling of oneness necessarily cultivates a very holistic approach in one's life. It fosters unity rather than disintegration

Self-Realization (SR)

Asking existential questions such as who am I or what is the purpose of my life, is the first step towards self realization. It facilitates the process of probing, finding out the truth or searching for the answers which plague human mind.. Though, SR is the end result of this "Universal Quest", but the very inception of it in one's mind, marks the beginning of the journey of a higher kind. (Upadhyay and Parashar 2013; Baba 2007):

Foresightedness (FS)

The ability to envision and lead others towards a bright future, while holding on to values and ethics, is a positive step towards building of a strong personality. Such personalities face unprecedented challenges and crisis with courage and wisdom.

Professionalism (PF)

Professionalism brings high standards to one's job. It means to use one's skills and abilities in workplaces. In a deeper sense, a professional is one who is adept in his/her job and serves the society through his/her acquired skills. Such a person is fully aware of his/her profession and is passionate about his/her work. (Upadhyay, Parashar, 2013)
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Self-Effacement (SE)

Here self-effacement should be understood in the light of being less self centered and more people centric. It means to be devoid of selfish interests and desires and to serve others without expecting anything in return.

The proposed SIPD framework will help educational administrative leaders and other stakeholders to develop and manage their human resource and create a sound educational research ecosystem.

On the basis of the above discussion, following research questions are devised:
- Is there any impact of spiritual intelligence on research performance?
- Is there any impact of spiritual intelligence on contextual performance towards accomplishing research performance?

3. Research Methodology

In this section, a systematic graph theory based procedure is proposed to assess and analyse the dimensions of spiritual intelligence and research performance and impact of spiritual intelligence on research performance. The proposed methodological procedure is easier to follow than other multi-criteria approaches (Upadhyay, Upadhyay 2016; Upadhyay et al., 2011; Upadhyay et al. 2009; Saaty, 1980) for tracing criteria and their interactions in a systematic way. In this research study, qualitative and quantitative data were collected to enable measurement of each participant's spiritual intelligence and research performance. These measurements were assessed pre and post engagement in a spiritual intelligence awareness programme. This pre and post schedule was allowed to enable any changes that might occur throughout the course of the research study in the spiritual intelligence or research performance of the concerned participants. Cohen et al (2007) state that survey questionnaire is most suited to gathering "data at a particular point in time with the intention of describing the nature of existing conditions". A survey questionnaire was used in this study to collect data related to research performance and spiritual intelligence of the participants. Sample population in this research study was the participants from top Indian universities and institutes. Participants were both male and female academicians, all in full time employment and across various age ranges. The number of years of experience, qualifications, leadership roles, research activities and projects of the participants spanned over a broad representative continuum. To ensure that the anonymity and confidentiality of participants was protected, all collected and analysed data were presented without potentially identifying details.

3.1. Graph Theoretic Systems Approach

The evaluation and analysis of SQ and its relation with RP in higher academic institutions was achieved through a structural approach called graph theoretical methodology. Graph theory is a logical and systematic approach (Deo 2004). The methodology has been extensively used in assessing, designing and evaluating alternative designs, products and processes (Paramasivam·and Senthil, 2009; Upadhyay et al 2011; Upadhyay et al 2009). The methodology is capable enough to capture and process interactions among parameters of interest at all levels. Hence, it has been preferred as a tool for data analysis for this study, over other available tools. There are number of factors responsible for creating a SQ and RP environment. But the effectiveness of the environment depends upon the degree of inheritance/interdependencies of these factors and the amount of interactions present among them. These interactions may be direction dependent or independent. The network showing these factors and interactions were used as a base model for analysis. This network can easily be presented by graph. If interactions are not direction dependent, the SQ and RP environment is represented by an undirected graph; if direction dependent, it is called a digraph representation.

A digraph model for SQ and RP was developed. (also called directed graph) G consisted of a set of vertices V={V1,V2,…,Vn}, a set of edges E={e1,e2,…, em} and a mapping function that maps every edge onto some ordered pair of vertices (Vi,Vj). Digraph models were defined for SQ and RP respectively which depicted the importance of interrelationships among the attributes. Thus, SQ and RP evaluation attribute diagram consists of two set of nodes and respective edges to depict the interactions. It is to be noted that the number of each nodes in the respective sets equals the number of evaluative attributes for SQ and RP. The attributes for SQ and RP were identified based on the proposed SQ and RP framework. Figure 3 shows the interaction for SQ and RP respectively. A digraph model for SQ is depicted in figure 4. Similarly, RP digraph models were developed.
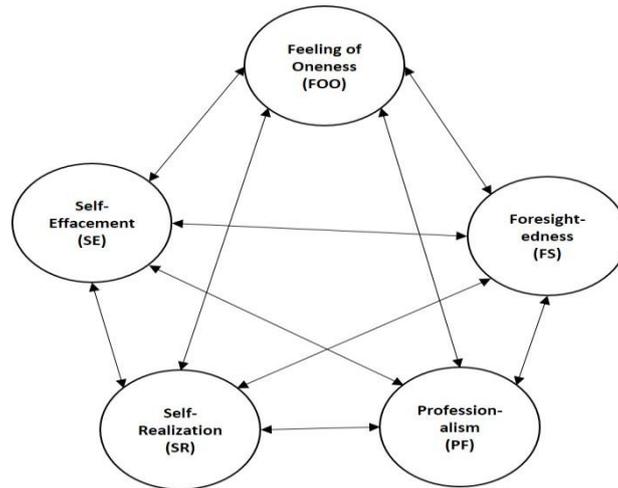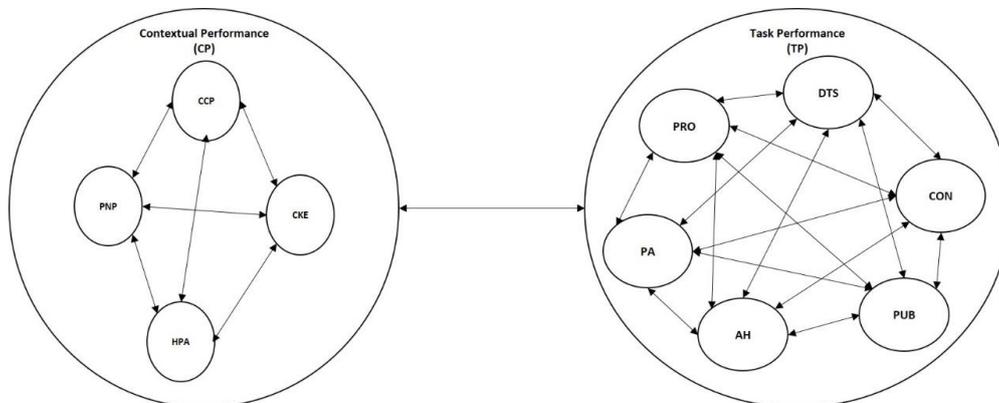

Figure 3a. SQ Interaction Model

Figure 3b. RP Interaction Model   **Figure 3c. SQ and RP Interaction Models**
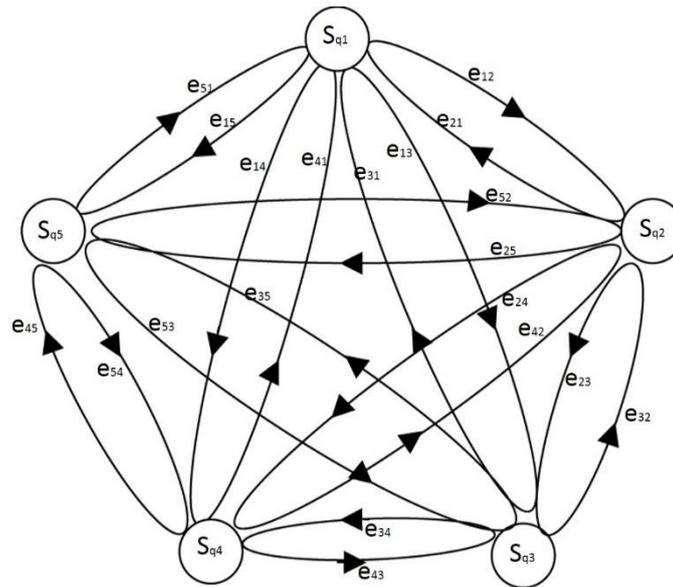
Figure 4. SQ Digraph Model Interaction Model

In this paper, the graph theory is used to quantify the SQ and RP indices. Therefore, the graph models in Figure 3 (a; b; c) and Figure 4 are converted into an equivalent matrix as per equation (eq.1). The A_i elements of the matrix (represented in the graph by a node) consist of the contribution of the ith dimension of SQ and RP (sub-dimensions/attributes) source for respective index. A scale should be used to assign value to these elements. The off-diagonal elements (a_{ij}) (represented in the graph by an edge between two nodes) consist of the relationship or interdependency between sources. The value assigned to each source and their relationships were decided by expert judgment and by those involved in the index measurement process.

$$S = \begin{bmatrix} A_1 & a_{12} & a_{13} & . & . & a_{1M} \\ a_{21} & A_2 & a_{23} & . & . & a_{2M} \\ a_{31} & a_{32} & A_3 & . & . & a_{3M} \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ a_{M1} & a_{M2} & a_{M3} & . & . & A_M \end{bmatrix}$$

(eq.1)

3.2. Permanent Function Approach

The Permanent function is a mathematical expression used in combinatorial mathematics that based is on the A_i and a_{ij} values which determine an uncertainty index. This function is the sum of several terms and is nothing but

the determinant of a M×M matrix considering all the terms as positive and hence, no information is lost (Rao, 2007).

The general expression for the permanent function of an M×M matrix is given as:

$$
\begin{aligned}
Per(S) = \prod_{i=1}^{M} A_i &+ \sum_i \sum_j \sum_k \cdots \sum_M (a_{ij}\,a_{ji}) A_k A_L \ldots A_M \\
&+ \sum_i \sum_j \sum_k \cdots \sum_M (a_{ij}\,a_{jk}\,a_{ki} + a_{ik}\,a_{kj}\,a_{ji}) A_l A_m \ldots A_M \\
&+ \Bigg\{ \sum_i \sum_j \sum_k \cdots \sum_M (a_{ij}\,a_{ji})(a_{kl}\,a_{lk}) A_m A_n \ldots A_M \\
&+ \Bigg[\sum_i \sum_j \sum_k \cdots \sum_M (a_{ij}\,a_{jk}\,a_{kl}\,a_{li} + a_{il}\,a_{lk}\,a_{kj}\,a_{ji}) A_m A_n \ldots A_M \Bigg] \Bigg\} \\
&+ \Bigg(\sum_i \sum_j \sum_k \cdots \sum_M (a_{ij}\,a_{ji})(a_{kl}\,a_{lm}\,a_{mk} + a_{km}\,a_{ml}\,a_{lk}) A_n A_o \ldots A_M \\
&+ \sum_i \sum_j \sum_k \cdots \sum_M (a_{ij}\,a_{jk}\,a_{kl}\,a_{lm}\,a_{mi} + a_{im}\,a_{ml}\,a_{lk}\,a_{kj}\,a_{ji}) A_n A_o \ldots A_M \Bigg) + ..
\end{aligned}
$$

(eq. 2)

The equivalent matrices and evaluative (permanent) function for SQ and RP digraphs are developed as per equations eq.1 and eq. 2 respectively. The benefits of the evaluative function are that it incorporates all the attributes and their interactions in totality and does not lose any information. The faculty members were assessed and evaluated on the basis of SQ and RP dimensions/ parameters. The basic assumption for the study was that none of the parameters exists in isolation and that there exists interaction among the parameters. The data on SQ and RP dimensions/attributes were collected from the participants with the help of a questionnaire (Appendix A) formulated on the basis of weightage. The questionnaire was designed as per study of SIPD in the Indian context. The entire questionnaire was divided into two sections. Section 1 consisted of aspects of Spiritual Quotient (SQ) and Contextual Performance (CP) while section 2 dealt with Task Performance (TP). Psychometric approach was used to frame the questionnaire. Questions on SQ were based upon the five proposed dimensions of SQ and questions on CP were based upon the dimensions as shown in the conceptual framework (Figure 1 and Figure 2). Questions on TP were based on quantitative parameters such as publications, patents, projects, consultancies etc. In section 1 of the questionnaire, a scale of 1-5 (1 - strongly disagree, 2 – disagree, 3 – partially disagree, 4 – agree and 5 – strongly agree) was used. It had a total of 16 questions – 8 positive and 8 – negative (based on psychometric test). The respondents were asked to choose only one option.

The equivalent matrix for figure 4 is mentioned below in equation (eq. 3):

$$SQ = \begin{bmatrix} S_{q1} & e_{12} & e_{13} & e_{14} & e_{15} \\ e_{21} & S_{q2} & e_{23} & e_{24} & e_{25} \\ e_{31} & e_{32} & S_{q3} & e_{34} & e_{35} \\ e_{41} & e_{42} & e_{43} & S_{q4} & e_{45} \\ e_{51} & e_{52} & e_{53} & e_{54} & S_{q5} \end{bmatrix} \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix}$$

(eq. 3)

The relative importance of the attribute (off-diagonal) elements aij is suggested as per Table 1. It may be mentioned here that the relative values assigned are as per authors' perception of SIPD implementation effectiveness. In this study, the relative importance for the different attributes are kept as equally important. The variation in the degree of relative importance can be done for the sensitivity analysis and will be reported in future research contributions.

Table 1. Attributes/Dimensions Relative importance

Class Description	Relative importance of attributes	
	aij	aij= 10 - aij
Two attributes are of equal importance	5	5
One attribute is slightly important	6	4
One attribute is very important over others	7	3
One attribute is most important over others	8	2
One attribute is extremely important over others	9	1
One attribute is exceptionally important over others	10	0

Eq. 4 represents the permanent function for SQ digraph which is developed by considering eq. 3

$$Per(SQ) = \prod_i^5 S_{qi} + \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij}) S_{qj} S_{qk} S_{ql} S_{qm} + \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij} a_{ji}) S_{qk} S_{ql} S_{qm}$$

$$+ \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij} a_{jk} a_{kl} + a_{ik} a_{kj} a_{ji}) S_{ql} S_{qm}$$

$$+ \left\{ \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij} a_{ji})(a_{kl} a_{lk}) S_{qm} + \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij} a_{jk} a_{kl} a_{li}) + a_{il} a_{lk} a_{kj} a_{ji}) S_{qm} \right\}$$

$$+ \left\{ \begin{array}{l} \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij} a_{ji})(a_{kl} a_{lm} a_{mk} + a_{km} a_{ml} a_{lk}) \\ + \sum_i \sum_j \sum_k \sum_l \sum_m (a_{ij} a_{jk} a_{kl} a_{lm} a_{mi} + a_{im} a_{ml} a_{lk} a_{kj} a_{ji}) \end{array} \right\}$$

(eq. 4)

The participants' index for SQ is generated by putting the values of a questionnaire for SQ attributes (dimensions) and considering relative importance among them as equal (Table 1). For all the participants the same procedure is repeated to generate the SQ index. Similarly, RP index was also developed. A software based on Java language and Excel Sheet was developed to automate the complete procedure.

4. Discussion and Analysis

Since behaviour-based questions are an essential part of SQ and performance, 100 % confidentiality was maintained. A total of 1157 responses were collected from university teachers (Assistant Professors, Associate Professors and Professors) of various reputed universities / institutes, across India. Out of 1157 responses collected, only 1137 were selected for validation and analysis of the survey. The age wise distribution of the participants is represented in Figure 5.
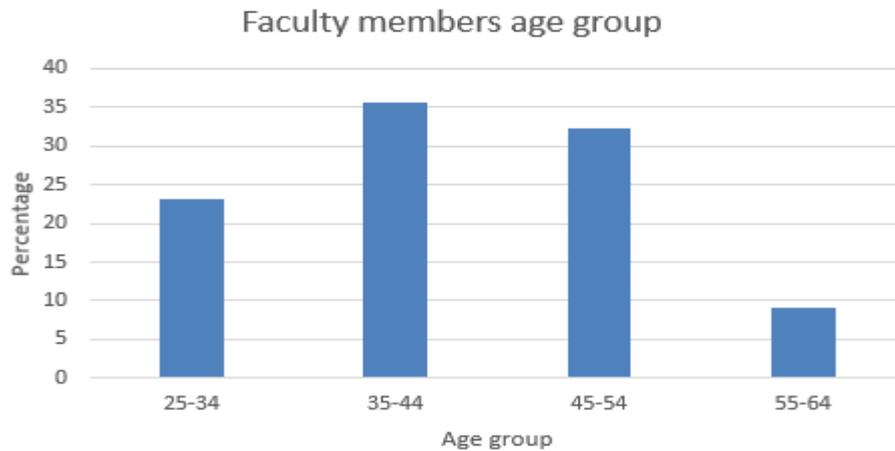
Figure 5. Age wise Distribution of Data

Out of 1137 participants (respondents), around 404 (35.53%) respondents were in the age range of 35-44. And 263 (23.13 %) respondents were in the age range of 25-34. Thus a total 667 (58.66%) respondents, coming under the age range of 25-44 clearly indicated that respondents were mostly young faculty members. This is an important inference for the purpose of this study because it reflected that most of the institutions for higher education were dominated by a high number of 'young faculty members' and that their SQ levels were a prominent aspect in affecting the results of this study. Also 366 (32.18%) respondents were in the age range of 45-54, which is a clear indicator of the "stability" in the teaching profession in the higher education sector of India, and less attrition rates, specially, after a certain age. However, only 104 respondents (9.14%) belonged to the age range of 55-64, which is a clear indicator of the crunch or paucity of faculty members at the senior level. Age is an important determinant of both SQ and RP, as with age; people gain experience, knowledge and maturity. However, due to less number of senior respondents, this factor did not play a major role in the analysis of the data. It also reflected that there is a dire need of senior faculty members in the higher education domain in India. The guidance and support of professors is definitely needed by junior faculty members as it helps them to make strides in their academic career and contribute substantially to the research domain.

Figure 6 depicts gender-wise responses of the faculty staff from the target universities and institutes. It can be inferred from the Figure 6 that the ratio of 'Female faculty members' to 'Male Faculty Members' is very low, with only 20.32% participants being female respondents. However, a major chunk of responses came from the male participants with 906 male faculty members constituting a whopping 79.68% of the total responses.
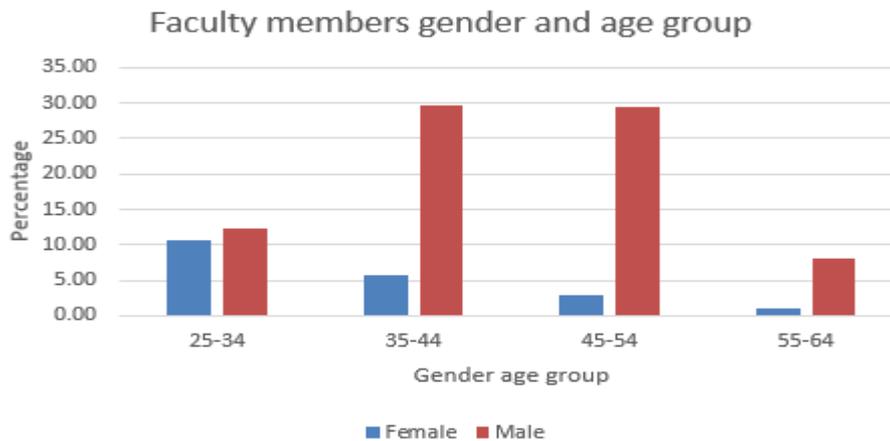
Figure 6. Gender Wise Distribution

This low percentage of female faculty members refutes the commonly held notion that teaching is the most preferred job by females in India and also that the percentage of women in the teaching profession is very high in this country. Also, a startling 'Male: Female ratio' of 80: 20 in the teaching domain would be greatly affected by the SQ attributes of the male population, and hence significantly alter the results of the study in that perspective.

The Figure.7 shows designation-wise responses of the faculty members from the target universities and institutes. As discussed earlier (Figure 5), a majority of the respondents were in the age range of 25-44 (58.66%). This precisely indicates a high number of Assistant Professors (53.5%) which formed a major chunk of respondents (out of a total sample size of 1137 respondents).
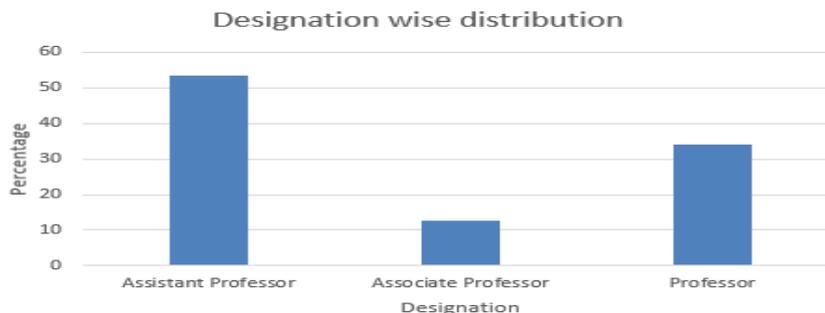

Figure 7. Designation Wise Distribution

However, a major highlight in this graph is that while the percentage of Associate Professors is only 12.4%, the percentage of Professors rises up to 33.94 %.

It may be inferred from the above analysis that there is a great shortage of senior faculty members in the higher education domain in India. An important issue that needs to be addressed here is that if there is any impact of spiritual

intelligence on research performance or not? On analysing the collected data, it may be deciphered that there is a considerable amount of impact of SQ on RP. Visual artefacts too represent this trend. Figure 8 shows the impact of SQ on RP of all faculty members across all designations consisting of Assistant Professors, Associate Professors and Professors (both male and female) in the age range of 25-64. It is to be noted that RP is calculated based on the CP and TP of an individual.
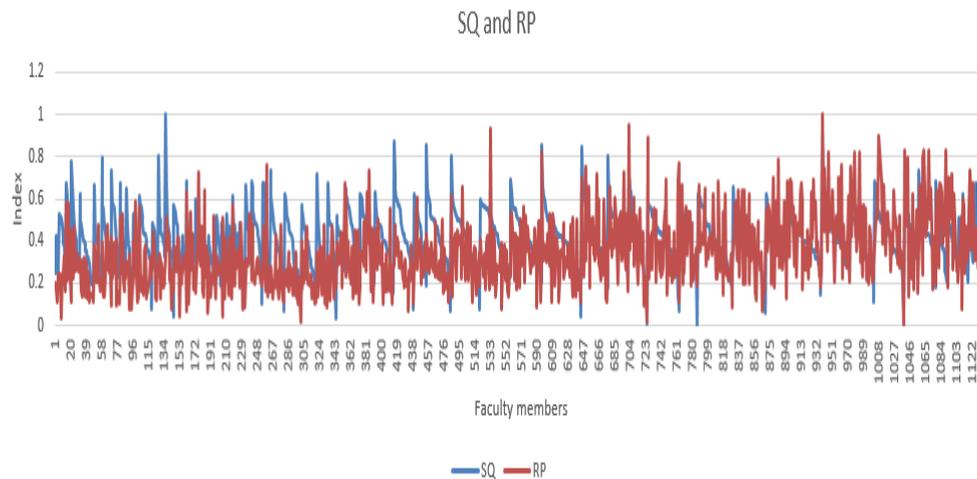

Figure 8. SQ and RP (All Designations)

As is seen in fig.8 there exist a direct positive relation between SQ and RP indices for all designations of the faculty members of the target universities and institutes of higher education in India. The next important question that needs to be answered is that: is there any impact of spiritual intelligence on contextual performance towards accomplishing research performance? This is a very important aspect of this research. It has already been discussed at length in the literature survey that it is not merely TP that is responsible for indicating an individual's overall performance. CP is also an indispensable part of any such process of performance measurement. Hence CP is instrumental in the actual measurement of performance and thereby contributes greatly in generating performance index of an individual. On a similar line of thought it is necessary to study the role of CP in the research performance of a university teacher and also to find out whether CP is impacted by SQ or not. The data collected from the survey-responses indicate a direct and strong impact of SQ on CP. The visual artefacts developed with the help of values also indicate the same. Since RP depends both on TP and CP, it too gets largely affected by SQ .Figure 9 shows the impact of SQ on CP of all faculty members across all designations consisting of Assistant Professors, Associate Professors and Professors (both male and female) in the age range of 25-64.
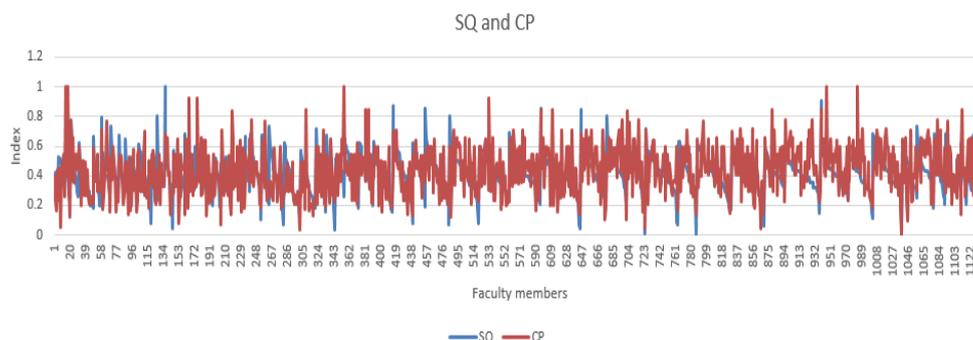
Figure 9. SQ Vs CP: All Designations

It is to be noted here that there exists a direct positive relation between SQ and CP indices. The proposed SIPD framework will help Educational Administrative leaders and other stakeholders to develop and manage their human resource and create a sound educational research ecosystem. RP should not be measured on the basis of TP alone. Since CP articulates and supports organizational, social and psychological goals of an institute, it should be given due importance in the measurement of the overall RP of university teacher.

5. Conclusions

In this paper, the spiritual quotient and research performance dimensions were developed. The graph theoretic methodological framework was utilized to generate the spiritual quotient (SQ) and research performance (RP) indices. The digraph represented interactions of spiritual quotient and research performance; sub-dimensions and equivalent matrices. Permanent functions were used to generate the SQ and RP indices. It was found that SQ has a direct and strong impact on CP. Since, RP is a combination of TP and CP, it too gets largely affected by SQ Research is a process that requires definite purpose, open mindedness, vision, coordination, patience and many more fundamental aspects of life. Hence to assess research performance, mere quantification of its output would not yield accurate results. A more comprehensive and inclusive approach is the need of the hour. The current research study is one of its kinds as none of the earlier research works have studied such an ecosystem comprising Spiritual Intelligence and Research Performance in the academic sector. The proposed SIPD model will help educational administrative leaders and other stakeholders to develop and manage their human resource and create a sound educational research ecosystem. The paper will open new spectrum for the researchers and scholars to exploit and extend the current research work in various sectors of interest.

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