Where You End and I Begin: A New Scale Development on Intimate Co-creation

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ARTICLE DETAILS

History
Received: November 2021
Available online: December 2021

Keywords
Intimate Co-creation
Personal Intimacies
Relational Co-creation
New Scale Development
Value Co-creation

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ABSTRACT

Purpose:
Built upon the theories of psychological ownership, personal intimacies, and interpersonal relationship; the concept of intimate co-creation was conceptually theorized in the recent management literature. Intimate co-creation typically occurs at the dyadic level often for the creative task engagements and has a spillover effect on groups and teams. However, there is no measurement scale on intimate co-creation available in the management literature.

Methodology:
The current study has addressed this literature gap by developing a new measurement scale on intimate co-creation. Best practices for new measurement scale development as available in the management literature were followed. A qualitative study was conducted first to determine the dimensional structure of intimate co-creation and an initial pool of 72 items. Scale development experts' review of the measurement scale, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) abetted in finalizing a 14 items measurement scale with four dimensions of intimate co-creation.

Findings:
This new measurement scale development is a milestone for further empirical research on intimate co-creation as it is the first-ever measurement scale on intimate co-creation.

Conclusion:
This is the first-ever measurement scale on intimate co-creation that is available for future researchers to empirically validate the concept of intimate co-creation.

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1. Introduction

Literary debate on workplace creativity and innovation through joint and informal task engagement started in the early 1970s in the management literature. Management scholars got their early inspiration from the field of design engineering in the 1970s where the idea of co-innovation was popular (Van de Ven et al., 1976). Creativity at the workplace for joint tasks involves social processes for matching employees' personal and social chemistry. Freedom of forming personal intimacies for joint tasks helps in creating effective teams with a better ability to address relational paradoxes. Hence, network structured organizations are more helpful compared to the tall hierarchical structures (Perry-Smith & Shalley, 2003). Such managerial interventions to align organizational structure for facilitating social bonding help in better team building (Harrison & Rouse, 2014) and stakeholders' engagement (Bechky, 2003). However, there is a lack of research on the potential outcomes of co-creation and co-innovation based on social and personal intimacies at the workplace (Hewett & Shantz, 2021; Rouse, 2020).

Rouse (2020) proposed the idea of intimate co-creation as an interpersonal social process by identifying its potential outcomes as well. Intimate co-creation is the process of establishing shared interpersonal boundaries with a sense of "we" instead of "I". It helps in creative idea disclosure and the intimate relationship of colleagues provides them with the sense of psychological safety due to a close social bonding. Creativity, innovation, and long-term relationship are the potential outcomes of intimate co-creation. However, intimate co-creation was earlier theorized only on conceptual grounds.

The concept of co-creation in marketing literature was first introduced by Ramaswamy and Prahalad in 2004 as "value co-creation", whereby customers are engaged with employees to have customized products and services through co-innovation based on product and service-dominant logic. Afterward, scholars made attempts to study the relational forms of co-creation in different areas of management. Efforts have also been made to integrate the literature on different forms of co-creation (e.g., Roser, DeFillippi, & Samson, 2013). Prominent types of co-creation at the workplace in the available literature include co-innovation in design engineering, value co-creation in marketing, relational co-creation both in marketing and management, HR co-creation, and intimate co-creation in the literature of human resource management (Hewett & Shantz, 2021; Rouse, 2020; Gronroos, 2012; Zhou & Hoever, 2014; Tse & Dasborough, 2008; Prahalad & Ramaswamy 2004). All such forms of co-creation have been studied in the management literature as relational forms of co-creation whereby interpersonal intimacies are established among a variety of stakeholders. However, no single theory is available in the management literature that elaborates all forms of workplace co-creation activities and behaviors (e.g., Hewett & Shantz, 2021; Rouse, 2020).

The concept of intimate co-creation was theorized only on conceptual grounds and it lacks empirical validation. A recent attempt for qualitative inquiry on intimate co-creation has been made (Shahzad & Amir, 2021). However, for deductive studies to further validate this concept, no measurement scale on intimate co-creation was available in the literature before this study. It is pertinent to have an operational definition of a concept while developing a new measurement scale on it. Intimate co-creation can be operationally defined as "an interaction among two or more individuals that leads to a series of creative engagements involving creative idea disclosure, supported elaboration and evaluation through which useful creative outcomes take place over the time along with the development of interpersonal relationship which is mutually beneficial for individuals and for the organizations. Intimate co-creation is the extension of the already existing concept of "relational co-creation". The current study aims at measuring perceived intimate co-creation at the individual level. A high level of the computed score on the Likert scale would mean a high level of intimate co-creation and vice versa".

As the current study has explored to the phenomenon of intimate co-creation; hence, due to the exploratory nature of the study, a qualitative study was conducted first to explore the dimensional structure of intimate co-creation. Accordingly, the initial pool of items for the new measurement scale was extracted on the basis of four newly extracted dimensions through a qualitative study that followed an exploratory sequential design (Cresswell, 2013). There was a literature gap for developing this measurement scale which the current study has addressed for the very first time as a novel contribution in the management literature.

Data for this study was primarily collected from faculty members of universities in Pakistan and from employees of service-based organizations who were engaged in joint tasks of creative nature such as research and development. Using ten steps approach for new scale development as proposed by Carpenter (2017), a new measurement scale has been developed. A qualitative study was followed by exploratory factor analysis (EFA) and then a confirmatory factor analysis (CFA) was conducted to confirm the factor structure and factor loadings. The final measurement scale comprised of four dimensions and fourteen items for measuring intimate co-creation. This measurement scale on intimate co-creation is the first-ever measurement scale in the literature of human resource management.

2. Literature Review

Social interactions shape the behavior of individuals at the workplace. Such interpersonal interactions might have positive as well as negative consequences (Farrell, 2003; Shenk, 2014). A friendly and interpersonal intimate relationship for an employee might be a source of psychological support for the creative tasks assigned to him. A cup of coffee or a friendly discussion with a colleague with whom an employee is working on a joint task or potentially can work on a joint task might be a source of effective socialization, honest discussion, and feedback (Markus & Wurf, 1987). Intimate relationship at the dyadic level is a source of mutual training, work-related guidance and creative ideas disclosure (Gruenfeld et al. 1996). Workplace diversity fosters intimate co-creation provided the employees have the autonomy to choose the partners of their choice for creative task accomplishment (Gormar et al. 2021). Rosue (2020) exemplified the informal interactions that take place in academia and healthcare sectors as the potential source of intimate co-creation. However, intimate co-creation needs empirical investigation in these two sectors along with many others sectors where creativity, innovation, and joint task accomplishment remains a priority (Gormar et al., 2021).

Creative interactions through intimate co-creation typically occur at the dyadic level and then demonstrate a positive spillover effect at the group and team level. Research in the past has been conducted on groups and teams for assessment of different dynamics related to value co-creation and other forms of interactional co-creation. However, dyadic level interactions based on intimate co-creation have been largely ignored in the past literature (Rouse, 2020; Chua, Morris, & Mor, 2012). For establishing personal intimacies at dyadic, group, or team level, workplace persuasion skills are of vital importance. There is no such empirical evidence available in the literature where the effect of workplace persuasion on intimate co-creation is tested (Jena & Pradhan, 2020).

Intimate co-creation typically starts at the dyadic level. Therefore, it has a lot of dependence on the perceptions of individuals about each other. Positive outcomes of intimate co-creation at dyadic level prove helpful for establishing relational intimacies based on intimate co-creation at the group or team level (Rouse, 2020; Decoster, Stouten & Tripp, 2019). This helps in better performance on joint tasks (Gronroos, 2012; Brands & Mehra, 2019) and it also increases the value of services being offered by the organization (Bowen, 2016; Santos-Vijande, 2015). However, for such a social phenomenon, the socialization capability of individuals is also

important (Tse & Dasborough, 2008). Positive managerial interventions may also prove helpful for intimate co-creation (Rouse, 2020). Therefore, role of organizational leadership is crucial for such managerial interventions (Hunter, Cushenbery, Fairchild, & Boatman, 2012). However, constant managerial communication and feedback are important during such interventions (Cordova & Scott, 2001).

Creativity, innovation and long-term relationship of employees is the obvious outcome of the intimate co-creation process (Rouse, 2020). For creative idea disclosure, psychological safety is also a needed for the employees because at times they feel that their creative ideas might be stolen by other members of the organization in a social process (Rouse, 2020; Decoster, Stouten & Tripp, 2019; Santos-Vijande, 2015). In case, if the individuals feel that the psychological safety for the disclosure of their creative ideas is not there, then they tend to drop their ideas as well (Mannucci & Perry-Smith, 2021). Hence, a constant feedback and support of leadership might be of crucial importance in this regard (Cordova & Scott, 2001). Solano and Dunnam (1985) were of the view that in large groups, individuals often tend to drop their creative ideas as compared to small groups where they tend to retain them. One reason for it might be that in small groups, individuals often get more recognition for their creative ideas and have better psychological safety climate (Mannucci & Perry-Smith, 2021). This argument provides support to the propositions of Rouse (2020) that intimate co-creation typically initiates at the dyadic level as a creative task engagement process.

Creativity through collective work engagements has increasingly gained attention of scholars in the management literature (e.g., Harvey & Kou, 2013; Harrison & Rouse, 2014). Broader research spectrum shows that the relational co-creation initiatives such as value co-creation etc., have been studied more concerning service-oriented organizations (Oertzen, 2018; Rouse, 2020). However, much more empirical evidence is needed for newly theorized forms of relational co-creation such as intimate co-creation. Such empirical research is possible in different sectors but for intimate co-creation, academia and healthcare sectors have been recommended for empirical evidence in the past literature. One reason might be that more active interpersonal collaboration is observed in these two sectors. Like joint research projects in university academia by faculty members and joint entrepreneurial ventures of healthcare professionals of formal and informal nature demonstrate the essence of intimate co-creation (Rouse, 2020).

Intimate co-creation at dyadic level also requires collaborative sense-making. If such collaborative sense making is established within the pairs, then it positively transforms into groups and teams as well (Bellis & Verganti, 2019; Rouse, 2020). However, the kind of interpersonal association and bonding that establishes at dyadic level cannot be substituted by the new group or team members (Farrell, 2003; Shenk, 2014). Therefore, employees with prior interpersonal relations would have better perceptions about the meaningfulness of joint and creative task (Svejenova et al., 2010). This helps in creating an intimate space for tacit knowledge sharing at the workplace which further strengthens the interpersonal bonding among individuals (Ahn & Hong, 2019; Hill et al., 2014). However, in dyadic level association, the role of gender is also crucial. For example, dynamics of dyadic association in male-male, male-female and female – female dyads might be different in a variety of different socio-cultural contexts. This needs to be explored further concerning organizational and culture context along with gender norms (Gaggioli et al., 2019).

Dyad as a source of very first level of interpersonal interaction for an individual is a source of intrinsic meaningfulness as well (Farrell, 2003; Shenk, 2014). Achieving the required extent of meaningfulness by individuals becomes a source of workplace creativity (Coopey et al., 1997; Rouse, 2020). This also generates role clarity and mutual understanding among partners of a joint task (Parker & Hackett, 2012). Such interactions of meaningfulness are also dependent on

organizational factors such as social environment and on the personal factors such as personality type of an individual. Introvert and extrovert personalities might act differently in similar situations (Simel, 1902).

Bellis and Verganti (2019) were of the view that the bulk of the creative ideas are generated at the individual level. However, those ideas of individuals are nurtured at group level or team level. Hence, dyad is the very basic level of interpersonal association for intimate co-creation. A greater level of trust and psychological safety gets established at dyadic level (Pearce & Sims, 2002). Such intimacies at a personal level are source of creative task accomplishment, creative idea disclosure, and long-term relationship (e.g., Wright & Cropanzano, 1998; Alvarez & Svejenova, 2005; Rouse, 2020).

2.1. Theoretical Underpinning

Concerning social exchange theory (SET), the interpersonal relationship of two individuals is often based on mutual interests. Each party offers something of value in return for value received from the other party. It's a kind of give and take. Such a relationship over time becomes a relationship of social exchange. There must be a balance from both parties in the exchange of value in such a social exchange. The social exchange offered might be tangible or intangible. An example of intangible social exchange is that of different human emotions (Emerson, 1976). Social exchange theory emerges from utilitarianism as well as social aspects of human behavior. At the dyadic level, creative interactions have been largely ignored in the past literature of management; hence, the emergence of intimate co-creation as a social exchange process is a perfect platform for this study with overarching effect social exchange theory. Homans (1961) explained social exchange theory at the individual level as a foundation that explains individuals' relationships based on mutual exchange of reward and value. Peter Blau and Emerson further confirmed the viewpoint of Homans (Delamater, 2006). Homan's work with respect to social exchange theory was focused on dyadic exchange while Kelly's work was focused on the social exchange of small groups (Emerson, 1976). As intimate co-creation typically forms at the dyadic level and has a positive transformation in groups and teams; hence, it is a perfect exchange relationship that can well be explained through social exchange theory.

Cropanzano and Mitchell (2005) explained that social exchange theory is a single theory in literature, however; it represents different models of social exchange that have contributed to this theory over a period of time. Hence, it is a comprehensive theory. There is a need for further research on reciprocal arrangements in social setups at the workplace. However, the basic assumption of social exchange theory is that relationships based on social exchange gradually develop over time, and parties involved in the exchange relationship follow the norms of social exchange. As per Rouse (2020), intimate co-creation is a kind of social exchange in which mutual exchange of creativity and innovation takes place through the establishment of a relationship based on personal intimacies at the workplace. No previous study has explored intimate co-creation regarding social exchange theory. The current study has fulfilled this gap in the management literature.

3. Methodology

A new measurement scale on intimate co-creation has been developed using a triangulation approach. Triangulation as a post-positivist approach simultaneously makes use of different research methods and techniques in a single study. The current study made use of methodological triangulation (Heath, 2015). Prior qualitative research is recommended for better exploration of dimensional structure in case if a new phenomenon is being studied through mixed methods research (Noble & Heale, 2019; Denzin, 2015). Furthermore, phenomenology is a common type of qualitative research technique (Creswell, 2013). One of the emerging methods

of phenomenology is interpretive phenomenological analysis (IPA) that is useful for precise elaboration of qualitative data (Smith et al., 2009). Using IPA and semi-structured interview guidelines, eight in-depth recorded interviews were conducted using Skype with the help of purposive sampling. Interviewees were the employees working in service sector organizations primarily from university academia as faculty members (i.e., Rouse, 2020) and they were also engaged in the collaborative tasks such as research and development. The average time per interview was 21 minutes. All the interviews' data was transcribed in QDA Miner Lite software for further analysis. Qualitative data analysis revealed that the concept under study, i.e., intimate co-creation comprised of five underlying emerging themes/dimensions. The sixth theme emerged from the relevant literature. Using those six themes, interviews, and literature support; an initial pool of 72 items was developed for scale development experts' review who were three university professors of human resource management (HRM). Based on scale development experts' review reports, 24 items were left behind as the most relevant items and others were excluded from the measurement scale. Two dimensions were also excluded based on reviewers' reports.

Once the dimensional structure was finalized after the qualitative study, an exploratory factor analysis (EFA) was conducted. Statistical Package for Social Sciences (SPSS - 23) was used for EFA. Separate datasets were obtained for EFA and CFA in two different time lags. Data was collected online using Google form that was sent to the potential respondents through emails, LinkedIn, Facebook, and WhatsApp. Afterward, respondents were sent reminders through emails and phone for enhancing the response rate (Fokkema & Greiff, 2017; Memon et al., 2017). The response rate of the whole survey for the quantitative study was 17 %. Carpenter (2017) proposed a ten steps approach for new scale development that was primarily related to EFA. That approach for scale development was followed in the current study for EFA. However, CFA was also conducted to further add rigor to this study. Some of the steps proposed by Carpenter (2017) included the conceptual and operational definition of the concept, literature support, qualitative study, experts' feedback on the scale, pre-testing, pilot testing, principal component analysis, Monti Carlo analysis, and establishing factor loading criterion, etc. Finally, based on a factor loading > 0.5, the total items loaded on four fixed dimensions after EFA was 18.

Sample size for EFA was 183 (N = 183) and for CFA, a separate data set of 165 (N = 165) was obtained (Fokkema & Greiff, 2017; Memon et al., 2017). Data for EFA and CFA were collected through simple random sampling as all the potential respondents of the selected organizations/departments were approached for data collection even if they did not show the willingness to participate in the survey. Green et al. (2016) stated that it is not recommended to follow EFA with a CFA on the same dataset. Memon et al. (2017) further emphasized the need for doing only EFA on a single dataset and then CFA on a separate dataset. Hence, a separate study was performed for confirmatory factor analysis on a different dataset to further validate the current study. Analysis of Moment Structure (AMOS – 23) software was used for conducting CFA. Confirmatory factor analysis (CFA) revealed that the final measurement scale on intimate co-creation comprised of four dimensions and 14 items.

3.1. A qualitative study to explore the dimensional structure

The first step of the scale development process was to conduct a qualitative study for exploring the dimensional structure of intimate co-creation through interpretive phenomenological analysis (IPA) (Smith, 2007). Following the recommendations of Smith and Osborne (2003), steps included were analysis of transcribed interviews, clustering codes of emerging themes, identifying master themes, and then the identification of final themes, codes and quotes. Interviewees were selected primarily from university academia as per the recommendations in previous literature (i.e., Rouse, 2020). Interviewees were informed about recorded interviews on Skype and the average time per interview was 21 minutes. Purpose sampling was used for the

selection of interviewees which is often used in qualitative studies (Boddy, 2016). As a rule of thumb, usually, six or more participants are selected in the qualitative studies (Giorgi, 2006). However, for the current study, eight participants were interviewed. Table 1 depicts the demographic characteristics of the interviewees of this study in terms of gender, age, education level, monthly income, work experience, and designation at the workplace.

TABLE 1: Demographic Details of the Interviewees

Respondent No.	Gender	Age in years	Education level	Monthly Income (in Rupees)	Experience	Designation
1	Male	39	MS	Above100,000	12 years	Unit Head – Corporate Lending
2	Male	40	PhD	Above 100,000	14 years	Assistant Professor
3	Male	36	MS	Above 100,000	10 years	Lecturer
4	Female	44	M Phil	Above 100,000	16 years	Associate Professor
5	Male	25	BSc	Above 30,000	7 years	IT Supervisor
6	Male	43	MS	Above 50,000	14 years	Lecturer
7	Male	40	MS	Above 100,000	12 years	Instructor
8	Male	31	BA	Above 40,000	8 years	Branch Services Officer

Source: Author's own elaboration

TABLE.2: Six Emerging Themes, Related Codes, And Definitions (Five themes from interviews and one from literature)

Codes	Themes	Definition of Themes
Working together Mutual discussions	Value formation	Joint working of employees in the form of spending time together and task-related mutual discussions are the source of value formation.
Social relations Consensus Trust Sharing of experiences	Effective socialization	Knowing each other by establishing trustworthy and friendly relations at the workplace.
Policy status Co-creation Creativity Common goals Team work	Perception of synergy	The idea that efficiency and output increase with combined working compared to individual work comes under synergy.
Opportunity Innovation Self-motivation Incentives	Workplace creativity (Later converted to "Creative Knowledge Sharing" upon review)	Inner zest of individual works to develop and achieve workplace targets. For this, motivation may be intrinsic or extrinsic.
Efficiency Idea sharing Innovative capability Learning	Perception of joint innovation	The individual's belief that efficiency, idea sharing and learning enhance the innovative capability and joint innovation the workplace.
*(*Theme emerged from literature only)	Intent of Relationship	The individual believes that workplace relations are useful for intimate co-creation.

Source: Author's own elaboration

Transcribed data in QDA Miner Lite software was analyzed. Codes were identified on the basis of the repetition of similar words. Similar codes formed the similar emerging theme. Hence, 18 codes constituted five emerging themes after a careful analysis of codes. Table 2 provides detail of codes, emerging themes, and the definitions of themes.

With the help of five emerging themes, an initial pool of 72 items was developed on intimate co-creation that was reviewed by three scale development experts who were the professors of HRM from three different universities. Table 1 shows emerging themes (axial codes), constituent codes

(open codes), and the definitions of the emerging themes. Exploration of emerging themes and an initial pool of 72 items provided the foundation for EFA. Analysis of qualitative data provided following coding frequencies and percentages as given in table 3.

Table.3: Coding Frequency of Emerging Themes from Interviews

Selective Codes / Theme	Axial Codes	Count	% Codes	Cases	% Cases
Value formation	Working together	7	5.50%	4	5.7 %
	Mutual discussions	6	4.70%	1	1.3 %
Effective socialization	Relationship	9	7.00%	7	9.4 %
	Consensus	7	5.50%	1	1.3 %
	Trust	11	8.50%	7	9.4 %
	Sharing experiences	3	2.30%	1	1.3 %
Perception of synergy	Policy status	2	1.60%	1	1.3 %
	Co-creation	8	6.30%	4	5.7 %
	Creativity	5	3.90%	8	10.8 %
	goals	1	0.80%	2	2.7 %
	Teamwork	8	6.30%	4	5.7 %
Workplace creativity	Opportunity	1	0.80%	3	4 %
	Innovation	4	3.10%	6	8.1 %
	Self-motivation	7	5.50%	3	4 %
	Incentives	1	0.80%	1	1.3 %
Perception of joint innovation	Efficiency	3	2.30%	3	2.7 %
	Idea sharing	10	7.80%	1	1.3 %
	Innovative capability	2	1.60%	1	1.3 %
	Learning	7	5.50%	3	4 %

Source: Author's own elaboration

3.2. Research Framework

Based on the qualitative study and literature review, six themes were emerged. The research framework given in the figure 1 below interprets this study. However, two themes were dropped later on based on factor analysis.

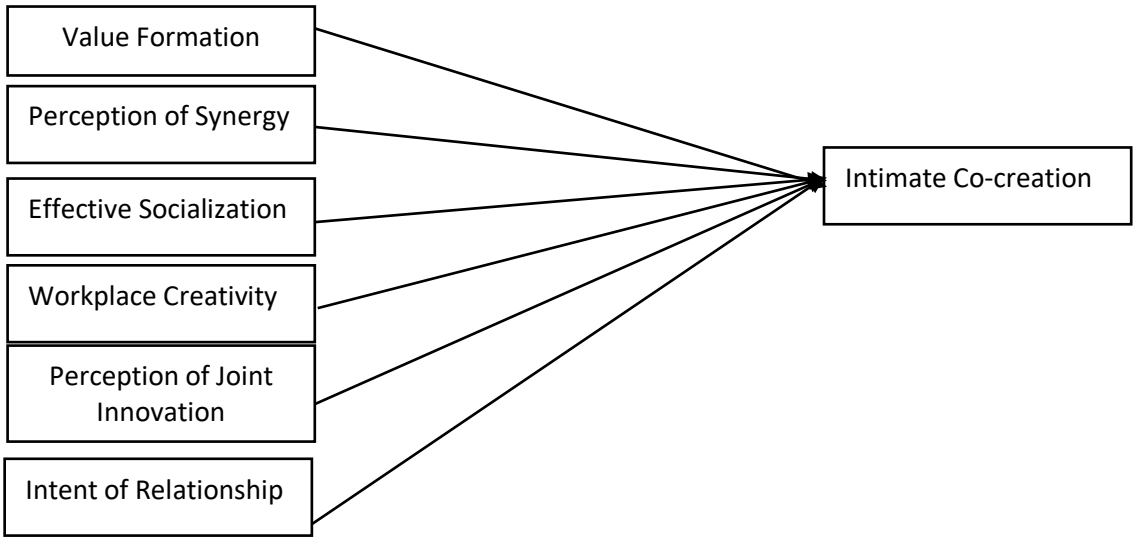

Figure.1: Proposed model for dimensions of new measurement scale on intimate co-creation
Source: Author's own elaboration

3.3. Exploratory factor analysis

Upon scale development experts' review of initial pool of 72 items measurement scale by three university professors of human resource management (HRM), three dimensions were merged with the other three dimensions. Many items were also excluded mainly on the basis of conceptual irrelevance criterion in the reports of three experts. Twenty-four items were finally remaining in the proposed measurement scale along with three dimensions after experts' review. However, upon Monti Carlo Parallel Analysis, one additional dimension was added which was "creative knowledge sharing" in place of "workplace creativity" as also advised in one of the scale development experts' review report (O'connor, 2000; Carpenter, 2017; Goldberg & Velicer, 2006; Carpenter, 2017). At this stage, 24 items measurement scale was sent to five potential respondents for pre-testing and they were asked about the conceptual clarity about items, and their perceived meanings of the scale were analyzed with reference to intended meanings of the concept of intimate co-creation (Collins, 2003). Potential respondents were also briefed about the meanings of the concept of intimate co-creation (Carpenter, 2017). The feedback of respondents was that the items were suitable for measuring the concept of intimate co-creation.

After pre-testing, pilot study of 24 items measurement scale was performed on 50 respondents. Pilot study is a useful strategy before conducing full scale survey. Pilot testing is also helpful in the assessment of internal consistency of a measurement scale through Cronbach Alpha values (Carpenter, 2017; Johanson & Brooks, 2009). Reliability value of the instrument was satisfactory as the Cronbach Alpha value was more than 0.7criterion and the obtained value was 0.894 (Gliem & Gliem, 2003). Perceived meanings of the measurement scale items were the same as the intended meanings of intimate co-creation (Cherney & McGee, 2011).

Carpenter (2017) also emphasized a proper sampling procedure for scale development. For a 24 items measurement scale 24 x 5 = 120 was the minimum sampling size as per the guidelines of past management literature considering if five respondents are taken per item (e.g., Memon et al., 2020). However, Thompson (2004) had recommended a minimum sample size of 150 for exploratory factory analysis as well as for confirmatory factor analysis. Data quality was examined as the next proposed step for scale development. Statistical Package for Social Sciences (SPSS) was used for EFA. There were no missing values in the data as the data for scale development was collected online. Outliers' assessment was made through box plot and it was also not a big concern due to the 5-point Likert scale (Wen et al., 2013). Bartlett's test of Sphericity and Kaiser Mayer Olkin's test were run to assess whether data is suitable for exploratory factor analysis or not (e.g., Hutabarat & Hutabarat, 2020). Both of these tests are conducted prior to conducting EFA (Goretzko et al., 2019). Table 4 depicts the results of both those tests.

KMO value was acceptable as it was greater than the threshold value of 0.7 (Carpenter, 2017; Tabachnick & Fidell, 2007). Bartlett's test of Sphericity was significant at 0.05 level (Carpenter, 2017). EFA was run using principal component analysis as a factor rotation and data reduction measure (John, 2017). This helped in exploring factor structure using SPSS 23 software (Hotelling, 1933). Promax rotation with Kaiser normalization method was used (Kaiser & Rice, 1974). Factor loadings greater than 0.5 were retained (Maskey, Fei & Nguyen, 2018; Henson & Roberts, 2006). Total variance explained was 60.8 % by four fixed dimensions. In social sciences, having total variance explained more than 60 % is an ideal case (Finch, 2019; Fabrigar & Wegener, 2012). The number of dimensions was later confirmed through scree plot and Monti Carlo Parallel Analysis and it remained as 4. The fourth dimension added at this stage was "creative knowledge sharing". Those items with communalities values less than 0.3 were deleted. Only those items with communalities value greater than 0.5 were retained (Watson,

2017). Such exclusion of items with low communality values enhances the total variance explained by the dimensional structure of concept being measured (Pallant, 2016). Instead of using the criterion of the eigen value, the current study used the scree plot criterion (Fabrigar & Wegener, 2011). Scree plot for the current four-dimensional structure as shown in the figure 1 also confirmed that four dimensions were above the eigen value of 1 (Creed et al., 2020).

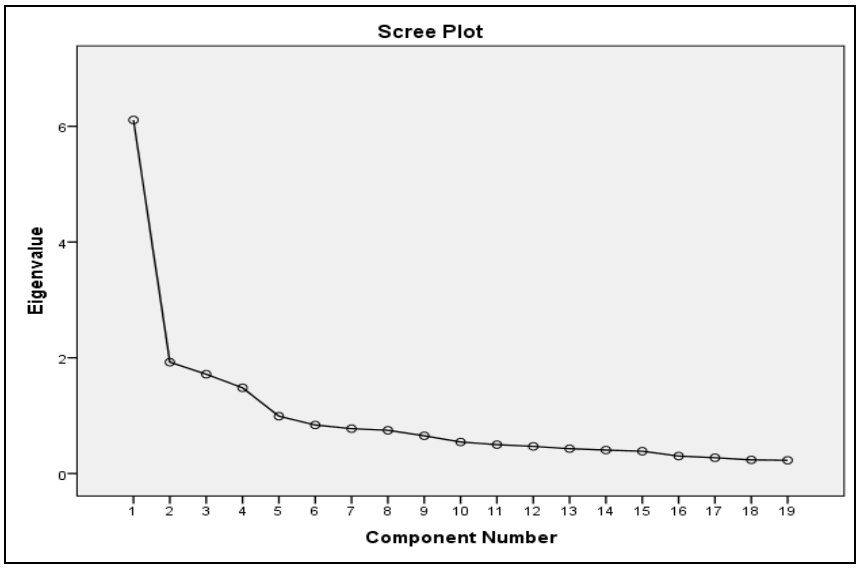

Figure.2: Scree plot with confirmation of four factors above cut off value of 1
Source: Author's own elaboration

To further confirm the four-dimensional structure of the model, Monti Carlo Parallel Analysis was run using syntax-based programming in SPSS 23 (O'connor, 2000; Liu & Rijmen, 2008). With a 95 % confidence interval and with a bootstrap value of 100, Monti Carlo Analysis revealed that only for the first four dimensions, percentile values were greater than mean values. Hence, the four-dimensional structure was confirmed through Monti Carlo Parallel Analysis as well (Watkins, 2005; O'connor, 2000). In the pattern matrix, items with cross-loadings were not retained. Furthermore, items were also assessed on the basis of their theoretical convergence on the relevant dimensions. It was found that items converged on their related dimension (Watkins, 2005). After removal of items on the basis of communalities less than 0.5, cross-loadings, or factor loading below 0.5, the final measurement scale after EFA comprised of 18 items and four dimensions. Four dimensions included value formation, creative knowledge sharing, perception of joint innovation, and effective socialization. 32.8 % was the highest variance explained by the dimension of value formation. This shows that value formation is the most important dimension in the scale of intimate co-creation (Finch, 2019; Fabrigar & Wegener, 2012). Second dimension explained 10.34 % variance; third dimension explained and 9.4 % variance and 8.22 % variance were explained by the fourth dimension. Overall, the model with 60.8 % total variance explained was in an acceptable range (Streiner, 1994; Field, 2013). Table 6 shows the factor loadings against each item obtained in exploratory factor analysis (EFA).

Table.4: Measurement Scale after Exploratory Factor Analysis (EFA)

Dimensions & Item Codes	18 Items	Factor Loadings
Value Formation		
VF1	I believe that working jointly with others produces better results.	0.772
VF2	I feel that most of the creative tasks are accomplished because of teamwork.	0.878
VF3	Employees in our organization are often helpful in joint and creative tasks.	0.812
Creative Knowledge Sharing		
CSK1	I learn from other employees while working with them.	0.59
CSK2	I share my creative ideas at the workplace for better co-creation.	0.653
CSK3	I have the ability to share knowledge of my field.	0.858
CSK4	I have the ability to learn the pertinent knowledge of my field from different sources at the workplace.	0.721
Perception of joint innovation		
PJI1	I feel that working with my colleagues is a source of innovation at the workplace.	0.619
PJI2	Collective efforts of the team members in our department are helpful in achieving the organizational goals.	0.809
PJI3	We strive for achieving common organizational goals at the workplace.	0.744
PJI4	Teamwork environment is encouraged in our organization.	0.754
PJI5	I feel that a supportive teamwork environment is a source of creativity.	0.617
Effective socialization		
ES1	I tend to socialize with others which helps me in teamwork.	0.64
ES2	I tend to socialize with others for creative task accomplishment which helps us in the creative idea disclosure at the workplace.	0.782
ES3	My relationship with my colleagues is a source of our better collaboration at the workplace.	0.758
ES4	I like to work on creative and innovative tasks initiated by my colleagues.	0.813
ES5	My colleagues help me at the workplace for creative and innovative tasks.	0.778
ES6	I feel comfortable during interaction with the colleagues of my department.	0.746

Source: Author's own elaboration

In the four-dimensional measurement scale after EFA, all the items had a factor loading greater than 0.5. The four-dimensional solution was in line with scale development experts' review, respondents' feedback, literature support, and interviews (Fabrigar & Wegener, 2012; Pett et al., 2003). As per Carpenter (2017), on a single dataset, these steps performed so far are primarily related to EFA and are sufficient foa new scale development. However, it is recommended to conduct CFA on a separate dataset to further confirm the factor structure and factor loadings (Memon et al., 2017; Green et al., 2016).

3.4. Confirmatory factor analysis

Confirmatory factor analysis (CFA) is recommended after EFA to further establish the factor structure and the factor loadings of observed variables for a final measurement scale (Malhotra, Hall, Shaw, & Oppenheim, 2004). CFA is used as a robust measure to confirm the uni-

dimensionality of factors extracted from EFA (John, 2018). In this study, CFA was performed using AMOS Graphics 23. Alongside EFA, conducting CFA is vital as it confirms the first order and second order factor (Flora & Flake, 2017). It is better to have separately collected data sets for EFA and CFA in two different time lags (Fokkema & Greiff, 2017; Memon et al., 2017). Hence, for the current study, separate data was collected for CFA. In CFA through AMOS Graphics 23, analysis of data confirmed a four-factor structure of a new intimate co-creation scale.

Data normality was observed through skewness and kurtosis. No real issue of univariate normality was found as more than 80 % CR values were in the range of + 2 to - 2 (Bai & Ng, 2005; Mardia, 1970). First of all, the 18 items scale obtained from EFA was coded for a measurement model in AMOS 23. Criterion was to have factor loadings > 0.5, assessment of model fit, model re-specification to improve model fit indices and finding reliability and validity. Figure 2 below shows the coded items with standardized estimates for the measurement model. RMSEA value was little high than acceptable range in the measurement model as it should be below 0.08. Other statistics were (χ2/df = 2.054, CFI = .935, IFI = .935, TLI = .922, RMSEA = .080). Hence, post hoc modifications through model re--specification helped to achieve a greater model fit in the measurement model (χ2/df = 1.75, CFI = 0.964, IFI = 0.965, TLI = 0.952, RMSEA = 0.068). Hence, final solution of the measurement model achieved the required values (Hu, & Bentler, 1999; Fornell & Larcker, 1981; Hair et al., 2010; Hulin, Netemeyer & Cudeck, 2001).

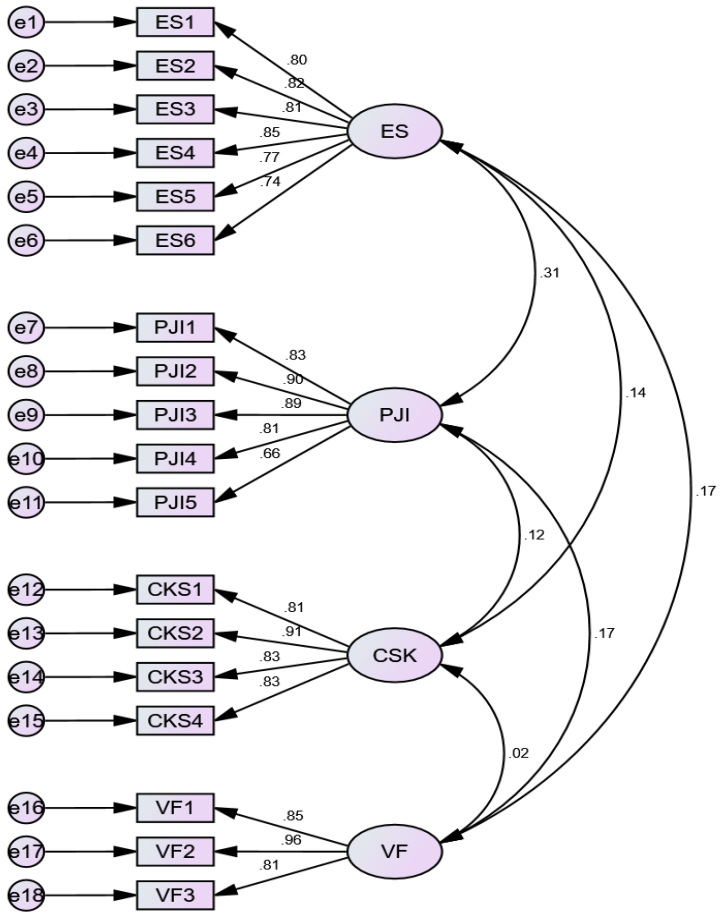

Figure.3: Measurement model with coded items having standardized estimates – Source: Author's own elaboration

Note: *ES = Effective socialization, PJI = Perception of joint innovation, CSK = Creative knowledge sharing, VF = Value formation*

In the above a model as shown in figure 2, modification indices were observed for improving the model fit and error terms with high covariance values were correlated to improve the model fit. This helped in model improvement as a post hoc measure. In two dimensions, error terms were correlated. Within the estimate matrices, standardized residual covariance values were also observed. Items with frequent values greater than 0.4 were considered as potential candidates for deletion (Gaskin, 2016). Two items were removed from the dimension of "creative knowledge sharing', one from "perception of joint innovation", and one from "effective socialization". This significantly improved the model fit of measurement model ($\chi 2/df$ = 1.75, CFI = 0.964, IFI = 0.965, TLI = 0.952, RMSEA = 0.068). Figure 3 elaborates the measurement model with model re-specification.

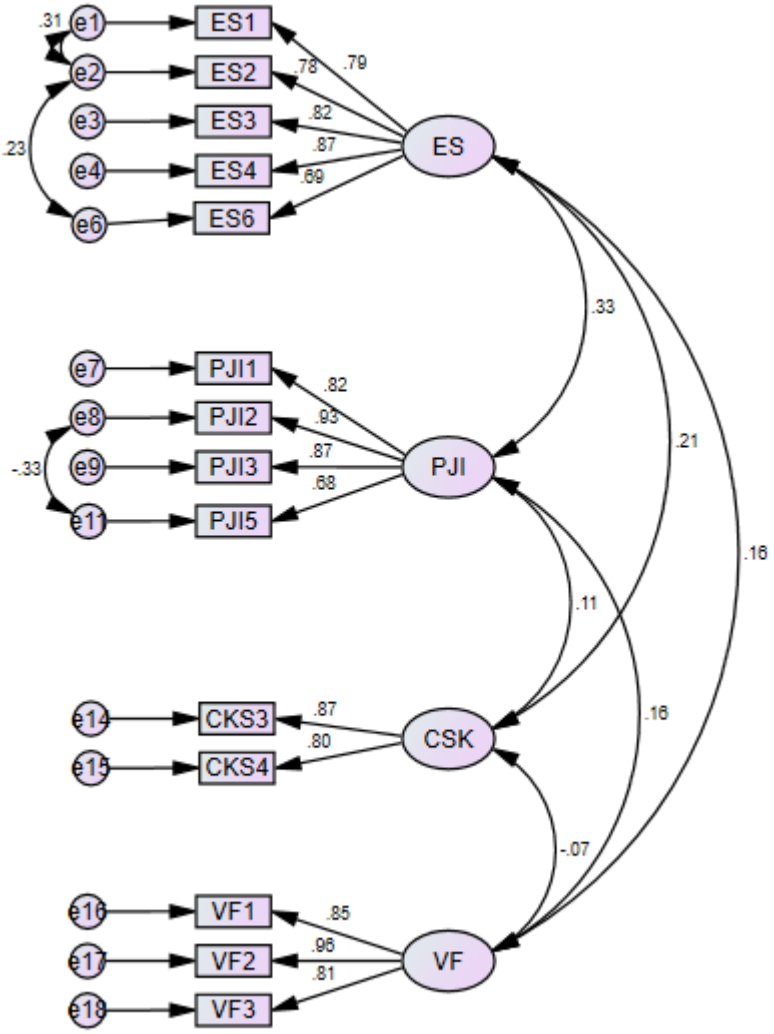

Figure.4: First order factor with complete model fit
Source: Author's own elaboration

Note: ES = Effective socialization, PJI = Perception of joint innovation, CSK = Creative knowledge sharing, VF = Value formation

Figure.3 shows the first order factor analysis obtained using AMOS 23. Kline (2015) stated that a minimum criterion for reporting model fit indices for CFA includes Chi Square, RMSEA, CFI and SRMR. However, reporting extra values of measurement indices is also useful. P value for the default model was significant at < 0.05. The value was .000. However, it often comes

significant as it is a value that is sensitive to sample size. Measuring reliability and validity is important in CFA. However, instead of Cronbach Alpha values, measurement of reliability in CFA happens through construct reliability while validity in CFA is measured through convergent and discriminant validity. Convergent validity explains how the items better converge on a dimension and discriminant validity examines whether the dimensions are significantly different from each other or not (Sarmento & Costa, 2019).

Construct reliability (CR) value should be greater than 0.6 (Hu & Bentler, 1999; Hulin, Netemeyer & Cudeck, 2001). All four dimensions had CR values of greater than 0.6 as shown in the second column of the table 7. For convergent validity, AVE values should be greater than 0.5. In the current study, AVE values for all the dimensions were more than 0.5 which is acceptable (Fornell & Larcker, 1981; Hu & Bentler, 1999; Hair et al., 2010). For discriminant validity, square root of AVE should be greater than other correlation values in the same row and same column (Fornell & Larcker, 1981; Hu & Bentler, 1999; Hair et al., 2010). For all the four dimensions, square root of AVE for respective dimension is greater than any other value of the square root of AVE in the same column and same row. Therefore, all the four dimensions meet the assumption of discriminant validity. All the factor loadings of re-specified measurement model are above 0.7 which is a good indication for factor loadings. One of the items in CSK was having a factor loading of 1 that was not normal. Therefore, as per the recommendations of Gaskin (2015), regression weight of that dimension was fixed to 1 and the issue was resolved. The new factor loadings for two items of that dimension of "creation knowledge sharing" were 0.80 and 0.87.

After first order factor analysis, a second-order factor analysis was run to observe how the dimensions would load on the respective construct. As per the recommendations of Edwards (2001), for a superordinate construct, a reflective - reflective second-order model was developed for further analysis represented through 14 items scale (Jarvis, Mackenzie, Podsakoff, Mick, & Bearden, 2003). Second-order factor also confirmed a four-factor structure with 14 items for the scale of intimate co-creation (Byrne, 2010). The model fit indices for second-order factor were satisfactory ($\chi 2$ = 1.899, CFI = 0.954, IFI = 0.954, TLI = 0.942, RMSEA = 0.074) (Hu & Bentler, 1999). Dimensions loaded on the construct with good beta values which shows a good amount of variance explained by each dimension. This finally established a 14 items measurement scale on intimate co-creation which is a novel addition to the existing body of knowledge on intimate co-creation as the first-ever measurement scale. Figure 4 shows the second-order factor analysis.

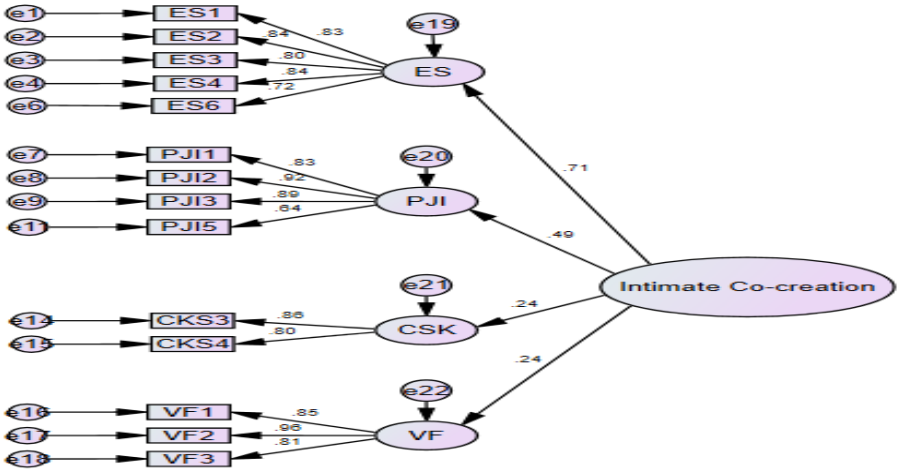

Figure.5. Second-order factor analysis
Source: Author's own elaboration

Note: ES = Effective socialization, PJI = Perception of joint innovation, CSK = Creative knowledge sharing, VF = Value formation

Table 8 shows the factor loadings of 14 items obtained after second-order confirmatory factor analysis. Hence, the final four-dimensional measurement scale on intimate co-creation is comprised of four dimensions and 14 items.

TABLE.5: Values of Construct reliability, Convergent and Discriminant Validity

	CR	AVE	MSV	MaxR(H)	CSK	ES	PJI	VF
CSK	0.85	0.746	0.05	1.027	0.864			
ES	0.894	0.629	0.111	0.903	0.223	0.793		
PJI	0.899	0.693	0.111	0.929	0.128	0.333	0.832	
VF	0.908	0.768	0.026	0.939	0.012	0.159	0.161	0.876

Source: Author's own elaboration

4. Discussion

Using exploratory sequential design for exploring a new phenomenon on intimate co-creation first through a qualitative study and then a comprehensive quantitative study has helped in developing a 14 items' measurement scale with four dimensions (Cresswell, 2013; Carpenter, 2017). Intimate relationship at the workplace is the source of creative idea disclosure and hence for the formation of effective social bonding that results in useful social exchange (Gruenfeld et al. 1996). The current study has addressed this research gap with the underpinning debate on social exchange theory. Intimate co-creation is also a form of social exchange whereby individuals look for psychological safety and mutual exchange (Rouse, 2020; Mannucci & Perry-Smith, 2021). Such exchange of interpersonal relationships happens in the form of exchanging values and rewards at different levels including individual level, team level and organizational level. As per the social exchange theory, the social exchange process typically happens at the dyadic level (Emerson, 1976). Hence, this argument gives further support to the findings of Rouse (2020) that intimate co-creation initiates at the dyadic level and then positively transforms to the group, team, and organizational level.

Four finally extracted dimensions after confirmatory factor analysis are also in conformity with the social exchange theory. Value formation as a dimension elaborates that individuals' creative interactions are the source of value production and exchange. This finding is in line with social exchange theory (Delamater, 2006). The second dimension extracted after confirmatory factor analysis is creative knowledge sharing. It is also a process of social exchange in which individuals exchange creative and tacit knowledge with each other and hence become a source of valuable social exchange for each other. Similarly, the other two dimensions of effective knowledge sharing and perception of joint innovation are also in line with the social exchange theory and workplace norms. Hence, based on these four dimensions, a newly developed measurement scale is a significant contribution to the existing body of knowledge in the management literature.

Future researchers might use this measurement scale for empirical research on intimate co-creation in different contexts and industries. The limitation of the current study was that it was a cross-sectional study; however, two separate datasets were used for EFA and CFA (Memon et al., 2017). Future researchers might want to empirically test the phenomenon of intimate co-creation with the help of a longitudinal study using this measurement scale.

5. Conclusion

This study has developed a new measurement scale on intimate co-creation. No previous measurement scale is available on this new concept in the literature of human resource management. This study is a milestone for future empirical research on intimate co-creation as previously, this concept stood only on conceptual foundations. With the help of this 14 items measurement scale, management scholars may test this concept of intimate co-creation through a deductive theory testing approach in different sectors and industries. In particular, any innovative, creative or shared task, no matter in which industry or sector is it, is worth exploring for intimate co-creation. This would help not just in theoretical contribution with respect to testing existing theories on intimate co-creation but for building a new theory on intimate co-creation via repeated empirical assessments.

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