Sense-Making Of Socio-Materiality Of Technology In Organizations : Using Qualitative Technique Through Social Construction

Neetu Bali, Dr Chandranshu Sinha

Abstract: Technology role as disruptive mediums for organizational change has been widely gaining significance in research. Recent studies have emphasized the ever increasing role of technology in organizations through the ideology of socio material which envisages technology to be intertwined between people and the material through "socio-materiality" of technology .The research tries to understand the technology and social phenomenon's that are aroused in organizations by understanding the inter-dependability .However; so far, researchers have dealt with the subject of Socio Material through theoretical justifications in workplace settings , with hardly any empirical study .To investigate this research we anchor our study on the phenomenon of Socio-material proposed by Wanda J. Orlikowski .We develop an empirical approach to study the phenomenon, through qualitative analysis using mixed research design methodology. Content analysis of the interviews from senior management in IT Industry in India was conducted. Reflection on the narratives, combined literature review , offer a valid and tested analysis method for grounded theory generation. The research contributes by developing relational ontology's between entities (whether humans , technologies and organizational systems) and their getting intertwined with each other. The study contributes to the relational constructs that create inter-dependability between the entities in organizational framework thus blurring the separation of technology (material) with social.

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Index Terms: Disruptive, Change management, Socio-materiality, Grounded Theory, Social Construction, Relational ontology

1. INTRODUCTION

The use of technology in organizations is scaffolding to the extent that it has starting envisaging the entire organizational gamut. Technology use in organization is in formidable. With days the technology usages in organizational frameworks is elucidating deeper connect than just functional existence .So far literature presents two views of technology in organizations one is the objective view which posits that technology dominates the people's behavior to the extent to which technology has been designed to include various features (Kling 2000; Winiecki 2004).The subjectivist view presents a view which states that people are the sole interpreters of technology, they design systems to get the things to be done the way they intend to by using technology (e.g., Cecez-Kecmanovic et al. 1999; Zuboff 1988) . However these views represent the ends of the two extremes. A mediating balance needs to moderate the situation to understanding technology and its affordance in organizational frameworks .Thus an integrative approach was proposed by Orlikowski and Scott has been adopted for the study .

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This integrative perspective called the socio-material view of technology, which "posits the entangled relations between humans and technologies as performed, that is, not pre-given or fixed but enacted in practice" (Orlikowski and Scott, 2008: 454). According to the theory of sociomateriality there is no dominating role played either by people or technology instead the two are intertwined with each other such that they collaterally create an existence in organizational frameworks. The dependability of the material and social is equivocal and complimenting each other. So far studies based on Sociomateriality of technology in organizations has been on theoretical verbose lacking an empirical approach . There lacks a practice based model that could develop the sociomaterialiy of IT and organizational frameworks .Thus the study intends to overcome this limitation in the study so far. Also, Sociomateriality is a very recent and a nascent ideology in the study of technology in organizations, (Orlikowski & Scott 2008; Johri 2011; Leonardi 2012). As Orlikowski and Scott (2008, p. 456; 2013, p. 79) point out, « sociomateriality is in its infancy » and « in the early stage of development », therefore the study tries to further the sociomaterial lens through a rigorous qualitative analysis conducted in the study. This research is guided by qualitative data analysis for understanding Sociomateriality of technology in organizational practices. The research explores through the grounded theory study the clarity on the sociomaterial existence of technology in organizations. The grounded theory approach to the study helped the research to explore potentialities of the study from diverse outlooks specifically reflecting in to understanding the use of technology not just an instance but continuous use in day to day activities of people in. This research paper will first outline sociomateriality and its applicability in understanding technology and organizational frameworks. Thereafter grounded theory research design for deeply exploring the "sociomateriality of technology in organizations " will be described and explored. Charmaz (2006) version of grounded theory is adopted here as it most closely aligns with a design approach to research enquiry incorporating pragmatism, symbolic interactions, and an interpretive view of research. The research primarily tries to

"creatively create" a design using mixed research methodology using social construction and N-Vivo analysis for understanding the narratives conducted from twenty senior managers in IT industry in India .An attempt has been made to rigorously and creatively use the N-Vivo and Social Construction to interpret and analyze the data . The study would then be followed by development of constructs that interplay with technology, organizations and people so that the connecting variables can be studied. In depth and insightful understanding of narratives would help to develop a rational understanding of the grounded theory approach .A model have been proposed that would conceptualize the three entities namely technology, organizations and people and their sociomaterial existence.

2 LITERATURE REVIEW

The research develops on the sociomateriality lens of technology in organizations. Sociomateriality however saw its genesis in the Giddens Structuration Theory , thus we posit the structuration theory firstly. It was the structuration theory which provided an integrative view of technology, deviating from the existing objectivist and subjectivist view.

2.1 Gidden's Structuration Theory

Giddens' structurationist theory (1979, 1984, and 1987) offers a collaborative view of technology in organizations. According to it, technology role is a mediating moderator in connecting to the human realms and the institutional properties of the organization. Orlikowski (1992) thereafter further developed on the Giddens' theory, to consider the sociomaterial lens of technology in organizations. Orlikowski (1992) introduced the "interpretive flexibility" in Information System role in organizations. This actually meant, that social and the material (technology) adapt according to the requirements of the hour. That is the relationship is recursive, and the tools, actors and structures continuously keep adapting with each other. Giddens and Orlikowski consider human action as the main element contributing to sense-making about information systems. According to them human are the actors that control the flexibility or the rigidity that the system can be given to further construct meaning in organizational environment.

2.1.1 Sociomateriality An overview:

Sociomateriality originates from studies such as Callon, latour's,Barad works on Actor Netwrok Theory (ANT) and Giddens Structuration Theory. Slowly with these sociology theories, the technology presence in organizations soon can to be understood, which was earlier non extant or considered un important. Works in these field if IS was later continued with (Orlikowski & Scott 2008; Johri 2011; Leonardi 2012.As Leonardi (2012, p. 27) notes, "the vast majority of studies of technology use in organizations never even described the technology that was under study", emphasizing the social and paying scant attention to the material. It was researchers like Orlikowski or Leonardi who brought in to consideration the impactful role played by technology that was affecting the social and institutional structuration of organizations .However still there is lot of scope for further investigation in to the research in Information System that could result in remarkable organizational interventions into organizations. On one hand, sociomateriality foundations have been developed by Orlikowski (2007, 2010), Orlikowski and Scott (2008), Scott and Orlikowski (2009, 2013) whose theoretical foundation is agential realism. On the other hand, sociomateriality in IS studies has been structured by Leonardi's writings (2008, 2010, 2011, 2013a, 2013b) and Leonardi and Barley (2008, 2010) who rely on critical realism. With the advent of Industrial revolution 4.0 with disruptive technologies , technology play a central and critical role in its presence in organizational frameworks.—"those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software" (Orlikowski and Iacono, 2001: 121)—in organizational processes, including knowledge sharing, strategizing, and performing everyday work that allows organizations to fulfill their role in the market and earn profits. According to "Socio-materiality" the people and technologies are constitutively entangled and, to understand the role of technology, we need to understand the entanglements. Socio-materiality emphasizes the importance of material properties of artifacts which could be computers , biometrics, printers, internet modems and other technical collaborative tools that are continuously interacting with the social / people of the organizations. Sociomateriality believes that technology and social are not distinct or separated they are inseparable. Thus the study of the relational aspect of technology and social needs to be ascertained which is called relational ontology. It is the relational ontology which eventually results into performitivity between the social and material. Thus, Orlikowski and Scott proposed sociomaterialty through "entanglements" however opposing to the view of entanglements , Leonardi proposed "imbrications", using tiles and imbrex as an example to picture relation between human and material agency (Leonardi 2011, 2013). The latter clearly showing separation between the two agencies. Imbrications as a notion in context with sociomateriality tends to picture human and material agency as separate and distinct entities, however, still are interdependent, that means influencing each other (Leonardi 2011). To sum up the conflicting ideologies both seem to be playing vocabulary games with terms imbrications – indicates separateness and entwining and entanglements meaning inseparability.

3 RESEARCH OBJECTIVE

- To study the social and material (technology) antecedents that entwine the social and the material (sociomateriality) of technology in organizations.
- To explore the understanding of sociomateriality of technology to design organizational frameworks that supports the theory of sociomateriality.

4 RESEARCH DESIGN

Since the focus of our study is to understand the way in which technology embodies in to the organizational and social structures of an organization we adopted the grounded theory design. Glaser and Strauss initially conceived the method in 1967. Charmaz (2006), having learned from both Glaser and Strauss in California, wrote her own interpretation in 2006. Charmaz version of grounded theory is adopted here as it most closely aligns with a design approach to research enquiry incorporating pragmatism (foregrounding practice as a

test bed for theory; Dalsgaard, 2014), symbolic interactions, and an interpretive view of research.

4.1.1 Data Collection:

As our study consisted of not just technology as an instance of use of organizations but a continuous medium of interaction with work, systems, procedures we needed to adopt a more flexible ,approachable ,interpretative, recursive ,open and interactional way of understanding in to the views of the respondents .In the study a questionnaire was designed which was administered through interviews and focus groups which last for 60-90 minutes each to engage multiple perspectives into sense-making of the narratives of the respondents. The respondent sample included 32% women and 68% men. The profile of the respondents as per Table below.:

***Table I**: Descriptive of Sample*

Company	Table 1. IT Users in the Organization	No of years of exp
A	Chief Technical Officer	23
C	Senior Consultant	16
B	Consultant	15
C	Marketing Head-North	13
A	Executive-HR	12
C	Consultant	12
A	Executive-Marketing	10
A	Academic Counselor-IT	9
B	Senior Consultant IT	9
B	Administration Head	9
C	Sales Officer	8
A	Senior Manager	7
A	Manager Sales	7
C	Academic Lead	7
B	Manager sales	6
B	Consultant	5
C	Training and Development Officer	5
B	Executive HR	3
A	Management Trainee	1
B	Management Trainee	1

4.1.2 Research Design for Qualitative Analysis using Constructivist Grounded Theory:

The literature review helped to define and identify variables that interplay technology and organizations. Basis these variables a questionnaire was developed which were then administered to employees from 3 top MNC's in India in the IT Industry. While selecting the respondents it was important to involve three sets of users of technology in organization namely Technology Designers which is the strategic senior management , Technology Developers which are the IT team that develops with functional experts and the Technology Users who are the final users of technology in organizations. The transcripts of the narratives collected from 20 respondents as discussed above from IT companies were then transcribed from audio for some respondents to written texts.

4.1.3 Research Methodology:

The 20 interviews were tape recorded and transcribed into transcripts which were then coded . In our study we have adopted grounded theory research design which is remodeled using a constructionist perspective. Grounded theory as detailed above tries to explore the inferences by considering an open and multiple perspective to knowledge of discovery through the course of investigation. Social construction is the way to explore, interpret, iterate and discover the process of outcomes.

4.1.3.1 Instrument:

A questionnaire was designed to interview the respondents based on the rigorous literature review. The constructs/measures identified were then constructed in to a semi structured questionnaire. The twenty respondents were administered the questions with interview based technique. The interviews lasted for 60-90 minutes each. The interviews recorded were then coded . The interpretation of the narratives was conducted using the Social construction and the Vivo Analysis method

Social construction as explained by Berger and Luckmann (1991) that conversation is the most important means of maintaining, modifying and reconstructing subjective reality. Thus by understanding the transcripts through conversations determine the social ,emotional ,physical, past, present associations about the subject of discussion like in study is the use of technology in organizational frameworks .Thus the researcher constructs an understanding through various perspectives of understandings of the narrations and not limited to words as spoken.

5 ANALYSIS AND RESULTS

The transcripts were analyzed through qualitative research technique namely Social construction . However the strength of social construction itself levels a critical view as it is accused of being denying direct perception of reality, as a lot of interpretation is created at the researchers end.

As seen in the Fig. 1 the three stages namely Open, Selective/Focused and Theoretical Coding have been detailed as conducted for the current research.

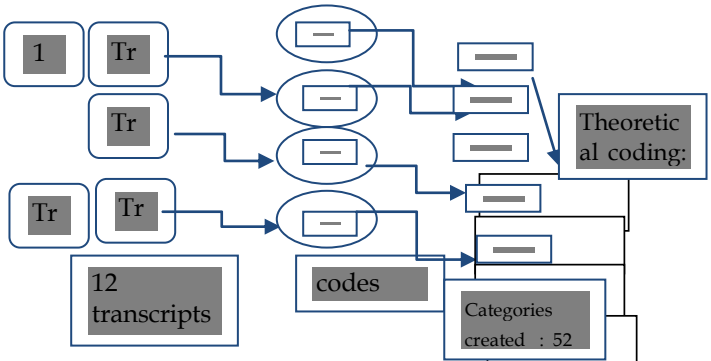


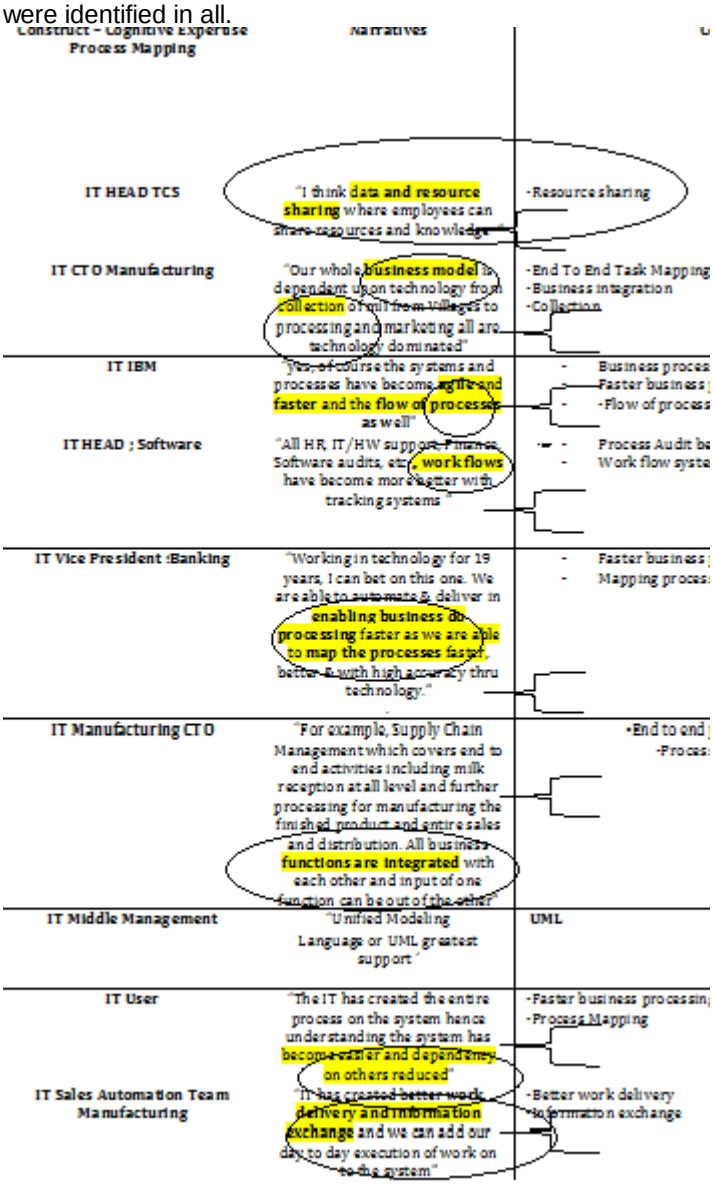
***Fig 1:** Illustration of Coding Process for Themes using social construction*

.1 Analysis and Findings using Social Construction:

A thematic analysis began with data reduction. The qualitative coding (Richards 2005) followed a set of principles and three steps: (1) descriptive coding, or storing information that describes the case; (2) topic coding, which allocates passages to topics; and (3) analytical coding, which defines and interprets the meaning of the extracts in their context.

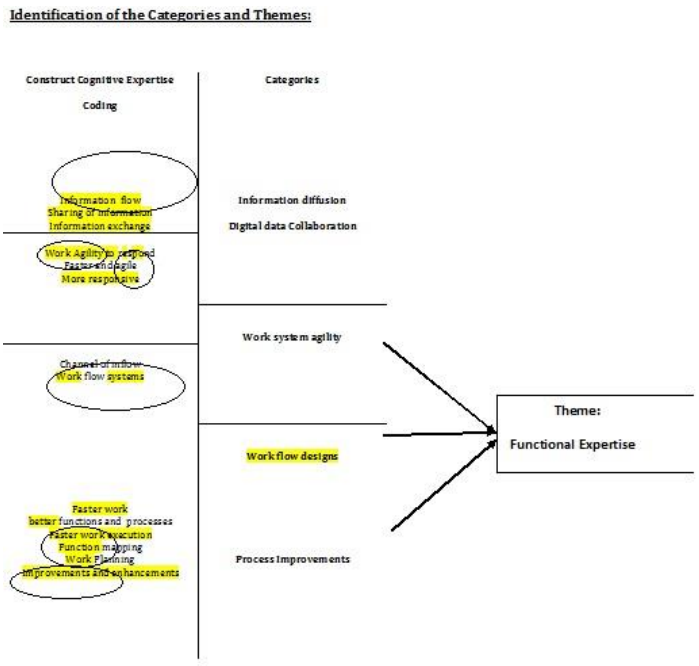
5.1.1 Phase 1: Open Coding of the Transcripts:

Open coding is the phase when each line of transcribed interview text is coded line by line (Urquhart, 2013). This is a very critical stage for coding as the emergent ideas or words need to be saturated to involve maximum understanding of the narratives. To identify the codes line by line analysis of the transcripts was conducted. Repetitive ideas , words, feelings and thoughts were looked at for identifying the dominant phrases . Paper and pencil technique of highlighting, making notes was adopted. In the study adopted more than 431 codes were identified in all.



5.1.2 Phase 2 : *Selective Coding of the Transcripts*

Once in the Phase 1 we had saturated the listing of all the codes, the next stage is of Selective / Focused coding .In general, the terms categories and constructs are interchangeable across the grounded theory methods (Birks & Mills, 2011; Urquhart, 2013). The codes as identified in the Phase 1 , many are complete as a concept in itself and some are to be arranged and combined with other codes in order to create a meaningful construct . This process is aided with the literature review understandings of the researcher at times. In selective coding, we tried to identify certain codes that could be grouped to create a meaningful category which was otherwise absent in stage 1 of coding. As a result fewer Constructs/Categories emerged as from Stage 1.



5.1.3 Phase 3 : *Theoretical Coding of the Transcripts Part 1:*

After the stage 2 is completed the resultant was certain grouped units of categories/constructs which were repetitive and some which were unique. The 3rd stage is conducted in two parts. In the first part there may be some selective codes that are emerging more frequently than the others called the Common Constructs which are identified. Interesting to note at this stage is that there are some constructs that are Unique Constructs that have emerged from the narratives which are not existent in the literature review so far which are of important in the study.

5.1.3.1 Phase 3 : *Theoretical Coding of the Transcripts (Identification and Integration of Core Categories):*

The third part of the theoretical coding was very critical as it involved analyzing the identified categories into patterns. The process involved the process of analyzing the categories and trying to relate the emerging constructs/categories with understood meanings captured during the narratives .This

stage involved identifying key patterns of categories through understanding the codes with a reconstruction of the experiences, knowledge and meanings derived from mutual relationality /participatory knowing of the coded units. linked to sociomateriality and technology use in organizations were constructed.

We conducted the narratives on interview questions as guided by the following themes: in Fig 2.

Themes	Objectives
Information mapping	1. Understand the technology influence on the information processing, absorption and application in business processes.
Culture , leadership ,social learning	2. To measure social developments in organizations with technology use. 3. To understand technology role in culture, organizational learning and connectivity.
Organizational structure	4. To study the role of technology in designing organizational frameworks like departmentalization, reporting, that is structuration.
Governance and Surveillance	5. To study the ethical and privacy factors related to technology assisted cameras etc.

Fig 2 *Main Themes discussed in the Narratives*

Findings from Social Construction from the Narratives:
Social construction has its origin from sociology , which attempts to understand things the way they are, i.e. reality in itself rather than past beliefs and thoughts . The postings and colored pen approach to identify significant thoughts and ideas were created . Common ideas and meanings were then grouped into common constructs which were then grouped under common themes. The process was integrative and rigorous .The resultant constructs and measures were identified as shown in Fig3.

coding	categories	Theme
Information flow	Information sharing end exchange	Information mapping and processing
Sharing of information		
Information exchange	Digital data Collaboration	
Work Agility to respond	Work system agility	
Faster and agile		
More responsive		
Channel of inflow	Work flow designs	
Work flow systems		
Faster work		
better functions & processes		

Fig3 *Table to exhibit Coding for Information Mapping*

Information mapping and processing emerged as a dominant theme in to understand the role played by technology in organizations. The theme encompasses not just information exchange and flow but work system agility, which states the ability of systems to respond to changes .Also work flow designs to mapping the flow of information could be controlled using technology. As one of the users stated" Information sees no boundaries, it crosses all functional departments and makes it available where ever needed".

coding	categories	Theme
Critical phases	Critical Thinking	Creativity and Culture
Critical analysis		
Complex thinking		
More project engagements	Parallel Engagements	
More flexibility		
Parallel projects		
Performance		
Commitments		

Fig4 *Table to exhibit coding for Culture and creativity*

As seen in Fig 4 Creativity and Culture. According to this critical thinking described as attitude to respond to complex situations and the ability to take multifunctional tasks and projects creates creative approach to work management .Also significant is that technology plays an integral role in creating a culture of performance as timesheets governance, deadlines, and transparent reporting is possible. As stated by one of the respondents

"• I think creativity perspective in a new light, I think creativity is shaped through others, there have to be people to create creativity that is provided by people again, so where is the question of fixed boundaries."

coding	categories	Theme
Social isolation	Social Learning	Social learning and awareness
Knowledge sharing abilities		
Share information		
More learning		
People closely associated	Social Cooperative Systems	
People connectivity		

Digital engagements		
Democratic information		
Greater data access		
More involvement	Social Awareness	
Better awareness		
Know how about company		

Fig5 *Table to exhibit Coding for Social learning and awareness*

Fig5 illustrates the theme social learning and awareness . According to which technology keeps people connected for knowledge sharing . Also people are better informed about company issues with technology as a great broadcaster for information. However it is important to know that technology to some extent is leading to social isolation due to which employees are feeling the gap of personal interactions.

Coding	Categories	Theme
Structural alignment	Departmentalization	organizational structure
Work specialization		
Departmental boundary		
People organizing		
Work division responsibility		
Autonomous agents		
Decision making	Locus of Decision making	
Process control		
Line of control	Formalization	
Power to decide		
Power to amend	Authority/Autonomous	

Fig6: *Table to exhibit Coding for organizational structure*

Technology role for organizational structural enhancements as seen in Fig 6 are also found to be impactful through decision making ability due to better information and however authority seemed to be low as amendments were no longer possible due to authorizations , limiting a role of the user to change information due to privacy issues as shown in Fig6.

Codlings	Categories	Theme
Internal security	IT security framework (internal/external)	Security
Internal security		
Employee tracking	Employee surveillance	
Policing		
Protecting		
Safety and protection	safety	

Fig7: *Table to exhibit Coding for security, surveillance and safety*

Safety and surveillance as in Fig7 was another factor that dominantly exhibited in the analysis. Though at one hand security at workplace was felt with cameras and other surveillance devices however the act of being supervised /controlled was felt by people. As one of the respondents said:
"I feel tracked always, my privacy at work felt in danger which irritated me at times especially when my boss uses it to track my movement".

5 RESULTS AND DISCUSSIONS

After the constructs from discussions through social construction and N-vivo were analyzed the social and technology antecedents became evident that were reflective in both the methods of analysis of the transcripts: The same are defined below.
Results of Social Construction of the social antecedents that interplay with technology :

Critical Thinking: Technology supports an innovative way to creatively redesign systems and procedures as it gives the potential to explore. Also due to information access collateral decisions can be taken faster.
Parallel Engagements: Technology supports multiple skilling like many project engagements due to connectivity and access .
Social Learning: Technology supports learning through collaboration and shared knowledge dissemination.
Social inclusion: It is defined as equal treatment of employee's w.r.t policies and procedures .As one of the transcripts mentioned" I feel I am equal in all respects in organization, thanks to the portal that provides regular job openings and job postings"
Social networking: The resource development due to social connectivity is beyond just work benefits but trust development, mutual respect and respect for each other. Rightly mentioned by one of the narratives as" The network of people in organization goes beyond workplace, even at times of personal crisis"
Culture of execution: Technology sets deadlines , commitments, timesheets, reporting thus creating performance adherence.
Cooperative systems: Sharing of resources physical like printers/fax/meeting room etc and also knowledge and social well being constitutes cooperation building.
Networked leadership: Technology which connects superiors and subordinates continuously creates harmony of work, social and psychological wellness.
Organizational learning: Employees share knowledge through repositories of documents that can be accessed and reprocessed for further developmental purposes.
Digital engagements: Technology in organizations is creating wellness through stress management ,ease , distraction through social chats, Instant messaging , gaming etc.
Social awareness: It describes the awareness about the surroundings through a formal channel of communication like the intranet where employees are informed about all management decisions and areas of importance.
Continuity: Business Continuity is the risk preparedness of organization to handle data losses/data hacking etc.
Information diffusion: This involves the use of technology to embed data and

information into the processes and systems through technology use like ERP etc.

Fig 8 the *themes originated were cognitive expertise, social sustainability, social collaboration and learning, organizational structure and safety, /ethics &surveillance.*

However it was interesting to note that there were certain unique variables which were significant through the rigorous qualitative analysis through narratives coding using social construction. They were novel to the study .Also the study

encompasses a list of thirty eight measures, Fig8 through which technology interacts with the social and organizational dynamics of the organization has been exhibited.

6 CONCLUSION

Technology relevance in today's organization is profound especially in disruptive organizational changes. However considering it in isolation would be a complete misnomer, as technology actually sediments the social and organizational properties requirements in to organizational diffusion. Thus, technology role in organizations would be growing exponentially with advent of machine learning, artificial intelligence, IoT and other prolific advents .However the role technology has played so far from the current research study reveals that technology is an incubator for many social and organizational reforms if channelized through rightful strategic agents of the organization. Certain roles of Chief Technology Officer, Chief Data Officer need to be included in the board room who would be the shapers of the organizations next.

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