

Linking Complexity Leadership Functions to Entrepreneurial Orientation: Evidence from Telecommunication Sector

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Abstract: Entrepreneurial orientation has not been much studied in conjunction with leadership to assess the organizational dynamics. This study aims to identify the interaction between complexity leadership functions and investigating their relationship with entrepreneurial orientation—this research study used survey questionnaire methods to collect cross-sectional quantitative data. To test research hypotheses, a sample of 288 respondents was collected from the telecommunication sector of Pakistan. Analysis extracted 15 fine-grain interactions for all the five complexity leadership functions. Findings indicate a significant relationship between generative leadership, information gathering leadership, information using leadership and entrepreneurial orientation, the partial relationship between administrative leadership and entrepreneurial orientation. However, an insignificant relationship was found between community-building leadership and entrepreneurial orientation because the Telecommunication sector might not focus much on community building compared to other practices of complexity leadership functions. Thus, this study makes a significant contribution to the body of knowledge in the domain of leadership and entrepreneurial leadership. For practitioners, the study highlights fine-grain interactions of complexity leadership functions to further augment entrepreneurial orientation.

Keywords: complexity leadership functions; entrepreneurial orientation; generative leadership; administrative leadership; information gathering leadership; information using leadership; community building leadership

Abstrak: Orientasi kewirausahaan belum banyak diteliti dalam kaitannya dengan kepemimpinan untuk menilai dinamika organisasi. Penelitian ini bertujuan untuk mengidentifikasi interaksi antara kompleksitas fungsi kepemimpinan dan menyelidiki hubungannya dengan orientasi kewirausahaan. Penelitian ini menggunakan metode survei kuesioner untuk mengumpulkan data kuantitatif *cross-sectional*. Untuk menguji hipotesis penelitian, sampel sebanyak 288 responden dikumpulkan dari sektor telekomunikasi di Pakistan. Analisis mengekstrak 15 interaksi untuk kelima fungsi kepemimpinan kompleksitas. Temuan menunjukkan hubungan yang signifikan antara kepemimpinan generatif, kepemimpinan pengumpulan informasi, kepemimpinan informasi menggunakan dan orientasi kewirausahaan, hubungan parsial antara kepemimpinan administrasi dan orientasi kewirausahaan. Namun, hubungan yang tidak signifikan ditemukan antara kepemimpinan pembangunan komunitas dan orientasi kewirausahaan karena sektor telekomunikasi mungkin tidak banyak berfokus pada pembangunan komunitas dibandingkan dengan praktik fungsi kepemimpinan kompleksitas lainnya. Studi ini memberikan kontribusi yang signifikan terhadap tubuh pengetahuan dalam domain kepemimpinan dan kepemimpinan kewirausahaan. Untuk praktisi, studi ini menyoroti interaksi halus dari fungsi kepemimpinan kompleksitas untuk lebih meningkatkan orientasi kewirausahaan.

Kata Kunci: kompleksitas fungsi kepemimpinan; orientasi kewirausahaan; kepemimpinan generatif; kepemimpinan administratif; kepemimpinan pengumpulan informasi; informasi menggunakan kepemimpinan; kepemimpinan pembangunan masyarakat

INTRODUCTION

Entrepreneurial orientation is considered as an organization's strategic position towards entrepreneurship. Entrepreneurial orientation and its role in organizational performance have been studied in the past (Kreiser & Davis, 2010; Rezaei & Ortt, 2018; Su et al., 2011). Entrepreneurship denotes the emergence of the new business or ventures as a complex system (McKelvey, 2004) due to different aspects of startup dynamics based on the new markets and technological advancements (Berger & Kuckertz, 2016). Businesses use this emergence as an enabler to develop new products or services (Akgün et al., 2014). The businesses' landscape keeps changing based on the dynamic environment (Arend & Chen, 2012), leading the businesses to constantly orient their entrepreneurial posture and strategically align themselves to the dynamic market requirements.

Entrepreneurial orientation is a strategic construct that has not been much studied in conjunction with leadership (Khan & Ahmed, 2019; Luu et al., 2019). A few studies related to leadership and entrepreneurial orientation largely reflect on the leaders' abilities, traits, and behaviors instead of organizational dynamics (Cho & Jung, 2014; Chung-Wen, 2008; Luu et al., 2019). However, complexity leadership provides a different lens to assess the organizational dynamics (Mendes et al., 2016). Before we understand this, it is imperative to define complexity leadership.

Uhl-Bien et al. (2007) describe Complexity Leadership Theory (CLT) as the one that seeks to take advantage of the dynamic capabilities of complex adaptive systems (CAS). CLT focuses on identifying and exploring the strategies and behaviors to foster organizational creativity, learning, and adaptability. CAS is a basic unit of analysis in complexity science. It is a neural-like network of interacting and interdependent agents bonded in a dynamic by a common goal, outlook, needs, etc.

Complexity leadership is an enabler of fine-grain interactions that allow the emergence of dynamic organizational systems (Uhl-Bien et al., 2007). Unlike the traditional leadership theories, complexity leadership allows generating an adaptive outcome through the fine-grain interaction between the agents of various hierarchies (Lichtenstein et al., 2006). Complexity leadership has five leadership functions and respective managerial outcomes (Hazy & Uhl-Bien, 2015).

The fine-grain interactions of complexity leadership functions are measured through a scale developed by Hazy and Prottas (2018). However, it has certain limitations; the scale was limited to measure two leadership functions (generative and administrative leadership functions) with 10 fine-grain interactions. Both leadership functions are considered bifurcated system functions. The bifurcated system functions joined the information gathering leadership function. Integrating two leadership functions as one in a bifurcated system creates an issue concerning each leadership function's outcome. As each leadership function contributes to different coarse-grain managerial outcomes, each complexity leadership function's fine-grain interactions need to be identified. Very limited studies have been conducted on complexity leadership functions, and there is a dire need to test complexity leadership functions with various intermediate and organizational constructs (Hazy & Prottas, 2018). To address these research gaps, this study aims to: a) identify fine-grain interactions of five complexity leadership functions; and b) examine the relationship between complexity leadership functions and entrepreneurial orientation.

The aim of this study is significant for businesses, which provides a pathway for managers and leaders to organize the identified fine-grain interactions of complexity leadership functions and create an environment that encourages experimentation, entrepreneurial process, and new product or service development. As businesses are required to adapt rapidly to changing market requirements, the adoption of complexity leadership functions helps manage the challenges of a complex business environment. Furthermore, the fine-grain interactions of complexity leadership functions support adapting to the change and developing the entrepreneurial posture of growing organizations.

The remaining article is organized in the following sequence. The next section explains the literature review and hypotheses development. Following this, the methodology, including the research instrument development process, is discussed. Later, analysis and findings are presented. Finally, the study concludes following with the discussions, implications, limitations, and future research directions.

LITERATURE REVIEW

Entrepreneurial Orientation

Entrepreneurial orientation refers to the processes, practices, and decision-making activities that lead to new market entry (Lumpkin & Dess, 1996). The businesses keep investigating new avenues and opportunities to sustain themselves in the market and survive the competition. On the other hand, the market also keeps on changing constantly. This adaptation of an organization to the changing market environment requires up-to-date information. Therefore, organizations keep on learning to adapt to changing market requirements, enabling them to set a new direction and succeed (Kreiser, 2011). Entrepreneurial orientation may lead the organization towards success by setting the right direction. According to Lumpkin and Dess (1996), the process of entrepreneurial orientation includes (i) innovativeness - to create something new which can disrupt the existing solutions and to bring new developments to the market through the process of experimentation or learning; (ii) proactiveness – an ability to take the initiative to identify an opportunity all the time; (iii) risk-taking - the propensity and ability of an individual to take a chance and ready to face failure; (iv) autonomy – freedom to work and make decisions by thinking freely and coming up with new ideas to resolve problems; and (v) competitive aggressiveness - the ability of an individual to aim for a competitive edge in the market and to lead the business towards success and to take it one step higher.

Complexity Leadership

Complexity leadership is a recognizable pattern of social relations within an organization that uses leadership functions to form a system of action (Hazy & Uhl-Bien, 2015). It is a collection of coordinated activities that affect the organizational environment (Hazy, 2011). Earlier leadership literature focused on the relationships between the leader and the follower (Graen & Uhl-Bien, 1995), which provides an understanding of organizational environment development (Avolio, 2007; Avolio et al., 2009). In complexity leadership, dyadic relationships depend on the interaction's nature, which provides a non-linear and non-intuitive outcome, making the system complex (Allen, 2001; Marion & Uhl-Bien, 2001). Natural attractors like values and behaviors embedded within an organizational system play an important role in such systems. The leader's responsibility is to inculcate the natural attractors in an organizational environment to create bi-directional interactions between the leaders and subordinates (Plsek & Wilson, 2001).

Complexity leadership focuses on day-to-day interactions between hierarchies bounded by the organizational rules and policies (Hazy, 2011). Although enacted locally, the fine-grain interactions are distributed at the organizational level. Organizational level distribution of these fine-grain interactions constitutes the meta-capabilities of leadership (Hazy & Prottas, 2018). Through a non-linear mechanism, the fine-grain interactions generate an outcome also known as a coarse-grain property (Hazy & Uhl-Bien, 2015) which assists in developing an environment within an organization. Based on the environment developed by the fine-grain interactions, an organization exhibits a specific behavior, reinforcing the fine-grain interactions (Hazy, 2011).

The organizational theorists believe that with the emergence of the coarse-grain properties, the organization, as a system, self-organizes itself due to the interdependency of the individuals' behaviors. As a result, the system helps the individuals co-evolve, thereby enforcing the system's structure and processes. This co-evolution of the individuals through interactions within a complex adaptive system and development of the organizational structure and processes produces optimum system performance, which is not necessarily in equilibrium (Surie & Hazy, 2006). Hazy and Uhl-Bien (2015) identified five different leadership functions in a complex system that lead to fine-grain interactions, generating a specific outcome which includes (i) generative leadership function; (ii) administrative leadership function; (iii) community-building leadership function; (iv) information gathering leadership function; and (v) information using leadership function. These leadership functions are discussed further in the next section to develop research hypotheses.

Generative Leadership Function

The generative leader function transforms the thought process, which can find the solution to the problems in a new and unique way. This leads the working force in an organization towards creativity and innovation (Bushe, 2019). Furthermore, the generative leadership function identifies the

opportunities in all the situations, finds possible answers by estimating assumptions, encourages other people to explore subordinates' trusts, and keeps their spirits high (Disch, 2009). The outcomes of generative leadership function are also known as coarse-grain properties, which include entrepreneurial orientation, autonomy, entrepreneurial process, experimentation, new product development, and adaptation (Hazy & Uhl-Bien, 2015).

Administrative Leadership Function

Administrative leadership function involves day-to-day fine-grain interactions which produce the coarse-grain outcome such as role clarity, consistent routines, a clear chain of responsibility, efficiency, and performance through the mechanism of entrainment (Hazy & Uhl-Bien, 2015). The alignment between the members of the organizations is caused by social interactions where the individuals based on the daily interactions tend to harmonize with each other over a period of time (Borrie et al., 2019). The interactions in administrative leadership function allow the division of responsibilities to the other individuals.

Community Building Leadership Function

This function allows the individuals to come closer to each other and behave in an organization as a community. A community can be expressed as a social gathering where every individual understands another individual (Dakiche et al., 2019). Community building leadership function generates managerial outcomes like community structure, trust, intrinsic motivation, citizenship behavior, and community orientation through the mechanism of belongingness and shared identity (Hazy & Uhl-Bien, 2015). In addition, this leadership function enables bonding between the coworkers where each acts as a supporter to another individual. This increases the strength of the relationship between the individuals and allows them to help each other in their daily routines.

Information Gathering Leadership Function

The information-gathering leadership function encourages the individuals to learn from each other based on their daily interactions. Information gathering leadership function through the mechanism of integration and synthesis of distributed information provides the managerial outcomes of exploration of data, listening, and learning culture (Hazy & Uhl-Bien, 2015). Individuals, while interacting with each other, pass on different types of information. Individuals learn either from outside the organization or within the organization (Serrat, 2017). Information is also gathered through personal experiences of individuals' professional lives.

Information Usage Leadership Function

Information using leadership function reinforces the information to decide about the new ways of doing the business by leaving the older methods. This leadership function allows the organization to set a new direction through the fine-grain interactions, which lead to a managerial outcome such as accountability culture, convergence orientation, clear responsibilities, and clear authority through a ratcheting mechanism (Hazy & Uhl-Bien, 2015). Information using leadership function deals with the progress of the organization by focusing on the organizational position.

Hypotheses Development

Generativity is a constant drive towards attaining a goal, and generative leadership function enables the entrepreneurial process as an outcome (Hazy & Uhl-Bien, 2013). Experimentation and new product development are the key outcomes of the generative leadership function. The organizations equipped with such dynamic capabilities allow maneuvering in the ever-changing environment (Hazy, 2011). Organizations tend to work and then rework to convert the creative idea into an innovative product or service under uncertain market conditions (Oldham & Cummings, 1996). To provide an innovative solution, organizations adopt exploitation, which involves exploring current and historical information (Real et al., 2014). The generative leadership function allows the organizations to solve the problems and offer innovative products, processes, or services through exploitation, and entrepreneurial orientation focuses on a new direction to succeed. Therefore, the following is hypothesized:

H₁: Generative leadership function has a significant relation with entrepreneurial orientation.

Organizations set goals to align all the operations based on the vision. Goal-oriented behavior motivates the organizations to keep up entrepreneurial ability (Kuratko et al., 1997) and enhance the organization's sustainability in the market by developing a competitive edge. Individuals within the organization make efforts to meet established goals by introducing new mechanisms or processes. This vertical collaborative work approach allows every individual to concentrate on a common issue (Ensley et al., 2006) where a team can behave entrepreneurially if the team's supervisor possesses entrepreneurial characteristics and encourages the team to behave exploratively and exploitatively (Renko et al., 2015). Defining goals, assigning tasks, and setting performance indicators produce role and task clarity (Northouse, 2014), encourage the individuals to employ innovative thinking, take risks and identify the opportunities proactively. It leads to the following hypothesis:

H₂: Administrative leadership function has a significant relation with entrepreneurial orientation.

Every individual in the organization must be treated with equality. The organization tends to develop a citizenship behavior (Vondey, 2010) if the employees are treated equally (Bahrami et al., 2014), given proper support (Alpkan et al., 2010), provided access to the resources (Johnson et al., 2014), and set the organizational environment in a way that everyone gets the feeling of being part of the community (Serrat, 2017). The community-building practices help the organizations develop intrinsic motivation among employees (Saks, 2011), including empathetic behavior, provision for basic individual needs, support for learning new skills, equality, and a friendly environment. Community building is related to entrepreneurial activities at the corporate level and provides a good orientation towards developing new products, processes, or services (Antoncic & Antoncic, 2011). The following is hypothesis is synthesized:

H₃: Community building leadership function has a significant relation with entrepreneurial orientation.

To compete in the dynamic market and provide maximum value, the organizations remain well informed about their surroundings. Information is the flow of facts that individuals learn through different sources while working in an organization (Beenen et al., 2017). Processing this information and deriving knowledge about the market's dynamism help the organizations to sustain and develop a competitive edge (Andreeva & Kianto, 2012). Sarasvathy et al. (2003) suggest two types of knowledge: a) scientific knowledge contributed by the scientific experts, and b) knowledge accumulated from the information passed on by the individuals at a certain time and place. The latter type of knowledge contributes more towards economic development. The entrepreneurial orientation and learning orientation helps to increase organizational performance (Wang, 2008), which depends on the information passed on by individuals working in the organizations for making decisions (Camps & Luna-Arocas, 2010). Therefore, the relationship between information gathering and entrepreneurial orientation is needed (Lisboa et al., 2011). This discussion leads to the following hypothesis:

H₄: Information gathering leadership function has a significant relation with entrepreneurial orientation.

If an organization wants to discontinue a product line and start a new one, the decision must be taken to call off the resources for the previous product line. To avoid ratcheting behavior and control the progress, the supervisor seizes control and power (Huang et al., 2015) and demands hard work from the subordinates (Puni et al., 2016). The leader provides required resources and makes tough decisions to launch a new product (de Luque et al., 2008). It allows monitoring the progress by looking at the use of resources and rewarding for good work. In the past, the reward system has not contributed significantly to an innovative product or service development (Bass, 1997) as authority and control of an individual reduce interference from others in decision-making and minimize the freedom to speak and share thoughts. However, information using leadership function is not meant to limit the freedom of speech but to monitor the completion of goals and targets, thereby not restraining innovative ideas flowing from low level to the top management (Pourmohammad & Rezai, 2016). Information using function allows organizations to utilize the information that can orient to new directions. The following hypothesis is proposed:

H₅: Information using leadership function has a significant relation with entrepreneurial orientation.

RESEARCH METHODOLOGY

Population and Sampling

The population of this study was the telecommunication sector of Pakistan, and a random sampling technique was employed to collect survey data. An instrument developed from an inductive study consisting of the fine-grain interactions of five complexity leadership functions (Hazy & Uhl-Bien, 2015), was distributed among the individuals working at low-level management, middle-level management, and high-level management in the telecommunication sector. A follow-up procedure was adopted to collect data from the respondents and received a total of 288 responses. The respondents were male (73.3%) males and female (26.7%) working at top-level management (10.1%), middle-level management (44.4%), and low-level management (45.5%). Experience wise, the responses were from the age of fewer than 25 years (19.8%), 26 to 35 years (49.7%), 36 to 45 years (21.9%), 46 to 55 years (8.3%), and 56 to 65 years (0.3%). The telecom industry hires individuals with requisite educational qualifications, and 56.6% of the respondents completed an undergraduate degree, and the remaining respondents completed a graduate degree or higher.

Measures of the Variables

This study adopted 18 measurement items of entrepreneurial orientation on a five-point Likert scale (from 1=Strongly Disagree to 5=Strongly Agree) from Hughes & Morgan (2007). For complexity leadership functions, an instrument consisting of 39 items on five-Point Likert scale (1=Never; 2=Seldom; 3=Half the Time; 4=Usually; 5=Always) was developed by the authors by following a rigorous instrument development process which is explained in the next section adapting 7 items from Hazy & Prottas (2018).

Instrument Development Process

Following Creswell and Creswell (2017), a sequential exploratory strategy was adopted, used when there is little known about the phenomenon. As there is little known about the complexity-leadership functions, the instrument was developed by conducting in-depth interviews. Following the guidelines of Creswell and Clark (2017), in the first phase of the study, in-depth interviews were conducted. The second phase analyzed the qualitative data for the instrument's development. Finally, in the third phase, the instrument was distributed for a pilot study to confirm the validity. The three phases were divided into the following five steps.

Step 1: A total of nine interviews were conducted, and then interviews were stopped as the information being obtained through interviews had reached theoretical saturation. According to Morse (1995), theoretical saturation is considered an adequate method for sampling. The number of interviews conducted was consistent with the recommended sample size (Creswell & Poth, 2017). Snowball sampling was applied to select the respondents for instrument development. The respondents were from the middle-level management and high-level management of the telecommunication organizations. These two tiers were selected based on the individuals' experience and a better understanding of the fine-grain interactions of complexity leadership adopted in the organizations.

Step 2: The responses of the interviews were transcribed. The transcriptions were then coded and analyzed for possible themes (Braun & Clarke, 2006). The respondents' views and themes generated statements for all the five complexity leadership functions (Gillham, 2000). After a careful and thorough review of the statements, an instrument was finalized for content validity.

Step 3: The initial instrument was then passed on for content validity. Two professors who had extensive experience in instrument development and one expert from the industry were engaged for content validity. The changes and suggestions proposed by the panel during the content validity were incorporated to refine the instrument.

Step 4: After the content validity, the instrument was forwarded to four industrial experts for face validity. The instrument was finalized after incorporating the suggestions for face validity. The instrument's measurement scale was finalized after the panel members' input and a detailed study (Amundsen & Martinsen, 2014; Hinkin et al., 1997; Rattray & Jones, 2007). The responses were measured on a 5-point Likert Scale (1=Never; 2=Seldom; 3=Half the Time; 4=Usually; 5=Always).

Table 1. Exploratory Factor Analysis (N=288)

| Items | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|--|----------|----------|----------|----------|----------|
| Even smallest need of the customer is given importance | 0.711 | | | | |
| Resources and time are provided to try new things | 0.831 | | | | |
| New approaches are encouraged | 0.780 | | | | |
| Discussing competitor's products/services | | 0.522 | | | |
| Discussing customer's feedback | | 0.768 | | | |
| Discussing employee's feedback | | 0.849 | | | |
| Achievement of targets is evaluated | | | 0.695 | | |
| Tasks performance is monitored | | | 0.696 | | |
| Key performance indicators are evaluated by supervisor | | | 0.764 | | |
| Job descriptions are defined clearly | | | | 0.604 | |
| Targets are established for everyone | | | | 0.778 | |
| Tasks are assigned to everyone | | | | 0.746 | |
| Everyone is honest with each other | | | | | 0.733 |
| Everyone is respected | | | | | 0.660 |
| Everyone is treated fairly | | | | | 0.734 |
| Eigenvalue | 2.501 | 1.609 | 1.532 | 1.289 | 1.162 |
| Cumulative % of Variance | 16.676 | 27.403 | 37.618 | 46.210 | 53.960 |

Step 5: In the last step, a pre-test was conducted using a pilot study. This step ensured the appropriateness of the content, wording, format, and layout of the questions. A total of 80 responses were collected during the pilot study. Exploratory Factor Analysis (EFA) with Principal Axis Factoring and Promax Rotation was performed to test the developed measurement instrument. Based on EFA findings, the measurement instrument consisting of 18 items was finalized where generative leadership function has three items, administrative leadership function five items, community building leadership three items, information gathering leadership function three items, and information using leadership function four items. The cumulative variance of 55.45% was explained by the refined model in the pilot study. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were performed to observe the appropriateness of exploratory factor analysis. The KMO measure of sampling adequacy resulted in 0.710, and Bartlett's Test of Sphericity resulted in ($\chi^2=560.733$, $df=153$, $p=0.000$). In the pilot study, any factor loading less than 0.4 or factors showing cross-loadings were deleted (Field, 2013). The factor loadings in the pilot study ranged from 0.426 to 0.913. A summary of the pilot study's tests is provided in Appendix A.

RESULTS AND DISCUSSION

To check validity (N=288), Exploratory Factor Analysis (EFA) was performed using Principal Axis Factoring with Promax rotation as an extraction method (Field, 2013). The factors having loadings higher than 0.4 were retained, and heavy cross-loading items were discarded (Field, 2009; Hair et al., 2009). The total cumulative variance explained by the model as a result of EFA was found out to be 53.96%. The factor loadings ranged from 0.519 to 0.850, with significant results of KMO (0.700) and Bartlett's Tests of Sphericity ($\chi^2=1227.269$, $df=105$, $p=0.000$). A total of 15 items were extracted, the summary of which is provided in Table 1. Correlation analysis was performed to check the association between complexity leadership functions and entrepreneurial orientation. The result shows a significant correlation between functions of complexity leadership and entrepreneurial orientation (see Figure 1).

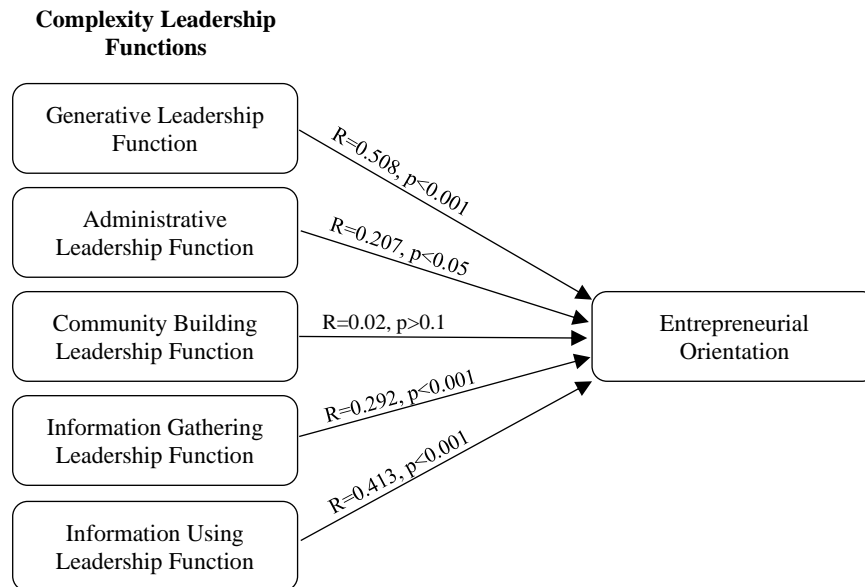


Figure 1. Research Model and Summary of Correlation Analysis

After EFA, convergent and discriminant validity were tested using confirmatory factor analysis (CFA). As entrepreneurial orientation in this study was taken as a higher-order construct, a two-step approach was carried out to validate the construct of entrepreneurial orientation. Once the higher-order construct was validated, a complete CFA with all the constructs was carried out. The results of CFA show that the reliability measures, composite reliability (CR) and maximum reliability (MaxR(H)) of all the constructs are above 0.70, confirming the reliability of constructs and convergent validity (Cudeck et al., 2001; Hair et al., 2009). Furthermore, the average variance extracted (AVE) for all the constructs of this study was above the cut-off value of 0.50 (Hair et al., 2009). The maximum shared variance (MSV) of all the constructs was much below the values of AVE presented in Table 2, suggesting discriminant validity of the constructs (Rim & Kim, 2016).

The model was checked for goodness-of-fit. The goodness-of-fit of all the measures in first-order CFA, second-order CFA, and complete model CFA were found well in range, as shown in Table 3. During CFA, two items of autonomy were dropped to improve the AVE, and proactiveness was also removed due to low AVE.

Table 2. Convergent and Discriminant Validity

| Variables of the Study | CR | MaxR(H) | AVE | MSV |
|---|-------|---------|-------|-------|
| Generative Leadership Function | 0.818 | 0.832 | 0.601 | 0.258 |
| Administrative Leadership Function | 0.749 | 0.760 | 0.501 | 0.097 |
| Community Building Leadership Function | 0.750 | 0.754 | 0.501 | 0.009 |
| Information Gathering Leadership Function | 0.764 | 0.818 | 0.529 | 0.085 |
| Information Using Leadership Function | 0.760 | 0.763 | 0.514 | 0.170 |
| Entrepreneurial Orientation | 0.848 | 0.851 | 0.584 | 0.258 |

Hypotheses Testing

Prior to hypotheses testing, the structural model was tested for the goodness of fit. All the goodness-of-fit measures were found to be well in the range—the details of the goodness-of-fit of the structural models. After testing the structural model's goodness-of-fit, the significance of relationships mentioned in the hypotheses was evaluated. Generative leadership function was found out to have a significant relationship with entrepreneurial orientation supporting 1st hypothesis ($p=0.000$, $t\text{-value}=5.338$, $Estimate=0.704$). Administrative leadership was found out to have insignificant relationship with entrepreneurial orientation ($p=0.411$, $t\text{-value}=0.822$, $Estimate=0.092$). The relationship appears to be insignificant, but administrative leadership has a significant positive correlation with entrepreneurial orientation. Therefore, Hypothesis 2 is partially supported.

Table 3. Goodness-of-Fit of Measurement Model

| Measure | Threshold | Estimates | | | |
|---------|-----------------|------------------|-------------------|----------------------------|------------------|
| | | First-Order (EO) | Second-Order (EO) | Complete Measurement Model | Structural Model |
| CMIN/DF | Between 1 and 3 | 1.122 | 1.122 | 1.152 | 1.071 |
| CFI | >0.95 | 0.995 | 0.996 | 0.979 | 0.991 |
| TLI | >0.90 | 0.993 | 0.995 | 0.976 | 0.990 |
| GFI | >0.90 | 0.970 | 0.970 | 0.911 | 0.922 |
| AGFI | >0.80 | 0.951 | 0.953 | 0.891 | 0.905 |
| SRMR | <0.08 | 0.036 | 0.037 | 0.047 | 0.066 |
| RMSEA | <0.06 | 0.021 | 0.018 | 0.023 | 0.016 |

Community building leadership function was found out to have an insignificant relationship with entrepreneurial orientation ($p=0.420$, $t\text{-value}=-0.807$, $Estimate=-0.091$), which might be due to the limited focus of the telecommunication sector towards community building; therefore, 3rd hypothesis was not supported. Information gathering leadership function and information using leadership function were found out to have a significant relationship with entrepreneurial orientation which support 4th and 5th hypotheses ($p=0.000$, $t\text{-value}=3.557$, $Estimate=0.423$) and ($p=0.000$, $t\text{-value}=4.278$, $Estimate=0.555$). The effect of complexity leadership functions on each dimension of the entrepreneurial orientation was noted as, $R^2=0.23$ for innovativeness, $R^2=0.26$ for competitive aggressiveness, $R^2=0.20$ for autonomy, and $R^2=0.14$ for risk-taking. The overall effect size of the complexity leadership functions on the entrepreneurial orientation was found out to be $R^2=0.27$ suggesting that the complexity leadership has an overall effect of 27% on the entrepreneurial orientation. The result of the hypothesis testing is given in Table 4.

The findings of this study suggest that the relationship of generative leadership function with entrepreneurial orientation remains consistent. Earlier studies have shown that generative leadership leads to new ideas (Disch, 2009). It encourages a new way of thinking that involves exploration and experimentation (London et al., 2012). In agreement with Hazy and Uhl-Bien (2015), the fine-grain interactions in generative leadership function also lead to experimentation and entrepreneurial process as a managerial outcome. Therefore, the findings related to generative leadership function remain aligned to the earlier studies.

Table 4. Results of Hypotheses Testing

| Hypotheses | Relationship | Estimate | t-value | Sig. | Support/Not Supported |
|--------------|--------------|----------|---------|-------|-----------------------|
| Hypothesis 1 | GLF ---> EO | 0.704 | 5.338 | *** | Supported |
| Hypothesis 2 | ALF ---> EO | 0.092 | 0.822 | 0.411 | Partially Supported |
| Hypothesis 3 | CBLF ---> EO | -0.091 | -0.807 | 0.420 | Not Supported |
| Hypothesis 4 | IGLF ---> EO | 0.432 | 3.557 | *** | Supported |
| Hypothesis 5 | IULF ---> EO | 0.555 | 4.278 | *** | Supported |

CBLF = Community Building Leadership Function, GLF = Generative Leadership Function, IULF = Information Using Leadership Function, IGLF = Information Gathering Leadership Function, ALF = Administrative Leadership Function, EO = Entrepreneurial Orientation. (***)P<0.01)

The findings for administrative leadership function in Table 4 show variation concerning the past literature. The leadership focusing on the hierarchal structure and supervision has shown a reverse relationship with innovative solution development (Pieterse et al., 2010). Similarly, leadership behaviors involving a clear chain of responsibilities have also been studied to have a significant relationship with entrepreneurial orientation (Chung-Wen, 2008). It is also observed that task-oriented leadership tends to have an insignificant relationship with entrepreneurial activities (Sazesh & Siadat, 2016). However, on the other hand, entrepreneurs are expected to be task-oriented (Laguía et al., 2019). The variation of results in past literature represents contextual dissimilarity. As the relationship of administrative leadership function with entrepreneurial orientation was not studied earlier, the results of this study show a significant correlation but insignificant impact on entrepreneurial orientation.

The findings reveal the insignificant relationship between the community-building function of complexity leadership and entrepreneurial orientation. One of the reasons for the insignificant relationship is that the telecommunication sector has currently limited focus on such interactions that nurture an entrepreneurial environment and uplift inter-workgroup competition. Therefore, organizations must develop better community-like behavior horizontally and vertically to improve the entrepreneurial initiative. An organizational environment promoting community-like behavior increases employee interaction and bonding with each other. Employee engagement which reflects an organization's bonding and citizenship behavior, encourages entrepreneurial activities (Kassa & Raju, 2015). The past literature suggests that the organizational environment reflecting fairness encourages a conducive environment which amplifies the cooperation in the entrepreneurial initiative in the organization (Covin et al., 2020; De Clercq et al., 2010). However, at the same time, within the organization, competition for better opportunities within the highly structured working groups may decrease the chances of knowledge sharing, damaging the entrepreneurial posture of the organization (Dorn et al., 2016; Tsai, 2002). In the latter case, the organizations may exhibit some form of bonding through respect, fairness, and honesty, but at the same time show a lack of entrepreneurial behavior.

The studies have shown that information has played an important role in innovative developments (Cillo et al., 2010). Organizations seek information from the market, explore the opportunities and initiate a suitable venture accordingly (Parry & Song, 2010). Therefore, it is important for the organizations to continuously gather information to assess the current trajectory of the organization (Sinkula, 1994). Therefore, the results related to the information gathering leadership function in Table 4 remain consistent with the past literature. Once the organizations set their targets, they keep monitoring and evaluating the organization's progress (Jamali et al., 2009). Organizations keep on monitoring any changes occurring internally or externally. Keeping in view any internal or external change, organizations align themselves by changing their action plan accordingly (Ben-Menahem et al., 2013). As the organizations continuously monitor and evaluate their plan of action, they remain well equipped with the process to exhibit entrepreneurial behavior (Cho & Jung, 2014). Therefore, the results of information using leadership function in Table 4 remain aligned with the past literature.

CONCLUSION

The study contributes by extending the existing knowledge on complexity leadership by identifying the fine-grain interaction of complexity leadership functions. Unlike traditional leadership theories such

as leadership traits and leadership behaviors, complexity leadership provides a different lens to assess the organizations. Organizational management needs to practice the outcomes and non-linear effects of fine-grain interactions on their ecosystems. Based on this consideration, identifying fine-grain interactions of each complexity leadership function provides an opportunity to further augment the complexity leadership theory through computational modeling or dynamic system modeling. Findings will guide the researchers in leadership and organizational development domains to clarify how these complexity-leadership functions can develop a balanced system.

This study has practical implications for organizations. Complexity leadership can act as a unifying mechanism to help the managers for developing an organizational environment and improving their performance. The complexity leadership functions discussed in this study are helpful for the business managers, and leaders develop strategies according to the market's changing requirements. The study's findings suggest that the management of telecommunication organizations should adopt and enforce fine-grain interactions to enhance the entrepreneurial posture at the organizational level. As each complexity leadership function's fine-grain interactions have been identified, it will support the business managers and leaders to understand the dynamism and application of these fine-grain interactions of complexity leadership function to develop a better ecosystem for the organization.

Limitations and Future Research Directions

Although this study contributes to both literature and practice, few limitations should be addressed in the future. The focus of this study was on the telecommunication industry, which involved 288 responses for the three tiers of management. It is recommended that the instrument should further be validated in other industries with greater sample sizes. As a validating instrument is a continuous process, validating the instrument developed as a result of this study will improve the instrument. The relationships of complexity leadership functions and entrepreneurial orientation were explored in this study; it is recommended that complexity leadership functions be tested with other intermediate and organizational constructs. Organizational culture refers to the shared assumption, values, and beliefs that show how the organization behaves.

As fine-grain interactions in each complexity leadership function along with their respective outcomes reinforce organizational behavior, a future study may explore the relationship between the complexity leadership functions and various cultures at organization, sector, and region levels to enhance this cross-cultural research and understandings.

This study identifies fine-grain interactions among complexity functions and presents the empirical evidence of complexity leadership functions' relationship with entrepreneurial orientation. The findings of this study indicate that the relationships of generative leadership function, information gathering leadership function, and information using leadership function were found significant with entrepreneurial orientation. On the other hand, administrative leadership function has an insignificant impact on entrepreneurial orientation but significantly correlates with entrepreneurial orientation. In contrast, the community building leadership function was found out to have an insignificant relationship with entrepreneurial orientation. This study contributes to the development and validation of an instrument for measuring five complexity leadership functions consisting of 15 fine-grain interactions.

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Appendix A. Exploratory Factor Analysis of Pilot Study (N=80)

| Items | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|---|----------|----------|----------|----------|----------|
| Job descriptions are defined clearly | 0.577 | | | | |
| Targets are established for everyone | 0.885 | | | | |
| Tasks are assigned to everyone | 0.640 | | | | |
| Key performance indicators for everyone are decided | 0.426 | | | | |
| Team members are insisted to do their assigned work | 0.593 | | | | |
| Even smallest need of the customer is given importance | | 0.598 | | | |
| Resources and time are provided to try new things | | 0.812 | | | |
| New approaches are encouraged | | 0.908 | | | |
| Everyone is honest with each other | | | 0.913 | | |
| Everyone is respected | | | 0.811 | | |
| Everyone is treated fairly | | | 0.529 | | |
| Achievement of targets is evaluated | | | | 0.758 | |
| Tasks performance is monitored | | | | 0.662 | |
| Key performance indicators are evaluated by supervisor | | | | 0.570 | |
| Deadlines to achieve the tasks are regularly reinforced | | | | 0.599 | |
| Discussing competitor's products/services | | | | | 0.811 |
| Discussing customer's feedback | | | | | 0.767 |
| Discussing employee's feedback | | | | | 0.698 |
| Eigenvalue | 4.052 | 2.281 | 1.445 | 1.161 | 1.042 |
| Cumulative % of Variance | 22.513 | 12.672 | 43.213 | 49.662 | 55.450 |

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