How to improve organizational performance during Coronavirus: A serial mediation analysis of organizational learning culture with knowledge creation

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The novel Coronavirus (Covid-19) crisis has dealt a severe blow to the global manufacturing industry. Simultaneously, it has paved the way for organizational learning and revision of its plans. It is, therefore, important to investigate organizational learning based on individual learning, as organizations only learn through individual learners. Based on the theories of action and dynamic theory of organizational knowledge creation (KC), this study proposes a serial mediation model where KC underlying mechanisms through organizational learning culture (OLC) such as acquisition of information (AOI), interpretation of information (IOI), behavioral and cognitive changes (BCC) have facilitated organizational performance (OP) during Covid-19. Data have been collected from 610 randomly selected employees in the manufacturing firms of Pakistan. To test the study hypotheses, we used SPSS macro PROCESS (Model-6 with three mediators). The study results suggest the serial mediation effect of IOI, BCC, and KC on the AOI–OP relationships under single-, double-, and triple-loop learning viewpoints.

KEYWORDS
Covid-19 crisis, knowledge creation, manufacturing firm, organizational learning culture, organizational performance, theories of action

1 | INTRODUCTION

Pneumonia of unknown origin was identified in Wuhan and first reported to the WHO Country office in China on December 31, 2019. As it began to rapidly spread in China, the Chinese government sealed its air and land borders. As China is the hub of world trade, China halted all business and locked all air and land traffics at once. Additionally, the Government of the Republic of China stopped all types of trade. Soon after from China, the virus spread across the world and the United nations-WHO declared it a “pandemic” on March 11, 2020. In Pakistan, the first confirmed case of Covid-19 was reported on a 22-year-old male patient in Karachi. According to Junaidi (2020), the tally of Covid-19 confirmed cases had jumped to 125,933, with 2,463 deaths. In terms of Covid-19 cases, overtaking China and Saudi Arabia, placed the country at number 15 worldwide (Sajid, 2020).

COVID-19 pandemic has affected whole swathes of the population and is particularly most susceptible to social groups that include people living in poverty (as they are not able to socially distance), older individuals, persons with disabilities, and in the case of western nations, people from ethnic minorities. Across the world, firms encountered difficulties in learning from the Covid-19 crisis. As the Coronavirus presents new challenges, it has necessitated organizations to learn rapidly. A successful organization is one that is capable of evolving and continuing to develop new ways of functioning (Wahda, 2017). The proposed learning process should form a culture within an organization, the stability of the learning process reflects
the individuals’ activities and initiatives (Wahda, 2017). When the learning initiatives become a strong culture, organizational KC capability is enhanced, which, in turn, increases the overall performance (Wang, Su, & Yang, 2011). Malik et al., (2011) also explained the same thing, in these words, “a Good Learning Culture will not only help employees to show a high level of performance but also keep those good employees in the organization” (p. 851) organizational culture is referred as OLC.

Learning from the crisis is a difficult and complex task. Numerous studies have considered the negative effect of the crisis on organizations (Marinova & Aniduza, 2020; Yu, Sengul, & Lester, 2008), but very few studies have investigated how firms can confront these challenges and learn from the crisis. Concurrently, a firm that vigorously compacts with an unstable atmosphere should not only create information and knowledge, but also process the information well. For example, the effect of the COVID-19 pandemic was felt across countries, cultures, and societies, and also is seen in the workplaces. Successful organizations are those that adjust to the changing environment and continue to boom and flourish despite external factors. Concomitantly, Koenen, Dochy, and Berghmans (2015) argue that “a competence-based institution should function as a learning organization that is constantly evolving in response to an ever-changing and increasingly complex professional practice”.

A systematic analysis of the literature indicates that while there has been some evidence of the value and modes of organizational KC (Nonaka, 1994; Nonaka & Takeuchi, 1995), there is a notable deficiency of empirical research studies (cf. Grigoriou & Rothearmel, 2017; Jiang, Wang, & Jiang, 2019; McFadyen, Semadeni, & Cannella Jr, 2009). Specifically, more empirical research has been required to explore what factors at the firm level would impede or drive organizational KC during crisis (e.g., Covid-19). Studies have proposed that organizations may use the OL process to generate the new knowledge (e.g., Castaneda, Manrique, & Cuellar, 2018; McHugh, Groves, & Alker, 1998; Vâtămanescu, Cegarra-Navarro, Andrei, Dincă, & Alexandru, 2020; Vatamânescu & Pinzaru, 2018; Wahda, 2017). In addition, Nonaka (1994) investigated the organization in terms of its capability to process and design the information comprises an essential technique for interpreting certain portions of organizational activities. During crisis (e.g., Covid-19) handling, organizations must process and apply huge amounts of new data in a timely manner. They need to develop processes that enable them to accomplish goals efficiently (Antonacopoulou & Sheaffer, 2014). According to Dodgson (1993), OL exceeds the sum of individual learning components. In addition, Pun and Nathai-Balkissoon (2011) investigated that OL engages “single-loop learning”, which is more fault modification incremental or oriented, “double-loop learning” is more inventive in its environment, and “triple-loop learning” is all the way through which organizations learn to gain knowledge. According to Dixon (1992) and Huber (1991), OL is based on individual learning that contributes to OP. Along these lines, the study of OL and KC is “pursued as independent themes in research (...) and the links between them tend to be forgotten (...) because it is hard to reconcile fundamental assumptions about knowledge, information, environment and learning” (Lyles, 2014, pp. 132–133).

Over time, organizations continue to improve their learning abilities in an environment marked by dramatic shifts and elevated rates of rivalry. Similarly, top managers seek to build an environment that is consistent with high levels of creativity, innovation, and development of novel knowledge in the times of crises. Consequently, the underlying concepts of OLC and KC emerge among others. In line with growing interest on OL and KC during crisis (e.g., Covid-19), this study addresses OLC, which is defined and proposed as a collection of organizational norms and values. Alongside, this research presents and tests a model under Covid-19 crisis. It is vital for OL to have the ability to generate novel knowledge. In these days, successful firms consider those that have the capability to learn and do it quickly. As the Covid-19 pandemic rages worldwide, organizations are testing their crisis management strategies. So, the fundamental purpose of this study is that internal learning constructs as the components of OL are very important when trying to cope with crises. Therefore, the focus of this study is to examine the serially mediating effect of IOI, BCC, and KC on the AOI–OP relationships.

2 | THEORIES AND RESEARCH HYPOTHESES

2.1 | Theories of action (viz., theory-in-use and espoused theory)

In a particular situation, individuals have “mental maps” of the way they act (Argyris & Schon, 1974). This includes how their actions are planned, executed, and reviewed. These mental maps guide the actions of individuals rather than the theoretical assertions (Argyris & Schon, 1974). Moreover, very few people are familiar with the theories or maps they use (Argyris, 1980). Central to Argyris and Schon’s work is the concept of “action theory”. Theory of action is a “mechanism” through which we associate our thoughts with our actions. Along these lines, Argyris and Schon’s (2002) theory of action leads us to consider the depth changes of knowledge. In addition, they divide the theories of action into two parts: (i) Theory-in-use is the “theory of action” implied by our behavior. (ii) Espouse theory, which we espouse to ourselves, which we know about. The difference is made between the two opposing “theories of action”, those, which represent what we do as managers and practitioners, and those in which we espouse our behavior against others.

2.2 | Organizational learning culture during crisis

Numerous research studies have suggested models that assist in crisis management. An organization has to deal with enormous amounts of new data and process it expeditiously under crisis. For these reasons, they need to build the processes that permit them to execute the tasks effectively and in a timely fashion. Furthermore, Huber (1991) said in their study that “organizational learning is a complex process that refers to the development of new knowledge and has the potential to change behavior” (as cited in Skerlarvaj et al., 2007, p. 348). According to Garvin (1993), organizations that have established a
strategic “learning culture” are good at developing, retrieving, and transmitting information, besides modifying ways to reflect novel information and acumen. Huber (1991) and Garvin (1993) described four constructs in OL, AOI, distribution of information and IOI, and organizational memory. In addition, Schwant and Marquardt (2000) developed a model of OL systems, which describes a system of learning as “a system of actions, actors, symbols and processes that enable an organization to transform information into valued knowledge which in turn increases its long-run adaptive capacity” (p. 61). Argyris and Schön (1974, 1978) were among the first to put forward models that expedite OL. They distinguish between “single- and double-loop learning”. Argyris (1991) used an example of the temperature in a room to explain the difference between them: “thermostat that automatically turns on the heat whenever the temperature in a room drops below 68 is a good example of single-loop learning. A thermostat that could ask why am I set to 68? and then explore whether or not some other temperature might economically achieve the goal of heating the room would be engaged in double-loop learning” (Argyris, 1991, p. 1).

This suggests that a “single-loop learning” is often thought of as a learning process involving a higher risk of not considering new factors, while “double-loop learning” process aims to question assumptions and seek new solutions if necessary (Choularton, 2001). As “double-loop learning” occurs only within the organization, it does not fully reflect changes in the external environment. Inspired by Tosey et al., (2012), Argyris and Schön (1974) proposed “triple-loop learning”, and specifically underlined the importance of an “active organizational responses” to change the external environment. In solving various problems, companies often not only take actions based on previous experiences and standard operating procedures (single-loop) or change principles and assumptions, but also can reassess their visions, structures, culture, principles, and even paradigms (triple-loop learning) (Kusters, Batjes, Wigboldus, Brouwers, & Baguma, 2017). Through this technique, companies can search beyond their internal structures of learning. Ultimately, as Kusters et al. (2017) argued, they can develop strategies for responding and adapting to a dynamic external environment (e.g., Covid-19 crisis).

2.3 | Knowledge creation

According to Stalk et al., (1992), efficacious organizations have the ability to learn fast. “Seen from the vantage point of organizational knowledge creation, learning is a daily activity for the organization” (Nonaka, 1994, p. 19). Similarly, it is the capability of a firm to organize and circulate information on their products, services, and systems (Nonaka & Takeuchi, 1995). Effective and consistent KC within a firm is essential for its success (Mousavizadeh, Ryan, Harden, & Windsor, 2015). In addition, Nonaka (1994) describes knowledge as “a multifaceted concept with multi-layered meanings” (as cited in Ode & Ayavoo, 2020, p. 02). In the essence of “dynamic theory of organizational knowledge creation”, Nonaka (1994, p. 12) states “the theory of knowledge creation embraces a continual dialogue between explicit and tacit knowledge which drives the creation of new ideas and concepts”. According to Bratianu and Bejinaru (2019), knowledge is composed of three knowledge forms: rational, emotional, and spiritual. Each form is transformed into another knowledge form, thus creating repetitive and interactive knowledge dynamics (Bratianu, 2015; Bratianu & Bejinaru, 2020). The unity of knowledge can be supported by the organic structure of the brain (e.g., behavioral change). In addition, dynamics of the knowledge is fundamental to the process of learning or unlearning that affects both consumer and organizational behavior.

2.4 | Organizational performance

During these unprecedented times (e.g., Covid-19), operational routines are disrupted. Organizations suffer significant losses, or even demise, because of the damages caused by the crisis (e.g., Cegarra-Navarro & Wensley, 2009; Kahn, Barton, & Fellows, 2013; Wensley & Cegarra-Navarro, 2015). It is impossible for an organization to plan 12 months in advance during the Covid-19 crisis because the reality is changing day by day. Corporate preference and the consistency of decision-taking are central to almost all organizational practices (Scott, 1987). Alongside, OP reflects its capacity to keep its “stakeholders” happy and succeed in the market (Griffin, 2003). The outcomes of an organization’s action/activity are measured by how well an organization has achieved its goals (Ho, 2008). OP involves assessing a company’s performance against its goals. Concomitantly, performance as a behavior or action is related to the goals of the organizations (Borman & Motowidlo, 1993). This study suggests to setting targets and any plans that the organization does must be flexible. According to Gupta and Somers (1996), manufacturing adaptability is one of the most challenging goals for organizations. In addition, Ferdows and De Meyer’s (1990) study (as cited in Kulkarni et al., 2019, p. 01) described that “the cumulative capabilities theory posits that the sequence in which manufacturing capabilities (cost, quality, flexibility, and delivery) are developed is a key determiner of lasting performance improvement”.

2.5 | Direct relationship between OLC (i.e., AOI, IOI, and BCC), KC, and OP

During crises (e.g., Covid-19), great importance is being given to learning and KC by companies. Although much was written on OL, less attention was paid to the KC, which is an important issue. Initially, most OL theories were of the mistaken belief “that knowledge development constitutes learning” (Senge, 1990). Nonaka and Takeuchi (1995) exposed the fallacy of this concept, stated even after several years of study in this area, “a comprehensive view of what constitutes organizational learning has not been developed.” Our knowledge has progressed since it was written, but not much. In this field, there is still a lack of empirical evidence, discussion, and even argument. Approaches to OL can be viewed from many different theoretical viewpoints (Easterby-Smith, 1997), but the way it is implemented will
create a difference. Incrementalists (e.g., Levinthal & March, 1993), with their double-loop learning, can be differentiated from those pursuing more fundamental reform and learning (e.g., Argyris & Schon, 1978). Clearly, both single- and double-loop learning need several levels of AOI and IOI, they both concern variation in cognition and behavior, but the changes and processes of the “double-loop learning” appear to be more insider and much long-term propensity than “single-loop learning”. Moreover, “double-loop learning” needs regular testing with regular information verification and feedback of the problem-solving techniques, whereas “single-loop learning” emphasizes only on resolving abrupt problems without verifying the appropriateness of present techniques. It is the adaptive learning or single-loop learning that is linked to KC in the first place. In addition, adaptive-learning simply follows systems and rules without questioning, while “double-loop learning” questions and changes the rules of an organization (Skhiri, 2017), and triple-loop learning involves “learning about learning” or radical changes in an organization’s purpose and identity. According to Skhiri (2017), double-loop learning is crucial to an organization’s progress, particularly during periods of rapid change (such as in the times of the Covid-19 crisis). Alongside, Dodgson (1993) describes that all three types of OL also depend on where the OL occurs in an organization. All three levels of OL (i.e., Single-, double-, and triple-loop learning) require some level of AOI and IOI, and they all relate to BCC in the organization. Similarly, the quality of BCC is affected positively by the existence of double-loop learning in an environment (Dermol, 2013). Triple-loop learning involves “learning how to learn” or “learning about learning” by reflecting on how we learn, which relates to information acquisition (Liepe & Sakalas, 2008).

According to Skerlavaj, Stemberger, and Dimovski (2007), strong learning culture of an organization places greater emphasis on acquiring tactical, strategic, and operational information, which lead to increased IOI. The results of which could affect BCC (Skerlavaj et al., 2007). Moreover, organizations having a knowledge-based culture invariably perform better in creative and innovative operations (Sandhawalia & Dalcher, 2011). In line with the cultural knowledge, Tseng (2014) argued that (as cited in Imran, Ilyas, & Fatima, 2017) organizations with a high-level KC and technology capabilities are more productive and could outperform other companies, as employees have more capability to provide error-free and effective services to clients (Meihami & Meihami, 2014, as cited in Imran, Ilyas, & Fatima, 2017).

Organizations that have built-up best learning surroundings are better at KC, acquiring of information, and transferring information, adapting behavior to reveal new information and insight (Cegarra-navarro, 2005). Simultaneously, learning has proven valuable for enhancing OP (Chen, Wang, Lin, & Chang, 2018; Choi, 2020; Martínez-Martínez, Navarro, García-Pérez, & Moreno-Ponce, 2019; Rosenberg, 2005). OLC must acquire and interpret the information in order to fully understand its meaning and turn it into knowledge (Garvin, 1993, as cited in Skerlavaj et al., 2007). Similarly, organizations should not forget to implement BCC in order to convert words into action. On this basis, we posed the following hypotheses.

H2: (a) AOI (b) IOI (c) BCC (d) KC will be positively related to OP.

H3: (a) IOI (b) BCC and (c) KC mediate the relation between AOI and OP.

H4: (a) IOI and BCC (b) IOI and KC (c) BCC and KC (d) IOI, BCC, and KC serially mediate the relation between AOI and OP.

3 | METHODOLOGY

3.1 | Research model and measure

This study suggests that, in times of crisis (e.g., Covid-19), OL happens in three discreet ways (e.g., Single-, Double, and Deutero loop learning). Grounded on Theories of action and dynamic theory of organizational KC, this study is dedicated to understanding the underlying

2.6 | Serial mediation effect of IOI, BCC, and KC

Several studies (e.g., Asongu & Tchamyou, 2020; Grimsdottir & Edvardsson, 2018; Iyer, Sharp, & Brush, 2017) have investigated how KC plays a central role in the success and survival of an organization. Calabretta, Gemser, & Wijnberg (2017) subsume the KC process “embedding new ideas, cognitive frames, and manners of thinking in organizations require adaptation (i.e., translation) to the specific practices and socio-cultural context of the target organization” (as cited in Abubakar, Elrehail, Alataliat, & Elci, 2019, p. 6). Along these lines, Kao and Wu (2016) suggested enhancing KC methods, which can lead to improve both economic and noneconomic performance of the firms. Additionally, Dermol (2013), Skerlavaj and Dimovski (2007) suggested the associations between OLC and OP. It also specifies that both economic and noneconomic performances are significantly associated with an organization’s BCC. The researchers investigated that BCC as a basic OL construct that helped improve the OP. The development of OLC is achieved through three sequential stages AOI, IOI, and then BCC (Garvin, 1993; Huber, 1991; Skerlavaj, Song, & Lee, 2010). Organizations that assign great value to OLC must first acquire knowledge and then interpret it in order to better understand its context and consequences. According to Skerlavaj et al., (2007), these three consecutive stages are required to complete the transition from “knowledge in words” to “knowledge in action” in OL. Previous research (e.g., Hernaus, Skerlavaj, & Dimovski, 2008; Skerlavaj & Dimovski, 2007; Zagorske, Dimovski, & Skerlavaj, 2009) suggested significant positive associations between AOI, IOI, and BCC. Conversely, none of these studies identified the direct and indirect correlation between IOI and BCC. This study suggests that IOI is an important stage that mediates the relationship between AOI and BCC. Along these lines, Resource-Based Theory (RBT) claims that if an organization acquires resources and uses them effectively, it can achieve key strategic advantage that can boost OP. Studies by Thompson and Kanweiler (2002) and Kandemir and Hult (2005) investigated the positive effect of BCC on OP. Similarly, numerous studies (e.g., Mehralian, Nazari, & Ghasemzadeh, 2018; Ramirez, Morales, & Rojas, 2011) examined the association between organizational KC and OP. In addition, there are so many perplexing factors that exist between KC and OP, and it is difficult to establish empirical relationships between them. Taking these challenges, this study proposes the following hypotheses:

H3: (a) IOI (b) BCC and (c) KC mediate the relation between AOI and OP.

H4: (a) IOI and BCC (b) IOI and KC (c) BCC and KC (d) IOI, BCC, and KC serially mediate the relation between AOI and OP.
mechanisms between AOI and OP in Pakistani Manufacturing industry under Covid-19 crisis. Specifically, this study assumes that the three mediators, IOL, BCC, and KC, might co-play a serial mediating role between AOI and OP, as shown in Figure 1. This means that AOI effects OP via IOL, BCC, and KC, in a sequential manner. Based on the above principles and literature, the questionnaire items were prepared, 24 items of OLC (i.e., AOI, IOL, & BCC) and 10 items of OP were selected and measured on a five-point Likert-scale taken from the study by Skerlavaj et al. (2010)). The eight items of KC constructs based on “dynamic theory of organizational KC” are measured by five-point Likert-scale, which have been adapted from the studies of Nonaka (1994), Lloria and Moreno-Luzon (2005).

3.2 | Data collection and sampling

This study randomly selected 40 companies in manufacturing industry in Lahore, Faisalabad, and Multan, which had more than 50 employees. In this study, we contacted top-, middle-, and lower-level managers of the companies and asked them to take part in the study. Thirty-two companies agreed to participate in the study. According to Fritz, Taylor, and MacKinnon (2012), and Creedon and Hayes (2015), percentile bootstrap confidence intervals for indirect effects do not show seriously inflated Type-I error even for very small sample sizes of 50 or 100; in particular, bias-corrected bootstrap technique requires at least 500 cases to avoid problematic Type-I error. Therefore, we distributed 610 questionnaires among employees, on average, around 19 questionnaires in each firm. Out of 610 questionnaires, 440 were returned. 425 were selected for the study, and the response rate was 72.13%. Fifteen questionnaires were removed from the study, whose answers were incomplete. The data compilation process lasted for 2 months. The data were collected through a research assistant who was trained and properly briefed before the research questionnaires were distributed. In Pakistan, English is the official language and the preferred medium of instruction in higher education. Henceforth, almost all employees can communicate in English except for manual workers or daily wage earners. Moreover, previous studies conducted in Pakistan and published in the mainstream journals (e.g., Fatima, Raja, Malik, & Jahanzeb, 2020; Qadri, Ghani, & Sheikh, 2020; Raja, Azeem, Haq, & Naseer, 2020) have made it clear that the format of the questionnaire in English is feasible. Subsequently, we did not translate the study questionnaire into Urdu by keeping our sample in mind. A letter containing the purpose of study and statements about the voluntary nature of the respondent was also attached with the questionnaire. Additionally, it assured respondents in strict anonymity of all responses received and did not ask for any information that would reveal the identities of the participants.

4 | DATA ANALYSIS AND FINDING

4.1 | Descriptive statistics

The respondents are top-level employees and organization’s decision makers in the manufacturing sector of Pakistan. The sample consisted of 267 (62.8%) males and 158 (37.2%) females, of which 290 (68.2%) were master degree holders, 91 (21.4%) were graduates, and the remaining had other qualifications like Mphil and PhD. The majority of respondents, 263 (61.9%), were from the age limit of 18–33, 119 (28%) participants were of age between 34 and 49, 34 (8.0%) were from the age limit of 50–65, and 9 (2.1%) respondents were over 65 years of age. Out of 425 respondents, 141 (33.2%) were employed
in textile manufacturing firms, 115 (27.1%) were employed in engineering product category firms, 75 (17.6%) were in Food and Beverage firms, 65 (15.3%) were employed in the pharmaceutical firms, and 29 (15.3%) were from the petroleum group. One hundred and sixty-four (38.6%) of the sampled employees were department heads while 150 (35.3%) were senior executives, 46 (10.8%) were chief executive officers, and the remaining 65 (15.3%) were other managers working in various manufacturing firms of Pakistan.

4.2 Covariates

In this study, we statistically controlled the effect of age, gender, education, manufacturing industry, and designation to ensure that it could not confound the effects of other variables of interest.

4.3 Inferential statistic

4.3.1 Reliability and correlation analysis

Table 1 presents the AVE, MSV, \( \omega \), and \( \alpha \) values of the study constructs. There were significant and positive correlations between AOI and KC \( (r = 0.423, p < .01) \), BCC and IOI \( (r = 0.732, p < .01) \), BCC and OP \( (r = 0.560, p < 0.01) \), BCC and AOI \( (r = 0.409, p < .01) \), and BCC and KC \( (r = 0.692, p < .01) \). In general, there were no unexpected results in the correlation matrix. Moreover, this study uses Cronbach's alpha (\( \alpha \)) and McDonald omega coefficient (\( \omega \)) to calculate the internal-consistency reliability of the items. In this study, we perform the reliability analysis of data via SPSS. According to Nunnally (1978), the value of reliability above 0.7 is considered acceptable. \( \alpha \) and \( \omega \) values of AOI are 0.801 and 0.851 for four items, IOI is 0.944 and 0.945 for eight items, BCC is 0.893 and 0.913 for seven items, KC is 0.888 and 0.898 for six items, and Cronbach's alpha of OP is 0.910 and 0.923 for seven items.

4.3.2 Confirmatory factor analysis

According to Henseler and Schuberth (2020), in confirmatory composite analysis (CCA), the concepts are modeled as composite factors (emergent variables), while in CFA the concepts are modeled as common factors (Latent variables). In addition, CAA assesses the nomological validity of composite factors, and CFA assesses the construct validity of common factors (Henseler, 2017). Therefore, to assess the discriminant and convergent validity of the common factors and to confirm to what extent our model fits the data, this study applied CFA via AMOS. The use of confirmatory factor analysis could be impacted by parameter identification, measurement instruments, the research hypothesis being tested, missing data, multivariate normality, sufficient sample-size requirement, and interpretation of model fit index (Schumacker & Lomax, 1996). According to Truong and McColl (2011) and Hulland (1999), for better results, “factor-loadings should be
greater than 0.5”. Therefore, the study items whose regression weights less than 0.50 were rejected and further not included in the analysis. For example, questions like “Our organization uses clipping service – regular collection of papers and articles to our interest” are dropped from the analysis due to less regression weights. Through CFA, 32 out of 42 items were extracted from the study questionnaire and 10 items were dropped due to factor-loadings less than 0.50 (Hair, Black, Babin, & Anderson, 2010). In addition, confirmatory factor analysis provided various goodness-fit indexes such as $\chi^2/df = 2.97$, “Goodness-of-Fit Index” (GFI) = 0.848, “Root Mean Square Error of Approximation” (RMSEA) = 0.068, “Adjusted Goodness-of-Fit Index” (AGFI) = 0.813, “Comparative Fit Index” (CFI) = 0.916, and Non-normed fit index (NNFI) = 0.903.

### 4.3.3 Discriminant and convergent validity

In this study, factor loadings of all items range from 0.595 to 0.878 are in the adequate range and “Average Variance Extracted (AVE)” is greater than 0.50 for all variables, which means there is no convergent validity issue in this study. In addition, Maximum Shared Variance values (MSV) are lesser than AVE (see Table 1). Furthermore, all diagonal elements are greater than its corresponding off-diagonal covariance matrix elements for adequate discriminant validity, which means the measurement model of the study has no discriminant validity issue.

### 4.3.4 Hypotheses testing

To prove the study’s hypotheses, this study used serial mediation model-6 via SPSS process macro by applying bootstrapping techniques (Hayes, 2013). PROCESS is an observed-variable modeling tool that relies on ordinary least squares (OLS). PROCESS is more reasonable when testing serial or sequential and parallel mediation, since it provides some algorithms that are not implemented in standard statistical packages (e.g., SPSS, SAS). In addition, Hayes and Scharkow’s (2013) describe that “bootstrap confidence intervals constitute a good approach for detecting path coefficients” (as cited in Cepeda-Carrion, Cegarra-Navarro, & Cillo, 2019, p. 81). However, “obtaining bootstrapped confidence intervals for specific indirect effects could be problematic in majority of SEM programs” (Gürlek & Çemberci, 2020, p. 13). For instance, whereas the AMOS provides “bootstrap confidence intervals” for overall indirect effects, it is not...
possible to obtain “bootstrap confidence intervals” for specific indirect effects (Leth-Steensø & Gallitto, 2016). Therefore, process macros are considered a better option for testing the hypothesis in the current study.

In addition, PROCESS macro has been used in various studies recently published in prestigious journals (Palmer, Koenig-Lewis, & Asaad, 2016; Huertas-Valdivia, Llorens-Montes, & Ruiz-Moreno, 2018; Gürlek & Çemberci (2020). Table 2 shows SE, regression coefficients, upper- and lower-bounds of the “confidence interval” of the constructs. $R^2$ is (0.511) explained 51.11% of variance of IOI, (0.459) 45.95% of variance of BCC, (0.722) 72.24% of variance of KC, and $R^2$ is 0.716, which explained the 71.64% of the variance of OP, as shown in Table 2.

**Direct effect**

Table 2 shows AOI has positive significant effect at ($\beta$ = 0.187, SE = 0.04; 95% CI = [0.103, 0.272]), IOI ($\beta$ = 0.571, SE = 0.04; 95% CI = [0.485, 0.657]), KC ($\beta$ = 0.194, SE = 0.05; 95% CI = [0.090, 0.297]) on OP, although the effect of BCC on OP was not significant at ($\beta$ = −0.05, SE = 0.05; 95% CI = [−0.144, 0.044]). Therefore, H$_{1a}$, H$_{1b}$, H$_{1d}$, and H$_{1c}$ were accepted, whereas H$_{1c}$ was rejected. Furthermore, the results illustrate that the direct effect of AOI at ($\beta$ = 0.200, SE = 0.04; 95% CI = [0.135, 0.290]), IOI ($\beta$ = 0.606, SE = 0.04; 95% CI = [0.517, 0.695]), BCC ($\beta$ = 0.546, SE = 0.04; 95% CI = [0.476, 0.616]) has positive significant effect on KC.

**Indirect effect**

Table 2 reveals that the indirect effect of IOI ($\beta$ = 0.478, SE = 0.04; 95% CI = [0.400, 0.567]), and KC ($\beta$ = 0.039, SE = 0.015; 95% CI = [0.015, 0.076]) between AOI and OP were statistically significant. However, the indirect effect via BCC was insignificant ($\beta$ = 0.01, SE = 0.005; 95% CI = [−0.004, 0.017]). Consequently, H$_{2a}$, and H$_{2c}$ were accepted, whereas H$_{2b}$ was rejected.

**Serial/sequential mediation**

Table 2 shows the indirect effect of AOI on OP through the sequential effect of IOI and KC ($\beta$ = −0.03, SE = 0.03; 95% CI = [−0.09, 0.02]) and BCC and KC ($\beta$ = −0.002, SE = 0.01; 95% CI = [−0.02, 0.01]) was insignificant. Therefore, H$_{4b}$, and H$_{4c}$ were accepted, whereas H$_{4a}$ and H$_{4c}$ were rejected.

### 5 | DISCUSSION

The concept of OL in academic research is widely theorized and applied. Despite the growing importance paid to crisis management, it is surprising that very few studies focus on learning conditions in relation to the crisis. Previous studies have shown that organizations in the public sector face significant difficulties learning from crisis (e.g., Borja & Elliott, 2013; Roux-Dufort, 2016). In this research, we studied the factors that drive OL from crisis (i.e., COVID-19). We applied the multiple regression analysis via process macro to test the hypotheses. The principal results of this research are as follows: (i) IOI and KC, respectively, mediate the relationship between AOI and OP and (ii) IOI and KC, IOI, BCC, and KC serially mediate the relationship between AOI and OP. (iii) The suggested hypothetical model of the relationship between AOI, IOI, BCC, KC, and OP has adequate “goodness of fit” test.

The results of “multiple regression analysis” show that all the research hypotheses were accepted, except H$_{1c}$, H$_{3b}$, H$_{3a}$, and H$_{4c}$. The results of hypotheses testing for H1a, H1b, and H1d presented that OLC (i.e., AOI and IOI) and KC have a significant effect on OP. These findings reflect past empirical studies (e.g., Guta, 2018; Hernaus et al., 2008). In addition, the study showed that BCC does not have direct effect on OP (H$_{2b}$) and indirect effect of AOI on OP via BCC (H$_{3b}$), the results are consistent with the findings of Guta (2018), where he found that changes at the behavioral and cognitive levels are not always beneficial or positive. In addition, the findings of the hypotheses testing of the current study for H$_{2a}$ to H$_{2d}$ indicate that OLC (i.e., AOI, IOI, and BCC) has a positive effect on KC in the manufacturing industry of Pakistan during COVID-19 crisis. This result overlaps with findings that indicate organizations use information to develop context, create knowledge, and make decisions during crisis (e.g., Auernhammer & Hall, 2014; Bratianu, 2015; Dermol, 2013; Song & Kolb, 2013). Furthermore, the results of the hypothesis (H$_{4d}$) indicate that the relationship between AOI and OP is serially mediated by IOI, BCC, and KC. The results are in line with the past studies where direct and indirect effects of OLC and KC on OP have been reported under various contexts (Skerlavaj et al., 2007; Song & Kolb, 2013). Additionally, this study did not find the serial mediation effect of IOI and BCC (H$_{4a}$), and BCC and KC (H$_{4d}$) on AOI-OP. These findings are consistent with the results of Garvin (1993) and Huber (1991). Whereas companies stressing OLC must first acquire information, interpret it to fully understand its meaning, and transform it into knowledge. At the same time, organizations must not forget the most important part—to implement BCC and convert the words into actions. Moreover, if companies wish to enhance and maintain performance at the time of crisis, they should have to pay full attention to the variables acquisition and interpretation of the information, as well as behavioral and cognitive changes at the individual levels.

### 6 | PRACTICAL IMPLICATIONS

This study will address the emergency needs of the changes that occurred in the organizations at the time of crisis (e.g., Covid-19). We would be particularly interested in OLC and its impact on KC at different levels of the organization. In addition, this study provided some guidelines to help top-, middle-, and lower-level managers of the manufacturing firms to comprehend how to increase knowledge creation and organizational performance. There are several implications...
for managers of this study. (i) This study shows the significance of OLC for improving and promoting OP via KC in times of Covid-19 crisis. It recommends companies to promote a learning culture. OLC has a key role to play in enabling employees and companies to renew, create, interpret, and implement knowledge to create the necessary competition for OP improvement in the times of Covid-19 crisis. Therefore, manufacturing firm’s executives or decision makers must significantly consider OLC supplementary variables and KC when focusing efforts or making plans for OP improvement. (ii) This research shows that OLC is a vital determinant of KC. This appears that executives or decision makers’ support for KC activities is crucial in manufacturing firms. Therefore, managers should promote learning culture within the organization in order to improve the knowledge creation environment and foster organizational performance. (iii) The findings of this research provide proof of a clear positive association between OLC, KC, and OP. Top managers concerned with the effectiveness of their manufacturing companies should be attentive to these OL constructs and KC practices and launch them in an organized way during crises (e.g., Covid-19). This has major implications for success-seeking managers. During the crisis (e.g., Covid-19), there is considerable unanimity that an organization’s fundamental strategic advantage lies in their ability to learn and react to challenges. Certainly, the development of an OLC to improve OP needs to be given greater attention. It will be accomplished by sanitizing an environment where the workers can and will constantly learn and share knowledge. We may conclude that single-, double-, and triple-loop learning combinations based on AOI, IOI, and KC significantly contribute toward OP.

7 | THEORETICAL IMPLICATIONS

This research contributes to the world management literature in two ways (Abubakar et al., 2019): by using the proposed framework grounded on the theories of action and dynamic theory of organizational KC to manage the business during Covid-19 crisis, organizations may obtain a better understanding of which knowledge entities they should have easy access to and with whom they should establish good relations that acquire critical knowledge to effectively execute the requisite tasks in the future when faced with a similar crisis (Antonacopoulou, 2006) This study shows how organizations can use the proposed framework to evaluate their ability to learn from their experiences in crisis handling, manage critical knowledge, and perform better critical crisis management tasks. Such kinds of understanding will help the companies learn to manage their knowledge better in the future in response to their business crises. In addition, theoretically, as we stated earlier, OLC is a form of “Behavioral Theory” of the firm applied by the organizations. According to March’s (1962) as cited in Augier (2004), organization is seen as an adaptive system between political alliance and firm employees who have distinct designations that allow the conflicts of interests. Subsequently, where conflicts of interest arise, it can also inspire learning to occur.

8 | CONCLUSIONS, LIMITATIONS, AND FUTURE DIRECTIONS

This is the first empirical investigation that studies the effects of OLC (i.e., AOI, IOI, and BCC) on OP via KC during Covid-19 crisis. Consistent with our expectations, the results reveal that IOI, BCC, and KC serially mediate the relationship between AOI and OP. This result strengthens the argument suggesting that OLC plays a key role in KC, which helps the organizations to improve their performance during Covid-19 crisis. Despite the promising findings, there are some limitations to this study. First, the present research was a cross-sectional study, but a longitudinal study would have been more appropriate to establish the fundamental paths of the researched variables (Poon, 2004). Second, data were collected only from manufacturing firms located in rural and urban areas of Lahore, Multan, and Faisalabad, so the results for all the manufacturing firms may not be generalized across the nation. While all the data were composed from a particular area, it would be interesting to replicate the research on a nationwide sample. This would provide the manufacturing firms with a better generalization and would attain a broader view and analysis.

Third, there is a limitation of the survey instrument. The study shows the probability of a “mono method bias”, as all indicators are measured in the same survey instrument and the data are obtained simultaneously. As a result, the answers to some survey questions are likely to influence the responses to other questions because of the way the questions are clustered on the survey. Therefore, future research should take into consideration this limitation and should proceed along this path.

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**How to cite this article:** Ahmad Qadri U, Ghani Mba, Parveen T, Lodhi FAK, Khan MWJ, Gillani SF. How to improve organizational performance during Coronavirus: A serial mediation analysis of organizational learning culture with knowledge creation. *Knowl Process Manag*. 2021;28:141–152. [https://doi.org/10.1002/kpm.1663](https://doi.org/10.1002/kpm.1663)