



RESEARCH PAPER

Agility and Operational Performance with Mediating Link of Sustainability: Case of Pakistani Oil and Gas Sector

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ABSTRACT

Drawing on Theory of Dynamic Capabilities, this study aims to test agility as a lead predictor of operational performance. Further it intends to investigate the mediating role of sustainability in the relationship between agility and operational performance. Data for the study was collected from the oil and gas sector of Pakistan during a time span of 2011-2020. Data for the study were collected from the annual reports of oil and gas companies listed on the Pakistan Stock Exchange (PSX). E-views software is utilized to perform multiple regression analysis. Regression results reveal that agility and sustainability are key predictors of operational performance. Further results also confirmed the mediating role of sustainability between agility and operational performance. Our study extends literature on economic and social benefits of organizational agility. This study has implications for theory and practice. It implies that managers and practitioners need to understand the concept and each dimension of agility and how it correlates with the sustainability. So, they can identify the factors that need to be prioritized which are not only beneficial for companies but also for the communities where they operate.

Keywords: Agility, Oil and Gas Sector, Operational Performance, Sustainability

Introduction

Customization originates in respond to the product complexity and market dynamism. Every organization started to focus the satisfaction of customer, a successful factor for its sustainability and compatibility. With the passage of time delivery speed became as important as quality and cost to satisfy customers. Moreover, customer preferences, stringent quality, product escalating competition, technological advancement along with increasing environment awareness forced the organizations to change their strategies that lead to change the manufacturing paradigm towards agility manufacturing (Singh & Vinodh, 2017). Agile manufacturing, a new phenomenon, enabling the organizations to respond quickly to change that satisfy the demands of customers efficiently in less response time in the customized global market (El-Khalil & Mezher, 2020). Agile practices include individuals, technology, and innovation to improve the performance of organization. Technology advancement enables the organization to cope the change effectively (Ridwandono & Subriadi, 2019). Employees are the human resource to achieve the goals of organization. Innovation is the source to identify changing trends and fashions for customer satisfaction (Anser et al., 2020).

Agile practices seek profitable opportunities from the volatile market that lead to increase the income, efficiency, and effectiveness of the firm. Moreover, agile firms sense the market changes quickly and respond smoothly to enhance or maintain operational performance. Operational performance is an output of organizational process and firm

usually consider these factors including productivity, quality, reliability, inventory turnover, income to measure it. Operational performance enhances market share and customer satisfaction to sustain competitive advantage in the market of turbulent environments (Nazempour, Yang, & Waheed, 2020). Company used sustainability as one of the models for their survival in this intense competitive environment. Sustainability of the organization refers to meet the needs of stake holders either direct or indirect without compromising the needs of future stakeholders. Agility-sustainability integration generates many benefits to organization in the form of product differentiation and abridged environmental impact that enhancing the chances of survival in the competitive market with cost effectiveness.

Previous studies investigate the role of sustainability in organizational performance in different sectors including pharmaceutical, telecommunication and others. SME's have been investigated in this context as well (Lee, 2019). Similarly other studies focused on the link between agility and organizational performance in different areas including higher educational private institutions and trading companies in public sector and hotel industry (Lyn Chan & Muthuveloo, 2021; Pulakos, Kantrowitz, & Schneider, 2019). The study attempts to empirically investigate the mediating role of sustainability between agility and operational performance in oil and gas sector, a leading sector of economy using specialized equipment and advanced skills for drilling, testing, producing, maintaining, and reclaiming natural gas and wells of crude oils in emerging country including Pakistan. Very limited qualitative research has been conducted in this context and focuses the developed countries including U.S.A only. The study attempts to fill this gap and quantitative aspect of research is incorporated to analyze the agility-sustainability –operational framework. The contribution of the study is to discuss that the social and economic dimensions of sustainability play an intervening role in agile-and operational performance relationship or not. Moreover, agile practices in oil and gas sector cope with the uncertain market conditions of change for their sustainability or not. The study answers the following questions: do agile practices impact on organizational performance? Do agile practices affect sustainability? Is organizational performance being affected by sustainability? Does sustainability intervene in the interaction between agility and operational performance?

The study is beneficial to corporate sector for designing agility practices for dealing uncertainty situations due to operational and strategic responsiveness. The study is also helpful in the context of management of human resources because in agile manufacturing employees and management critical thinking skills are developed through training and research and development that results in an innovative and competitive organization. In addition to that social and economic dimension in the firm mapping with manufacturing process result in sustainability that leads to improve the operational performance of organization. So, the study contributes for policy makers to consider these dimensions for the sustainability as well as for improving the operational performance of organization.

Theory and Hypotheses

Theory of Dynamic Capabilities is the most relevant theory that delineates a company's ability to adapt, innovate, and reconfigure itself in the phase of an ever-evolving business environment (Teece, Pisano, & Shuen, 1997). According to theory there are three major aspects of any organizations to dynamic capabilities. These are sensing where opportunities are identified, securing where revised business models are made, and transforming where structures and cultures are moved in alignment with capabilities (Zainal, Yousuf, & Salloum, 2020).

Rapid alterations in skills, customer and public needs instigated momentous changes in the industrial environment that lead to enhance the competition in the industrial environment. In response to this competition revolution came in the strategies of business that remodeled their distinct abilities and numerous tools and practices have been as a result, the competition has increased, and the many businesses have already reconstructed

their distinct capabilities and have developed the various tools and practices to maintain the enhance their competitiveness and to maintain their survival and augment their competitive position. The pros and cons of these tools and practices have been evaluated that originated the concept of agility (Margherita, Sharifi, & Caforio, 2021).

Agility refers to the proficiency of an organization towards a new change in the shadow of uncertainty through innovation and research (Haider & Kayani, 2020; Shams, Vrontis, Belyaeva, Ferraris, & Czinkota, 2021) state that agility is the ability of an organization to maintain flexibility, speed and performance while adapting to change in a dynamic business environment. Similarly, agility determines the ability of an organization to meet the market needs with flexibility and quickly. Agility organizations exhibit an inherent power to withstand in shocks and upheavals in an uncertain business environment to increase operational performance

Operational performance refers to a measure of composite factors including speed, reliability, quality, cost, and flexibility of an organization in the event of change. Agility facilitates the management team to design strategies that provide a guideline for the daily operations of the business. Agility supports the collaborative work in a business organization to achieve a common goal through innovative team and better communication system. Agility designs the product according to specification of customers through research and development to maintain customer's satisfaction. Agility assists in adapting technologies to improve operations in the context of production. Agility promotes responsiveness to market changes and demands of customers. These agility processes and practices enhance the competitive strength of an organization that lead to increase the market share and operational performance of organization.

Operational performance is to achieve the results that are planned by any organization. It is a process that can be measured through many indicators such as inventory turnover, service excellence, financial targets, customer satisfaction, market share, reduced cost, sales volume, strategic realistic vision, and mission. Inan, Gungor, Bititci, and Halim-Lim (2021) refer that operational performance good or bad indicates that an organization is pursuing the strategies correctly or not to achieve its overall goal and objectives. Good operational performance helps in sustaining the economic, social, and environmental conditions of an organization that lead to maintain the competitive position of an economy. In a dynamic competitive environment, it is not possible without agility practices. So, agility in the context of human development, product development, strategic development, utilization of opportunities in right time facilitates the organization to gain a giant market share in the business world (Siagian, Tarigan, & Jie, 2021).

Competitiveness of an organization raises the sustainability in long run as well. Now in this market dynamism unprecedented pressure forces the organization not to just survive but to adopt agile practices to thrive in the long run. (Singh & Vinodh, 2017) empirically investigate the role of agility and sustainability for enhancing operational performance of the company. An agility-sustainability criterion is built using graph theory to access the operational performance of the company. The findings of the study support that agility practices are involved in maintaining the sustainability that lead to improve the operational performance of an organization effectively. (Melo, 2019) discusses that sustainability can be achieved through agility. Agility develops a team that is resilient, adaptable and a quick learner that rapidly respond to changing environment for maintaining the competitive edge; one of the indicators of sustainability. So, sustainability is impacted by agility positively. From the above literature following hypotheses of the study are developed for empirical investigation

H1: Agility has a positive impact on operational performance.

H2: Sustainability is positively affected by agility processes.

Sustainability is multidimensional and it refers to the fulfillment of current needs without compromising the capability of future generations to meet their needs. A sustainability triple bottom line model including social, economic, and environmental dimensions is considered an evaluation model in business for measuring the operational performance of business. Based on these dimensions Dow Jones sustainability index has been developed as a benchmark for measuring the levels of sustainability in business firms. Business planning includes sustainable development goals including value creation to stakeholders, enhancing the quality of human life, environmental safety, development of human and social capital that are the indicators for operational performance. So, sustainability dimensions affect the operational performance in one way or the other. Al Nasour and Najm (2017) empirically investigate the relationship between sustainability and operational performance in pharmaceutical industry of Jordan. Sustainability's triple dimension model has been applied that has a significant impact on market share, earnings, and business growth.

Lee (2019) empirically discusses the practices in the context of sustainability-oriented human resource management that improve the operational performance of the company. The results of the study support that sustainability practices have positive effect in improving operational performance of organizations. (Lăzăroiu, Ionescu, Andronie, & Dijmărescu, 2020) explore empirically the sustainability practices in business strategy help in reducing the expenses and increasing the earnings that positively affect the operational performance. Afum et al. (2020) demonstrate that with reduced cost company can offer more value to the customers while providing quality product in time that led to enhance its market share and customer loyalty. Moreover, sustainability strategy functions like a catalyst between financial performance and managerial abilities developed through agility practices. From the above literature following hypotheses have been developed.

H3: Sustainability mediates the relationship between agility and operational performance.

Conceptual Framework of the Study

From the theoretical and empirical literature conceptual framework of the study is devised and shown in figure 1.

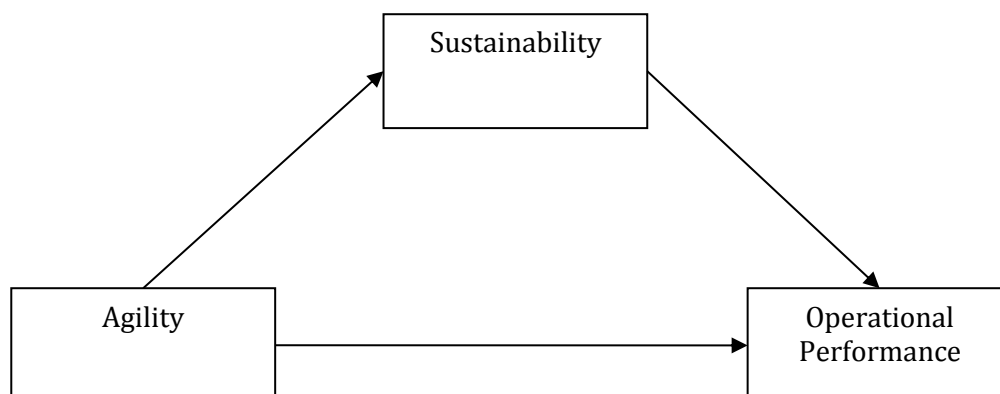


Figure 1 Theoretical framework of the study

Material and Methods

Data and Sample

Data for our study was collected from the annual reports of companies listed at the Pakistan Stock Exchange (PSX). There are currently 533 companies listed at the PXC. For our study we choose the oil and gas companies listed at the PSX. The sector was chosen due to its suitability for research objectives of study. Since now a day's oil and gas companies are expected to outline the detail sustainability strategy. Now a day, sustainability is a key consideration for oil and gas companies and conformance to the health, safety and environmental laws and contribution to the societies in which they function are at the core of their sustainability strategy. In Pakistan oil and gas comprised of three categories 1) oil and gas exploration, 2) oil and gas marketing and 3) oil and gas refining. There are 4 oil and gas exploration companies, 8 oil and gas marketing and 4 gas refining listed on the PSX. So, we analyzed the data for the 15 companies for ten years from 2011- 2020.

Measurement

The independent variable Agility was measured using two proxies i.e., research and development, and employee training (El-Khalil & Mezher, 2020). Mediator variable sustainability was measured using two proxies' one economic conditions and other is the social conditions. Further the economic conditions were measured using Return on Investment (ROI) and Net Income (NI) whereas the social conditions were measured using welfare and donations. Finally we measured our dependent variable operational performance of the firms through Earnings before interest and taxes (EBTI) (El-Khalil & Mezher, 2020).

Econometric Models

Model 1

$$Y (OP) = \beta_0 + \beta_1 (RD) + \beta_2 (TR) + \varepsilon$$

Model 2 a

$$M (ROIN) = \beta_0 + \beta_1 (RD) + \beta_2 (TR) + \varepsilon$$

Model 2 b

$$M (NI) = \beta_0 + \beta_1 (RD) + \beta_2 (TR) + \varepsilon$$

Model 2 c

$$M (WE) = \beta_0 + \beta_1 (RD) + \beta_2 (TR) + \varepsilon$$

Model 2d

$$M (DN) = \beta_0 + \beta_1 (RD) + \beta_2 (TR) + \varepsilon$$

Model 3

$$Y (OP) = \beta_0 + \beta_1 (RD) + \beta_2 (TR) + \beta_3 (ROIN) + \beta_4 (NI) + \beta_5 (DN) + \beta_6 (WF) + \varepsilon$$

Note: OP Operational Performance, RD = Research and Development, TR = Training, ROIN= Return on Investment, NI = Net Income, DN = Donation, WE= Welfare

Data Analysis

E-views software is utilized to perform data analysis. E-views was preferred due to the problem of missing values and unbalanced panel. In the first stage we calculated the descriptive statistics, correlation, and unit root test and finally pooled regression analysis

was performed to test the how agility affects sustainability, and operational performance. We employed Baron and Kenny method to analyze the mediating role of sustainability in the relationship between agility and operational performance.

Results and Discussion

Table 1
Descriptive statistics

	OP	DN	TR	NI	RD	WE	ROIN
Mean	15.39	11.10	10.86	15.08	11.10	11.688	3.417
Median	15.37	11.11	10.93	15.02	11.08	11.600	0.178
Maximum	15.76	11.60	11.30	15.87	12.03	12.55	3.017
Minimum	14.83	10.59	10.40	14.59	10.34	11.20	0.090
Std. Dev.	0.27	0.298	0.304	0.335	0.498	0.361	9.029
Observations	150	150	150	150	150	150	150

Note: N=150, RD = Research and Development, TR = Employee Training, OP= operational performance, ROIN= Return on Investment.

Table 1 displays the data's descriptive statistics. Results indicate that the oil and gas companies listed on the PSX have operational performance ranging from 14.39 to 15.76. The minimum and maximum donation amounts from the oil and gas industry are 10.59 and 11.60, respectively. The risk of agility determining factors such as training and research and development are 0.304 and 0.498 to mean value. Number of observations for the processing of data is 150. The standard deviation to mean value is highest in the context of Return on investment.

Table 1
Correlation Analysis

	DN	TR	NI	RD	WE	ROIN
DN	1					
TR	-0.46	1				
NI	0.17	0.49	1			
RD	0.46	0.22	-0.54	1		
WE	-0.41	0.41	0.338	-0.552	1	
ROIN	0.07	-0.57	-0.366	-0.004	0.015	1

Note: N=150, RD = Research and Development, TR = Employee Training, OP= operational performance, ROIN= Return on Investment.

Table 2 shows the results of the correlation analysis. Agility determining factors including training and Research and development have positive and negative association with economic and social dimensions of sustainability. It means organization spends a lot of expenditure on training and research and development that leads to low income and less return on investment. The correlation summary reveals that all the values are within tolerable limit. Therefore there is no issue of correlation in the data.

Table 3
Unit Root Test

Variable	Method	Significance
OP	Levin, Lin & Chu t*	0.01***
DN	Levin, Lin & Chu t*	0.03***
RD	Levin, Lin & Chu t*	0.01***
WE	Levin, Lin & Chu t*	0.003***
ROIN	Levin, Lin & Chu t*	0***

NI	Levin, Lin & Chu t*	0.001***
TR	Levin, Lin & Chu t*	0***

Note: *indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance, N=150, RD = Research and Development, TR = Employee Training, OP= operational performance, ROIN= Return on Investment.

The table 3 shows the results of unit root test. Results in table 3 shows that all variables are significant indicating that the data of the study is stationary. Therefore, data series had no auto correlation so there was no unit root in the data, and it is normally distributed.

Table 4
Regression Analysis

Models						
Variable	1	2a	2b	2c	2d	3
Employee Training	1.24*** (40.69)	-2.68*** (-2.72)	1.13*** (29.75)	0.44*** (13.03)	0.94*** (23.48)	0.54*** (15.9)
Research & Development	0.17*** (5.79)	2.92*** (3.03)	0.24*** (6.49)	0.56*** (17)	0.125*** (3.17)	-0.21*** (-12.4)
Return On Investment						1.29*** (13.96)
Net Income						0.51*** (23.48)
Donation						0.4*** (16.72)
Welfare						-0.02 (-1.02)
F-statistics	2.03	2.08	2.02	3.04	2.89	3.03
Probability (F)	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R ²	0.033	0.04	0.04	0.04	0.03	0.67

Note: *indicate 10% level of significance, ** indicate 5% level of significance and *** indicate 1% level of significance

To test the proposed model, we fitted the series of regression models. The Baron and Kenny model is employed method to analyze the mediation hypothesis in Table 4. In Model 1 of the, the regression of organizational agility that was measured through R&D and training with operational performance of the companies that was measured through EBIT ignoring the mediator sustainability, was significant ($\beta = 1.24$, $t = 40.69$), $p < 0.01$) and ($\beta = 0.17$, $t = 5.79$, $p < 0.01$). Therefore, hypothesis 1 was accepted and first condition for mediation was met. The model 2 showed that the regression of R&D and training on the mediator sustainability that was measured through two proxies' economic conditions (ROI and NI) and social conditions (donation and welfare) was also significant. Similarly model 2a, 2b, 2c and 2d indicate the significant effect of R&D and training on the ROI ($\beta = -2.68$, $t = 2.72$, $p < 0.01$) ($\beta = 2.92$, $t = 3.03$), $p < 0.01$), NI ($\beta = 1.13$, $t = 29.75$), $p < 0.01$), ($\beta = 0.24$, $t = 6.49$, $p < 0.01$), donation ($\beta = 0.44$, $t = 13.03$), $p < 0.01$) ($\beta = 0.56$, $t = 17$), $p < 0.01$) and, welfare ($\beta = 0.94$, $t = 23.48$, $p < 0.01$), ($\beta = 0.125$, $t = 3.17$, $p < 0.01$). Therefore hypothesis 2 was also accepted and second condition for mediation was met. In the model 3 the analyses revealed that, controlling for the mediator sustainability (ROI, NI, welfare, and donation), agility (R&D and training) was still a significant predictor of operational performance (EBIT), ($\beta = 0.54$, $t = 15.9$), $p < 0.01$), ($\beta = -0.21$, $t = -12.4$), $p < 0.01$), ($\beta = 1.29$, $t = 13.96$, $p < 0.01$), ($\beta = 0.51$, $t = 23.48$, $p < 0.01$), and ($\beta = 0.4$, $t = 16.72$), $p < 0.01$). It was found that sustainability partially mediated the relationship between agility and operational performance. Hence hypothesis 3 was accepted.

This study examined the impact of organizational agility on the operational performance of the organizations. The study further employed the mediating mechanism to examine the role of sustainability in this relationship between agility and operational performance. The results revealed sufficient support for proposed hypotheses of the study. The results showed that agility has the significant positive influence on the operational performance of the companies. Moreover, agility has significant positive influence on sustainability which in return as a significant influence on operational performance. It confirms the mediating role of sustainability in the relationship between agility and operational performance. The statistically significant coefficient of mediator and independent variable indicate partial mediation.

The findings of the study indicate that organizations are facing growing demands, competitions, and future uncertainties that require specific capabilities to survive. Organizational agility is the organization's ability to move dynamically to respond to rapid changes and achieve effective and profitable results. This finding of research is in line with the previous researches that suggest that agility can help companies to gain competitive advantage in a highly volatile environment through creativity and innovation (Cegarra-Navarro, Soto-Acosta, & Wensley, 2016; Nafei, 2016). Agility is concerned with effective decision making and its implementation in the timely manner. Organizations that can make high quality decisions faster and implement them smoothly can reach the higher level of operational performance. In the uncertain environments the organizations need to respond quickly. Agile companies can quickly scan the environment for threats and challenges and rapidly adapt. Therefore, the responsiveness aspect of organizational agility leads to competitive advantage that leads to higher operational performance (Wanasida, Bernarto, Sudibjo, & Purwanto, 2021).

Another finding of the research is the confirmation of mediating role of sustainability in the relationship between organizational agility and operational performance. The findings of the study suggest that when organizations include agility in its strategic plan and its implementation it leads to sustainability, which in return increase the operational performance. Agile organizations don't implement strategic plans in the traditional manner, rather agile organizations adapt according to the environmental challenges and public concerns. Agile practices help organizations to reduce the impact of their products on the environment through flexibility. Both agility and sustainability are significant in achieving competitive advantage by taking into consideration the environmental pressures. Therefore, improved social and environmental performance leads to higher level of operational performance (Bouguerra, Gölgeci, Gligor, & Tatoglu, 2021).

Conclusion

Our study examines the role of agility in enhancing operational performance through the mediating role of sustainability. It shows that companies in the process of building the capability to innovate and adapt rapidly to survive the changing and difficult environment create ecological, social, and economic value in the form of sustainability which in return enhances their operational performance. We propose that enterprise agility and its effect on sustainability is particularly relevant to operational performance of companies in the oil and gas sector. Awareness and management of environmental issues has become integral for the oil and gas sector. Companies are expected to stay profitable but at the same time respond to environmental challenges, climate change and act more responsibly.

The study contributes to the stream of literature on the impact of agility and sustainability on operational performance of the companies. The study provides empirical evidence specifically in the context of oil and gas companies. The study employed the mediating mechanism to highlight the significant role of sustainability in the relationship

between agility and operational performance. Past studies have focused on the economic outcomes of organizational agility, the current study take in to account the social benefits that can be achieved through organizational agility.

The study has implications specifically for oil and gas sector. There are growing concerns about this sector's compatibility with sustainable future of the world (Okeke, 2021). There should not be any discrepancies in the sustainability policies and implantation. Many companies fail to put their policies into action. It further necessitates that regulator should create awareness about the conformity and dedication of companies towards sustainable future. In doing so, regulators can devise sector wise mandatory disclosure policies in the annual reports about the implementation and compliance of sustainability principles.

Managers and practitioners need to understand the concept and each dimension of agility and how it correlates with the sustainability. These companies should implement agility and sustainability practices congruently. Better understanding of these concepts can help mangers identify the factors that need to be prioritized. The findings of the study clearly suggested that to cope up with the market uncertainties and complexities organizations need to adapt to reduce cost, waste and use of environmentally harmful inputs and outputs. In doing so sustainable practices can help and increase the operational performance of the companies. Additionally economic and social sustainability is not only beneficial for companies but also for the communities where they operate.

The current study has limitations and certainly warrants more investigation into unexplored parts by the future research. One of the major limitations of the study was that data is collected from only listed institutions of one sector. In future, researchers can collect data from of companies in various sectors especially IT sector or textile sector and non-registered institutions for better understanding of agility, sustainability, and operational performance of companies. Another limitation of the study was the time-period; data for only ten years was collected. Future studies can expand the study period longer than 10 years. Lastly, we collected data for the three variables and used only employed mediating mechanism. Future research can investigate the effects of other variables especially the moderators in the relationship between agility and operational performance of the companies.

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