DEVELOPMENT OF DOWNSTREAM SMES INMANUFACTURING VALUE CHAIN: A STUDY IN THE CONTEXT OF OMAN

[1]KHALID AL QATITI, [2]ARUN BAJRACHARYA, [3]MIR DOST, [4]NUR NAHA BINTI ABU MANSOR

[1]Faculty of Business, Sohar University, Sohar, Oman
[2]School of Management, New Uzbekistan University, Tashkent, Uzbekistan
[3]University of Winchester, United Kingdom
[4]Faculty of Business, Sohar University, Sohar, Oman
E-mail: kqatiti@su.edu.om, a.bajracharya@newuu.uz, Mir.Dost@winchester.ac.uk, Nurnaha@su.edu.om

Abstract - This research considered the context of Oman where it is observed that a few mature manufacturers of primary products such as steel, aluminium and plastic are operating relatively in large scale, but at the same time the relevant local downstream companies especially small and medium enterprises (SMEs) are generally struggling for their business with the upstream parties. The research problem is to inquire into the status of the key upstream and downstream parties in the value chain and explore the reasons behind their state of existence so as to find out the possible ways to develop the downstream SMEs. This research utilized two approaches to develop a set of coherent output. First, a qualitative research approach was used to learn about the general status of the upstream and downstream companies in the value chain. The second approach was a model-based logical inquiry to clarify the reasons behind the state of existence of the key parties in the value chain.The qualitative inquiry informed more favorable state of affairs on the part of prominent u/s parties whereas the d/s counterparts were found to be in a challenging situation. The logical inquiry informed the causal structure of business growth, resource consumption, management of resources, and the interaction with other parties in the value chain. In overall, it was found that besides the interventionist policies, development and access to local and overseas markets for SMEs would provide opportunities for them to grow naturally, and at the same time, their internal capabilities are essential to generate and tap the market opportunities. The favourable interplay of market opportunities and the internal capabilities would help SMEs to grow and flourish in the long run.

Keywords - Manufacturing value chain; SMEs; in-country value; market opportunities; internal capabilities

I. INTRODUCTION

The existence and integration of local upstream (u/s) and downstream (d/s) companies in the manufacturing sector of primary products help generate the in-county value by creating multiple and sustainable economic opportunities in the home country (Nguyen et al., 2022; Vidal et al., 2021). However, to get a functional and integrated value chain inside the country, certain conditions need to be in place (Kim and Chai, 2017; Cheng, 2011). For instance, the small scale of domestic demand and the low capabilities of the relevant d/s companies including SMEs could be a matter of concern for the large-scale manufacturing company to supply within the country – they would rather prefer to export in mass to get the benefit of the scale and assurance of business. The d/s parties, on the other hand, might find that the large-scale u/s parties are out of their reach, and the under-developed business ecosystem does not support them in starting and sustaining the business. Therefore, tapping the business and economic opportunities created by the potential value chain or the larger business ecosystem of the primary product could be conditioned and constrained due to the industry environment in the country. This research attempts to develop an understanding on the status of u/s and d/s parties in thecontext of several primary products' value chains. Specifically, in this research, the status of the key u/s and d/s parties in the value chains of steel, aluminum, and plastic industries in the country of Oman have been inquired in terms of their ongoing state of existence and the probable reasons behind that. The findings of this research will be useful in formulating the regulatory framework and business models to start and develop especially the sustainable d/s enterprises for the three primary products in similar countries.

Steel, Aluminum and Plastic Industries and In-Country Value Contribution in Oman

Steel, aluminum and plastic industries are strategically important sectors in Oman especially in maximizing the in-country value (ICV) and diversification of the economy (Oman News Agency, 2023). The key players such as Jindal Shadeed Iron & Steel, with its annual production capacity of 2.4 million tons (Jindal Shadeed Iron & Steel, n.d.), and Sohar Aluminium which has produced 3,706,691 metric tonnes of aluminium since its inception (Sohar Aluminium, 2023), are driving economic growth through domestic production, job creation, and export-oriented strategies. According to a Times of Oman article, the Ladayn Polymer Park attracts $88 million in investments and contributes $46 million annually to ICV (Times of Oman, 2023).These sectors collectively contribute significantly to Oman's GDP, fostering a sustainable and diversified economy.

Furthermore, Oman's downstream sectors, particularly plastics, aluminum, and steel, are marginally driven by SMEs (UNIDO & Ministry of Commerce, Industry and Investment Promotion,

2023). The plastics industry, fueled by domestic production of polyethylene and polypropylene, supports SMEs manufacturing packaging materials and household goods. The aluminum sector, anchored by Sohar Aluminum, empowers SMEs to produce extrusions, profiles, and components for various industries. Similarly, the steel sector, led by Jindal Shadeed Iron & Steel, enables SMEs to manufacture construction materials and machinery parts. Collectively, these SMEs, employing 10-50 workers in plastics, 50-200 in aluminum, and 20-150 in steel, play a crucial role in Oman's industrial ecosystem. Their growth and contribution to Oman's GDP hinge on supportive policies, infrastructure development, and access to regional and international markets.

The steel, aluminum, and plastic sectors collectively employ thousands of individuals, with SMEs contributing moderately to employment opportunities (UNIDO & Ministry of Commerce, Industry and Investment Promotion, 2023). Moreover, exports from key players like Jindal Shadeed and Sohar Aluminum contribute substantially to Oman's non-oil revenue streams (Oman Export Review, 2024). Downstream SMEs, in turn, foster entrepreneurship and support local supply chains, aligning with Oman's national strategy for economic diversification (Vision 2040, 2023).

II. RESEARCH METHODOLOGY

This study utilized two approaches to develop a set of coherent research output. First, a qualitative research approach was employedseeking to assimilate the experiencesof respondents to understand the reality of the existence and collaboration of u/s and d/s parties in themanufacturing sectors in Oman. The experience sharedby the respondents would have rich contents that will take researchers closer to the reality especially in the situation of few leading companies with fewer potential respondents at the executive or top management level. The respondents were sampled out using the purposive sampling approach. The population frame included the top-level managers and leaders from steel, aluminum and plastic manufacturing companies and the corresponding SMEs operating in Oman. A total of eight respondents from the upstream side and ten from downstream were interviewed. Semi-structured interview questions were asked keeping the options open for other subsequent questions. The duration of each of theonline interviews ranged from 1 to 2 hours for individual respondents which were video recorded. The interview data were then transcribed, coded and categorized for their content analysis.

The second approach utilized in this research was a model-based logical explanation to clarify the causal structure of the state of existence and collaboration of the u/s and d/s parties in the value chain. This second approach is an initial step in formulating a simulation model to understand the problem and complexity in developing a functional and productive value chain in manufacturing sector.

III. QUALITATIVE DATA ANALYSIS

As a part of the first approach of this research, the qualitative interview data were analyzed using a general content analysis technique. Table 1 presents the relevant coded and categorized data under the headings of “experience of u/s and d/s parties while working with their counterparts”. The table presents a highly condensed output from the detail interview data. Mainly two categories have been developed on both the sides of u/s and d/s parties: first with the connotation that the counterpart u/s or d/s parties are collaborative, and second, they are constrained and inadequate.

The instances of d/s respondents stating their u/s counterparts as collaborative or supportive are higher than the u/s respondents stating so about their d/s counterparts. Likewise, the instances of d/s respondents stating their u/s counterparts as constrained or insufficient are less than the u/s respondents stating so about their d/s counterparts. It clearly shows that the u/s companies were perceived to be more capable, collaborative and supportive whereas the d/s companies were more constrained, incapable or insufficient. The u/s parties are mainly the major plastic, aluminum and steel manufacturing companies, and as such they are more capable and collaborative, and they can be more supportive to the d/s parties they are working with.

The observation also indicates that there are still more opportunities for u/s parties for business with their d/s counterpart, and it is more pronounced that the d/s counterparts have got much more business opportunities to gain. The lost business opportunities at the u/s and more at the d/s part seem to be either lost to the foreign companies, or they have not been fulfilled creating the situation of locally lost opportunities.

The data inform that the d/s companies observed their u/s counterparts are constrained mainly due to their limitations in supplying the variety and the specific technical outputs. It has also been mentioned that the local u/s parties are business-wise difficult to interact with probably because of the scale differentials.

Experience of working with u/s manufacturing firms as observed by d/s companies	Experience of working with d/s companies as observed by u/s manufacturing firms
Local u/s companies are collaborative: We have been in productive collaborations with key upstream plastic suppliers. We have been sourcing and distributing materials through productive collaborations We have been providing IT solutions and equipment rentals to support upstream manufacturing operations in Oman. Balancing challenges and forming valuable partnerships with reliable local upstream suppliers for high-quality materials. Strategic location and government support enabling efficient sourcing of prime raw material from the local major manufacturing company. **Started working with locals:** Started diversifying supply chain through new partnerships with local along with the old international upstream suppliers. **Local u/s parties are constrained orinsufficient:** Designing profiles through a multi-step process involving local and international collaboration. Need to deal with international upstream suppliers based on material grade requirements. Importing raw materials through dealers for quality assurance due to limited opportunities to interact with local upstream engagement. Our supplier cannot supply all the raw materials we need, and at the same time the local slow market hinders them to supply with larger variety. **Technical challenges:** Our company is struggling with high mold and extrusion costs, hindering flexibility and profitability. U/S dependency on one single major manufacturer in the country poses risks, with alternative solutions being costly.	**Local d/s companies are collaborative:** We maintain positive collaboration and long-term partnerships with key downstream companies. We fully get engaged with d/s companies. We work as a mid-stream company collaborating properly with our u/s and d/s. We maintain mutually beneficial relationships with d/s SMEs although their situation gets influenced by global demand fluctuations. **Local d/s companies are constrained orinsufficient:** We engage with d/s SMEs for services and operations support, but we export 70% of our products to North America, Europe, and the GCC. We collaborate with downstream SMEs for services, while exporting our product for further processing. Some 80% of our raw materials iron ore come from overseas and we export our product to primarily to UAE and Saudi. D/S companies have limited financial and operations capacities to take-in our product in bulk. So, we engage distributors so that they could absorb the volume and later distribute to SMEs as per their requirements. There are challenges in connecting with downstream SMEs due to financial, vendor management, and operational capacity gaps. We have industry challenges in quality control, raw material availability, and value loss due to re-importing the intermediary or final product. There are challenges in d/s manufacturing due to SME skills gap. Limited direct engagement with downstream SMEs impacts product processing in the country. Financial constraints and expertise gaps hinder SME partnerships.

Table 1: Experience of Upstream and Downstream Parties while Working with their Counterparts

On the part of the observation of u/s companies, their d/s counterparts are constrained mainly due to their limitations in financial, operational, and general management capabilities. The scale, scope, and the level of maturity in business seem to be the main hindering factors as observed by the u/s companies.

It is also found that the u/s and d/s companies when

they perceive each other collaborative, they would have been working with each other for a long term. The larger and prominent u/s parties generally support their long-term d/s companies in their operations despite the business issues they face in the course of time. Among the collaborative d/s parties, there are a sizeable number which provide support services rather than doing business in the main product line. This also indicates the ample opportunities that are available for potential d/s companies in the u/s companies' main line of business.

A Model on the Operations of Business

Analysis results of the interview data provided a glimpse of the context in which the u/s and d/s companies are generally operating in Oman. Further, following the second approach of this research to understand the underlying reasons ofhow the companies operate as they operate, the concept of a generic operational model of a business firm as shown in Figure 1 is now utilized. The model is a slightly modified version of the main conceptual framework used in one of the authors' previous works in Bajracharya et al. (2021). The model has been developed using the principles of systems thinking (Sterman, 2000; Senge, 1990), and it portrays a potential growth mechanism of a business firm along with the constraining or limiting processes that hinder the growth. The model is a variant of the limits to growth archetype (Senge, 1990) which depicts the fact that as the business starts operating, the limiting forces also get activated. If the business is properly "managed" to manage the growth process and the limiting forces,then it would sustain or grow, otherwise it gets declinedand it may turn into failure.

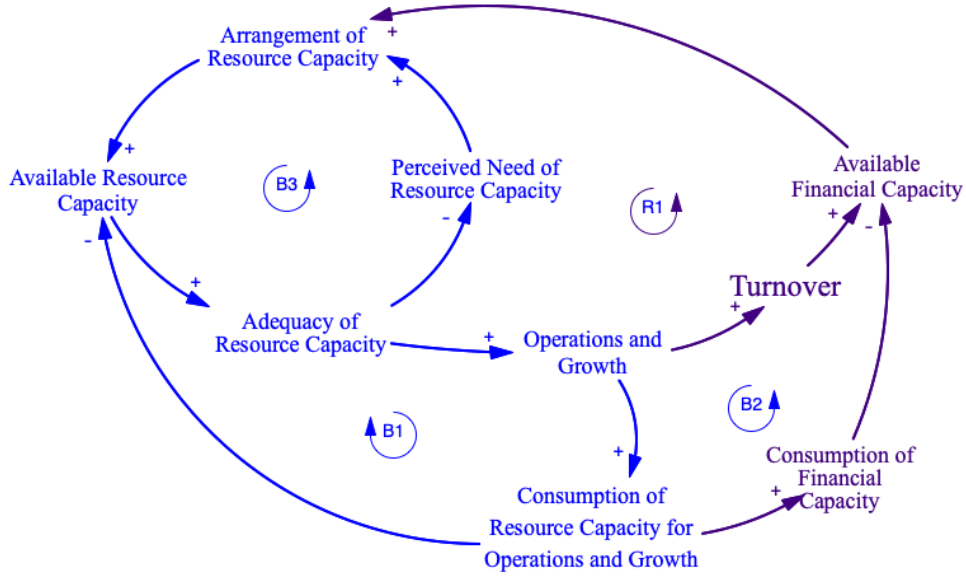


Figure 1: Operational Model of a Business Firm

As presented in Figure 1, the reinforcing loop R1 (*Turnover →+ Available Financial Capacity →+ Arrangement of Resource Capacity →+ Available Resource Capacity →+ Adequacy of Resource Capacity →+ Operations and Growth →+ Turnover*) depicts the growth/decay process of the firm due to increase/decrease of the turnover from the business operations and growth.

Balancing loops B1 (*Operations and Growth →+ Consumption of Resource Capacity for Operations and Growth →– Available Resource Capacity →+ Adequacy of Resource Capacity →+ Operations and Growth*) and B2 (*Operations and Growth →+ Consumption of Resource Capacity for Operations and Growth →+ Consumption of Financial Capacity →– Available Financial Capacity →+ Arrangement of Resource Capacity →+ Available Resource Capacity →+ Adequacy of Resource Capacity →+ Operations and Growth*) respectively represent the limiting or constraining effects of the consumption of operational and financial resources due to operations and growth of the firm.

Balancing loop B3 (*Adequacy of Resource Capacity →– Perceived Need of Resource Capacity →+ Arrangement of Resource Capacity →+ Available Resource Capacity →+ Adequacy of Resource Capacity*) represents the management process for arranging the operational resources. The financial resources are generally arranged from the internal turnover, and if it is needed, it could alsobe arranged from the sources of equity and borrowing.

The interplay of reinforcing loop R1 and balancing loops B1, B2, and B3 represents the processes of growth/decline, the consumption and consequent need of capacity to operate with the growth, and the decision in arranging the needed capacity. Overall, the whole processesessentiallyproduce the time-

varying performance of the business in a given context.

Interaction of U/S and D/S Companies

The concept of the business operations model as presented in the previous section is an individual organizational model. Further, when it is needed to develop an understanding of the interaction of u/s and d/s companies in manufacturing value chain, their inter-organizational interactions would be essential to consider. As business companies cannot survive alone without the value chain, it is pertinent to explore how the inter-organizational interactionsresult into individual organization's survival, sustenance, growth, or even failure. For that, it would be important to know the essential contact points in the individual business operations model that get influenced when one company interacts to another in the value chain.

In a dyadic relationship between u/s and d/s companies, there will be transactions with resource orders and payments. The favorable transactions would fulfill the goals of resource arrangement and the turnover from the revenues, and thus it would support the continued relationship between the u/s and d/s parties. In the case of perceived or continuousunfavorable transactions, the relationship would not be continued, or it would even not get initiated. Therefore, the resource arrangements and the business turnover are the key variables that determine the strength of relationship between the transacting u/s and d/s parties in the value chain. Besides that, the volume of transactions over the time between the parties determines the market size within value chain. Larger the market size, more the transactions there would be to sustain the business relationships between u/s and d/s parties.

IV. CONCLUSION

This research paper considered two lines of inquiry into the status of and relationship between u/s and d/s parties in manufacturing value chain. First, the qualitative empirical inquiry to understand the context and condition of the u/s and d/s parties in the steel, aluminum and plastic manufacturing value chains in Oman. Second, based on an archetypal systems model, a logical inquiry was made to understand the underlying reasons behind certain state of the relationship between the u/s and d/s parties.

The empirical inquiry informed more favorable state of the affairs on the part of prominent u/s parties whereas the d/s counterparts were found to be in a more challenging situation.

The logical inquiry highlighted that each business company would be going through the situation of its own business performance conditioned by the internal resource consumption and management processes,and it would be influenced by the transactional relationships with its u/s and d/s parties.

Therefore, in order to develop the d/s parties, especially the SMEs, it would be helpful to consider the following points.

a. Market is the main base for business. Market opportunities need to be explored and developed for the local d/s companies so that the potential sources of revenue are at least assured to start and run the business.
b. Most often, new business models need to be developed to expand the market, for example, linking the d/s SMEs to the value chain of a greater overseas market opportunities, or creating the process of circular economy or servitization with more value addition opportunities.
c. To sustain and grow the business, the internal capabilities of d/s SMEs are essential – the capabilities especially to exploit the growth potential by proficiently managing the required resources are important.
d. The priming and interventionist policies such as the in-country value porgrammes, new market creation by the government, and arranging support programmes for start-ups and new SMEs would be helpful to trigger the business with the expectation that these would push for the perpetual development. However, in the long run, SMEs should be supported by the market mechanism and the thriving ecosystem to run their business independently.

This research is largely conceptual in essence. More empirical study is further required to develop, quantify and simulate the generic business operations model used for logical arguments in this research. It will further help to clarify the assumptions, validate the concepts, and generate more concrete understanding on the operations of different parties in the manufacturing value chain.

REFERENCES

[1] Bajracharya, A., Ogunlana, S. O., Goh, C. S., and Tan, H C. (2021). Understanding the Performance of Construction Business: A Simulation-Based Experimental Study.Construction Economics and Building, 21 (4), pp. 60-88. http://dx.doi.org/10.5130/AJCEB. v21i4.7559.
[2] Cheng, J. H. (2011). Inter-Organizational Relationships and Information Sharing in Supply Chains. International Journal of Information Management, 31 (4), pp. 374-384. https://doi.org/10.1016/j.ijinfomgt.2010.09.004.
[3] https://downloads.unido.org/ot/15/44/15446402/Oman%20Manufacturing%20Strategy-%20En%20-%20for%20web.pdf
[4] https://timesofoman.com/article/139575-pacts-signed-to-set-up-88mn-industrial-projects-in-sohar
[5] Jindal Shadeed Iron & Steel. (n.d.). Company profile. Retrieved from https://jindalshadeed.com/company-profile.html

[6] Kim, M. and Chai, S. (2017). The Impact of Supplier Innovativeness, Information Sharing and Strategic Sourcing on Improving Supply Chain Agility: Global Supply Chain Perspective. International Journal of Production Economics, 187, pp. 42-52. https://doi.org/10.1016/j.ijpe.2017.02.007.

[7] Nguyen, M.H., Phan, A.C. and Matsui, Y. (2022). Supply Chain Integration and Economic Performance: Empirical Evidence from a Developing Country. Benchmarking: An International Journal, 29 (9), pp. 2710-2732. https://doi.org/10.1108/BIJ-01-2021-0004.

[8] Oman Export Review. (2024). Trade and Export Data Analysis. Ministry of Trade andIndustry, Oman.

[9] Oman News Agency. (2023). Industrial Sector Local Content Plan Launched. Oman News Agency. https://omannews.gov.om/topics/en/80/show/119724

[10] Senge P. M. (1990). The Fifth Discipline: The Art and Practice of the Learning Organisation. New York: Currency Double Day.

[11] Sohar Aluminium. (2023). About Us.https://www.sohar-aluminium.com/node/1271

[12] Sterman, J. D. (2000).Business Dynamics: Systems Thinking and Modelling for a Complex World. Irwin McGraw Hill, USA.

[13] Times of Oman. (2023, December10). Pacts signed to set up $88mn industrial projects in Sohar. Times of Oman.

[14] UNIDO & Ministry of Commerce, Industry and Investment Promotion. (2023). Oman Manufacturing Strategy.

[15] Vidal, L. A., Marle, F., and Dernis, M. (2021). Modeling and Estimating Host Country Values in International Projects to Facilitate In-Country Value Creation. Sustainability, 13, 5592. https://doi.org/10.3390/su13105592.

[16] Vision 2040 (2023).Vision 2040 Implementation Report. Oman's Ministry of Economy.

★★★