Journal of Contemporary Macroeconomic Issues
www.scekr.org

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# Determinants of Capacity Utilization of Firms: A Comparative Analysis of Developing and Developed Countries

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| PAPER INFO | ABSTRACT |
|---|---|
| | *This paper employs data from more than 100 World Bank Enterprise Surveys of different developed and developing countries to analyze the determinants of capacity utilization in firms between 2007-2023. Appling Tobit model, the results show that while developed countries have more access to capital, technology, reliable electricity, better management, and sound infrastructure with fewer challenges, In developing countries problems such as energy constraints, informal competition limit capacity utilization of firms. Whereas the ownership concentration has mixed effects. The analysis also highlights the importance availability to finance, digital readiness, innovation, and choice of destination market. Results also highlight that access to finance and inadequate supply of workers are the biggest challenges the firms face in the wake of capacity utilization.* |

## 1    Introduction

A firm is an institution that takes capital, labor and technology to produce goods or services for profit making by combining various resources in an optimal way (Teece, 2014). This requires prioritization of a myriad of key initiatives such as prudent cost control, revenue optimization, and competitiveness for businesses to this smoothly. When pricing, many resort to aggressive market-driven pricing tactics and cost-cutting methods to increase profits. In addition, enterprises wish to win in a competitive environment through product and service innovation and also seek specific markets or distinct capabilities (Teece, 2014). Moreover, Basically, the efficient utilization of resources (money, people and technology) is one of the most important things to support consistent high output with minimal costs for the firms to thrive and grow.

Operational success for a company requires optimum utilization of resources (money, people, technology), whereby costs are minimized and high levels of output are sustained. A more suitable operational resource utilization leads to profitability and production improvements (Teece, 2014). Closely related, capacity utilization is one important statistic for the economy which reveals how much of their production resource factory or company uses to produce goods. Capacity utilization is

found by dividing actual output by the maximum possible output if you were producing and selling every product at full capacity.

Companies are quite likely to gain from high-capacity utilization. It frequently means that resources, such as personnel, machinery, and capital, are being used efficiently, resulting in improved operational performance and financial sustainability (Chiu et al., 2016). Furthermore, organizations who use a big amount of capacity will experience economies of scale in their infrastructure spending. In addition, high-capacity utilization enterprises also have economies of scale; higher the output levels, lowered the cost per unit expenditure as fixed expenditures (like rent and salaries) are spread over increasing number of units (Gandhi et al., 1985). This reduces the cost which can be passed on via flexible pricing, greater profit margins and competitive advantage for the company.

However, inefficient capacity usage might have a detrimental consequence. Firms produce at less than their full potential capacity, which means they are not functioning at the minimal average cost or the lowest per-unit cost for their output. This inefficiency prevents the corporation from competitively pricing its products, resulting in lower revenue (Harrison et al., 2021). Furthermore, underutilized capacity frequently leads in squandered financial and human investment capital, jeopardizing a company's potential to increase production.

Furthermore, idle capacity is a significant waste of capital and human resources, jeopardizing a company's output and financial potential (Tushman et al., 2005). Extended underutilization could have further dampened the appetite of investors, making it more difficult for such enterprises to raise such funds for their growth ambitions (Jensen et al., 2017; Schnellenbach, 2024).

Capacity utilization has an impact not just on individual enterprises, but also on the entire economy. The rate of capacity utilization is not only a company attribute, but also an important economic indicator that measures the efficient use of the bare minimum of production resources. High-capacity utilization ratios are often associated with strong economic performance because huge segments of industries are virtually always operating at full capacity, resulting in higher outputs, employment levels, and profitability. Low-capacity utilization, in comparison, indicates that instead of undercutting prices to capture the greatest market, productive capacity is introduced, resulting in high prices per unit, decreased profit levels, and slow economic development (Schierding et al., 2016). The global economy is Not only does capacity utilization effect individual enterprises, but the international economy is integrated through various exchanged products and services, as well as investments, thus big changes in capacity utilization in some major economies have worldwide implications. On the other side, during the 2008 financial crisis, the significant drop in the percentage rate of capacity utilization exacerbated the global slowdown in economic expansion (McConnell et al., 1986).

The utilization of capacity differs regarding developed and developing economies. Worldwide, developed countries generally have better capacity utilization levels because the technology used is better, the infrastructure is well developed and the demand is more predictable. However, these economies remain open to economy shocks. For instance, demonstrating susceptibility of even the most advanced countries for example, the COVID-19 pandemic eroded through the actual capacity utilization significantly (OECD, 2020). On the other hand, cross-country fluctuations in capacity utilization are relatively higher among emerging economies due to, inter alia, infrastructural shortcomings, political instabilities, and dependency on export destinations (Easterly & Levine, 2016). Evaluations have revealed that the capacity utilization of many African and Latin American countries is contingent on the profitability of primary commodity industries.

This research compares the utilization of capacity within developed and developing nations in order to distinguish the dynamics of the two. Although both developed and developing countries are charged with the responsibility of enhancing production efficiency, factors that affect capacity utilization vary. Industrial relations flexibility, technology advancement, and policies contribute to

achieving high levels of capacity utilization of industrialized countries by (Baily & Montalbano, 2018). However, according to Hausmann et al. (2008), emerging economies exhibit structural constrains, which include poor infrastructure, low industrialization, and openness to foreign markets that might hinder their potential output realization. Eberly et al. (2008) lack dynamic aspects in emerging economies, while Bigsten et al. (2009) lack cross-country comparisons of developing countries. Tobit regression analysis offers a better perspective to this work. This work, with Tobit regression included, gave more understanding of how capacity utilization may be enhanced in a number of conditions in the economic system.

The objectives of this research are threefold:

1. Identifying the factors that influence capacity utilization across countries.

2. Identify the factors that influence capacity utilization in developing countries.

3. Evaluate the factors that influence capacity utilization in developed countries.

This work is important because it has the ability to shape both research in academia and policymaking. An essential economic measure is capacity utilization which shows how much capacity a country or a corporation uses, and identifies areas in need of improvement.     In most poor countries, institutional and structural limitations such as insufficient infrastructure, power outages and lack of financial availability impose a limit on capacity utilization. This could lead to huge economic growth. On the other hand, industrialized countries have different challenges to face, where innovations and competition should be accorded a higher weight since they need high capacity utilization.

By studying these aspects in different economic contexts and providing policymakers and corporate executives with insights into them, this study offers important insights for building specific strategies to optimize capacity utilization. Second, the study attempts to contribute to the literature by providing practical recommendations on how to maximize capacity utilization and improve global economic performance.

Rest of the paper is structured as follows. Next section presents the review of relevant literature. The third section explain the data and methodology of the study. In the fourth section the results are explained in the light of literature. And the last section, section 5, concludes the whole study.

## 2      Literature Review

Capacity utilization is an important measure of economic health of firms and countries alike, the extent to which a firm's production capacity is being used efficiently is indicated by it. Much scholarly interest has been given to the differences in capacity utilization between developed and developing countries. In this section, we review the recent literature to examine the factors determining capacity utilization, comparing between developed and developing economies, and highlighting the key challenges and opportunities.

Availability of infrastructure and the technology is one of the most important factors that determine capacity utilization. Higher capacity utilization is provided by advanced infrastructure and high-tech in developed countries. This means that firms in these economies can better manage, optimize and manage production processes (Schierding et al., 2016). Research has proven that technology adoption brings about greater resource allocation efficiency, and higher output levels, which in turn increases capacity utilization rates (Chiu et al., 2016). Studies also show that firm characteristics significantly affect the capacity utilization of firms (Ume et al., 2021), like firms' size, age, ownership structure, and managerial experience (Goel & Nelson, 2021). Rahmouni (2021) found that capacity utilization is negatively related to the firm's experience in export. On the other hand, developing countries have poor infrastructure, limited access to advanced technology, which results in lower and more volatile capacity utilization (Hausmann et al., 2008). Manufacturing productivity is hampered in many

emerging economies because of limited access to reliable energy sources, as identified by Baily and Montalbano (2018), especially limiting the capacity utilization levels.

In developing countries, capacity utilization is influenced a great deal by market dynamics. Informal competition, which occurs outside the regulated market environment, yields an environment in which firms have to confront the challenge of inconsistent market demands and underpricing that adversely affect capacity utilization. Recent studies show that informal firms often run at lower capacity because of financial constraints and lack of access to formal markets (Easterly & Levine, 2016). However, firms in countries at higher levels of development benefit more from stable market structures, a dependable demand and good regulation, which in turn translates into more predictable and a higher capacity utilization (Jensen et al., 2017). In addition, as indicated in the literature, when industrialization and market sophistication are present in developed countries, capacity utilization rates are increased better by the degree of alignment between supply and demand (Tushman et al., 2005).

Among the most important determinants of capacity utilization is financial constraints, especially for developing countries. Lack of credit and capital in these economies limits the firm capacity to invest in production capacity, and hence lowers utilization (Jensen et al., 2017). Yet, it is foreign ownership that to some degree alleviates some of these constraints. Foreign firms study brings capital, technology and managerial knowledge, which then helps to raise capacity utilization in emerging economies (Baily & Montalbano, 2018). Foreign ownership has a particularly strong effect on sectors that require large investment in technology and infrastructure, which are rarely within reach of domestic firms in developing economies (Schierding et al., 2016).

Energy constraints in many developing countries are a significant bottleneck towards high levels of capacity utilization. Production processes are subject to frequent power outages and inconsistent energy supply causing suboptimal capacity usage (Bigsten et al., 2009). Corruption in the public and the private sectors alike exacerbates the inefficiency with which resources are allocated, including energy, limiting firms in their ability to optimally produce (Eberly et al., 2008). Firms in developed countries are benefited by the steady and efficient energy supply that facilitates higher levels of capacity utilization (OECD, 2020).

In economies essentially integrated with global supply chains, capacity utilization is determined by export orientation. Demand for firms' products in developed countries, because of their strong international trade networks, is more stable and predictable than that in developing countries, resulting in higher capacity utilization rates (Schierding et al., 2016). The developing countries with strong primary commodity reliance, on the other hand, tend to experience greater fluctuation in capacity utilization levels. Global commodity price volatility and geopolitical risks are driving these fluctuations, affecting levels of demand and output in these economies (Hausmann et al., 2008).

The government ownership of enterprises in both developed and developing countries can induce a mixed result of capacity utilization. Firm efficiency of government owned firms in developing economies, especially those lacking in competition and bureaucratic inefficiencies (Harrison et al., 2021). On the other hand, governments may increase capacity utilization by investing actively in infrastructure, deregulating industries, or creating incentive for innovation (McConnell et al., 1986). Governments in developed countries sometimes possess regulatory power to support capacity utilization through competitive markets and technological innovation that increase efficiency in production processes (Teece, 2014).

Capacity utilization is driven more and more by digital readiness and managerial expertise. On the other hand, as industries digitize, the need to employ digital tools to manage resource, optimize supply chain and produce schedule become inevitable (Teece, 2014). Firms in developed countries utilize capacities much more efficiently than other firms, because digital infrastructure is so advanced there. In developing countries, for example, inefficiencies result from the lack of digital readiness

(Harrison et al., 2021). Optimizing capacity utilization (Gandhi et al., 1985) also requires managerial experience, especially in managing in complex market environments.

*Conclusion*

The determinants of capacity utilization differ considerably between developed and developing countries. Superior infrastructure, technology and stable market structure favors the capacity utilization in developed countries and hence capacity utilization in developed countries are higher and more consistent. On the other hand, developing countries are faced with energy constraints, financial limitations, informal competition, and political instability – all of which hamper its capacity utilization potential. Developing countries are advised to improve infrastructure, improve access to finance and foreign investment, whereas developed countries have to improve innovation, they have to be digital ready and so on meet and maintain capacity utilization levels.

## 3 Data and Methodology

We provide a detailed theoretical foundation for the econometric investigation in this section that examines capacity utilization (CU) among developed and developing countries from 2007 through 2023. The data need to be properly appraised and the significance of this investigation properly explained and this must be through a robust theoretical framework. This section describes the crucial variables and the comparative analysis framework that evaluates critically the essential elements affecting CU for developed and developing countries. The selected period is the best data available from the World Enterprise Indicator Survey to represent representative data. On the bases of rigorous review of literature, the study has developed following model to explain the determinants of capacity utilization.

$CU = \beta_0 + \beta_1 (Mng\_exp) + \beta_2(Age) + \beta_3(Large\_own) + \beta_4(Forign\_own) + \beta_5(Govt\_own) + \beta_6(Legal\_status) + \beta_7(Power\_out) + \beta_8(Own\_web) + \beta_9(Total\_exports) + \beta_{10}(Annual\_sales) + \beta_{11}(main\_mkt) + \beta_{12}(Informal\_comp) + \beta_{13}(Innovation) + \beta_{14}(Inno\_foreign) + \beta_{15}(Finance) + \beta_{16}(Purchase\_credit) + \beta_{17}(Formal\_training) + \beta_{18}(Fulltime\_emplyees) + \beta_{19} (Obstacles)+\in$…………………………………………………………………………………….(1)

To model dependent variables that have been truncated or censored, like in our case, Tobit regression is suitable estimation technique. Truncation is the process of excluding observations outside of a range from the sample, whereas censoring is the practice of only observing the dependent variable inside a specific range. When a large number of data have the same value at a boundary, like zero, the Tobit model is especially helpful. Tobit model coefficients explain the relationship between the independent variables and the latent variable y. Compared to standard linear regression coefficients, Tobit model coefficients take into account the latent variable's underlying distribution as well as the censoring mechanism. Therefore, this study utilizes the Tobit model to estimate the regression coefficients in equation 1. The description of the variable in equation 1 is provided in Table1.

**Table 1**

**Description of Variables**

| Independent variables | Definition | Measurement |
|---|---|---|
| **CU** | Capacity utilization of firms | Percentage |
| **Mng_exp** | top manager experience in this sector | Years |
| **Age** | what year was this establishment formally registered | Years |
| **Large_own** | what % of this firm does the largest owners own ? | Percentage |

| | | |
|---|---|---|
| **Forign_own** | % owned by Private Foreign Individuals, Companies Or Organizations | Percentage |
| **Govt_own** | % Owned By Government/State | Percentage |
| **Legel_status** | Legel status of the firm | Likert scale |
| **Shareholding company with shares traded in stock market** | Shareholding company with shares traded in stock market | 1 |
| **Shareholding company with non-traded shares or shares traded** | Shareholding company with non-traded shares or shares traded | 2 |
| **Sole proprietorship** | Sole proprietorship | 3 |
| **Partnership** | Partnership | 4 |
| **Limited partnership** | Limited partnership | 5 |
| **Power_out** | Over last FY, Did This Establishment Experience Power Outages? | 1(yes) , 0(no) |
| **Own_web** | Establishment has its own website | 1(yes) , 0(no) |
| **Total_exports** | % of sales: Direct exports + % of sales: Indirect exports | Percentage |
| **Annual_Sale** | First Product/Service, Percent of Total Annual Sales | Percentage |
| **Main_product** | In last FY, main market for establishment's main product | |
| **Local_mkt** | main product sold mostly in local market | 1 |
| **National_mkt** | main product sold mostly in national market | 2 |
| **International_mkt** | main product sold mostly across the country | 3 |
| **Informal_comp** | Does This Establishment Compete Against Unregistered Or Informal firms? | 1(yes) , 0(no) |
| **Innovation** | During the last three years, has this establishment introduced new or significant product | 1(yes) , 0(no) |
| **Inno_foreign** | interaction term of foreign ownership and innovation. | Percentage |
| **Finance** | % Of Working Capital Financed By Other (Money Lenders, Friends, relatives) | Percentage |
| **Purchase_credit** | % Of Working Capital Purchased On Credit/Advances From Suppliers customer | Percentage |

| | | |
|---|---|---|
| **Formal_traning** | Formal Training Programs For Permanent, Full-time Employees In Last FY | 1(yes) , 0(no) |
| **Fulltime_employees** | Num. Permanent, Full-Time Employees At End Of 3 Fiscal Years Ago | Numbers |
| **Obstacles** | | |
| **Access to finance** | How Much Of An Obstacle: Access To finance? | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Access to land** | How Much Of An Obstacle: Access To Land? | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Business licensing &permit** | How Much Of An Obstacle: Business Licensing And Permits | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Corruption** | Corruption | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Courts** | Courts | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Crime, theft and disorder** | Crime, theft and disorder | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Custom & trade_regulations** | Custom and trade | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Electricity** | Access to electricity | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Inadequatly_educated_worker** | Inadequately educated workers | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Labor_regulations** | Labor related regulations | 0(No obstacle), 1 (Yes it is an obstacle) |
| **Political instability** | Political instability in a country | 0(No obstacle), 1 (Yes it is an obstacle) |

*Rationale of variables' choice*

*Capacity Utilization (CU):* capacity utilization is used to gauge a company's effectiveness in maximizing its output potential or productivity and growth. A higher value of high CU means that the resources are being used efficiently. Good CU reflects good economic growth resource use while CU low may indicate underutilized resources that may hamper production and exacerbate economic inefficiencies. CU is caused differently in industrialized and developing countries. For example, in developing countries, power shortages and insufficient infrastructure often cramp CU's development; in the industrialized economies, on the contrary, there are innovative requirements and fierce competition.

*Manager's Experience (Mng_exp):* Senior management's industry tenure has direct implications for the strategic efficiency, decision making and resource allocation of the company. These experienced managers enhance operational efficiency in CU, and match output with market demand, in order to promoting market stability and global supply consistency. The experience of the organization allows it to compete in the global markets and ensures both the production capacity and economic stability.

*Firm's Age (Age):* The history of a business reflects the extent of market presence, processes and so on. But older companies tend to have better supplier customer relationships and can more easily navigate the markets of the world. This enables greater supply chain location (as well as greater ability to control such location), affecting global supply and pricing dynamics. Thus, longevity of a company may contribute to the operational robustness and continuity in global markets.

*Ownership Concentration (Large_own):* High ownership concentration has major impact on strategic decisions which determine production, competitiveness, and scale of the world supply. For example, powerful owners might change manufacturing tactics in order to develop, which will change global supply and price trends. Ownership concentration therefore has a major influence on market strategy, as well as international competition, of a firm.

*Percentage of foreign ownership (Foreign_own):* Manufacturing capacity, operational efficiency and integration into the global market improve with foreign ownership. The international capital, management approaches and technology that foreign owners bring to bear with their international ownership usually enhances flexibility in supply chains in global terms. Furthermore, foreign investment may alter a company's competitive position and influence pricing in international markets.

*Government ownership (Govt_own):* In critical areas, government owned shares in a corporation can impose public policy and subsidy objectives that impact the output, market dynamics and pricing. Often, such ownership considers factors other than market efficiency, e.g. economic stability and service affordability, and has the potential to influence global market supply and price through the strategic decision-making of market supply and price influenced by the governmental goal.

*Legal Status (Legal_status):* Both regulatory compliance and taxation depend on the legal structure taken by a company and it also matters how flexible the company is operating. However, some of these legal arrangements allow more aggressive market development investments while others are limited by regulatory constraints that may affect productivity and competitiveness. A company's legal status affects the amount of capacity that a company possesses in building a global presence and the level of success that the company will experience in global marketplaces.

*Power outages (Power_out):* increase the costs of production and reduce productivity which affects supply levels and prices. Outages lasting more than a month reduce output in energy dependent industries, curtailing global supply and raising the possibility of higher prices. Hence power stability is required to improve CU and maintain constant global supply and demand dynamics.

*Website Presence (Own_web):* Global awareness, market reach and trade volume increase with a company's digital presence. Digital flexibility is shown through a website that supports the international market entry and competitiveness, which leads to changes in supply levels and global pricing patterns due to higher market penetration.

*Export activity (Total_exports):* This indicates high export volumes with a company that dominates the international market, something that allows making the company influence global supply chains and pricing trends. Supply and pricing in a number of markets are driven by export-oriented enterprises, which exploit competitive production advantages and market position to shape global trade patterns.

*Annual Sales (yearly_sale):* Market dominance shows up in large annual sales figure, which in turn affect global supply and pricing dynamics. This is commonly used when the firm is a large industry participant and has high sales volumes, firms with high sales volumes can affect global market prices in terms of their production or pricing strategy.

*Primary Market Focus (Main_mkt):* The term is applied to a company's impact on supply chains and prices around the world. Global supply networks are very deeply interwoven with the international focused businesses that produce decisions are vital to market equilibrium and pricing trends in key markets.

*Competition with Informal Enterprises (Informal_comp):* Often, cost advantage of unregistered businesses leads to pricing in global markets. Registered businesses face a problem with their ability to disrupt global supply chains, pricing strategies and market equilibrium as they present a problem for pricing with their competitive pricing.

*Originality (Innovation):* Innovation promotes product diversity and operational improvements, thus enhancing the company by establishing its competitiveness in the worldwide arena. International trade is influenced by companies that are innovative, which tend to meet specific wants, alter global supply and pricing through product differentiation.

*Funding Access (Finance):* Capacity expansion is highly dependent on funding since output, market and global pricing dynamics are all influenced by it. Businesses, well-funded, can help enhance their CU by investing in output growth which has impact on global supply and price stability.

*Credit Purchases (Purchase_credit): Cash* flow and operational flexibility has positive impact on production stability and thus credit purchases. Operational agility may influence supply dynamics and global competitiveness, and may result in the benefits of firms' effective credit handling.

*Formal Training (Formal_training):* It improves worker productivity, which leads to higher production, as well as better operation efficiency. The formal training CU raises also enhances competitiveness and affects global demand and price.

*Fulltime employees (Fulltime_employees):* An increase in a fulltime workforce will increase production capacity and thereby affect market prices and global supply levels. The CU will be strengthened by a greater workforce to affect supply and demand balance and stabilize global pricing.

*Obstacles (Obstacles):* Land access, land access to finance, economic, political, corruption and infrastructure issues may add to costs and restrict the growth of CU. All of which reduce competitiveness: high taxes, regulatory changes, political instability can affect global supply and demand dynamics.

## 4      Results and Discussion

This section presents and explains the empirical findings of this study. First, the statistical summary of all variables is presented in Table 2, and then the regressions results are presented in Table 3.

**Table 2**

**Descriptive Statistics**

| Variable | Obs | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| CU | 53,899 | 76.37303 | 21.84545 | 0 | 100 |
| Mng_exp | 53,216 | 19.87526 | 11.64787 | 1 | 74 |
| Age | 50,407 | 22.43163 | 16.60964 | 0 | 221 |
| Large_own | 45,661 | 77.05392 | 26.81984 | 0 | 100 |
| Forign_own | 53,407 | 7.367143 | 24.32717 | 0 | 100 |
| Govt_own | 53,290 | 0.281066 | 3.82377 | 0 | 99 |
| Legel_status | | | | | |
| Share_non_trd | 53,723 | 0.043333 | 0.203608 | 0 | 1 |
| Share_trd | 53,723 | 0.363252 | 0.480941 | 0 | 1 |
| Sole_prop | 53,723 | 0.335908 | 0.472311 | 0 | 1 |
| Partnership | 53,723 | 0.117454 | 0.321964 | 0 | 1 |
| Limited_part | 53,723 | 0.124863 | 0.330566 | 0 | 1 |
| Others | 53,723 | 0.015189 | 0.122305 | 0 | 1 |
| Power_out | 53,712 | 0.496221 | 0.49999 | 0 | 1 |
| Own_web | 53,803 | 0.418229 | 0.493273 | 0 | 1 |
| Total_exports | 53,439 | 17.08309 | 31.47756 | 0 | 100 |
| Annual_Sale | 53,398 | 86.284 | 20.67386 | 1 | 100 |
| Main Market | | | | | |
| Local_mkt | 53,899 | 0.343346 | 0.47483 | 0 | 1 |
| National_mkt | 53,899 | 0.509564 | 0.499913 | 0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| **International_mkt** | 53,899 | 0.14709 | 0.354199 | 0 | 1 |
| **Informal_comp** | 49,657 | 0.580522 | 0.493479 | 0 | 1 |
| **Innovation** | 53,899 | 1.655133 | 0.47786 | 0 | 1 |
| **Inno_Foreign** | 53,407 | 11.40618 | 39.69095 | 0 | 100 |
| **Finance** | 52,856 | 70.63073 | 33.1352 | 0 | 100 |
| **Purchase_credit** | 52,261 | 10.25547 | 20.34051 | 0 | 100 |
| **Formal_traning** | 53,673 | 0.654146 | 0.47565 | 0 | 1 |
| **Fulltime_employes** | 52,336 | 140.876 | 3804.727 | 0 | 500000 |
| **Obstacles** | | | | | |
| **Access to finance** | 52,504 | 0.136313 | 0.343124 | 0 | 1 |
| **Access to land** | 52,504 | 0.030626 | 0.172305 | 0 | 1 |
| **Business licensing &permit** | 52,504 | 0.027979 | 0.164914 | 0 | 1 |
| **Corruption** | 52,504 | 0.081784 | 0.274038 | 0 | 1 |
| **Courts** | 52,504 | 0.011409 | 0.106201 | 0 | 1 |
| **Crime, theft and disorder** | 52,504 | 0.017389 | 0.130718 | 0 | 1 |
| **Custom & trade_regulations** | 52,504 | 0.039064 | 0.193748 | 0 | 1 |
| **Electricity** | 52,504 | 0.102659 | 0.303516 | 0 | 1 |
| **Inadequatly_educated_worker** | 52,504 | 0.094317 | 0.292272 | 0 | 1 |
| **Labor_regulations** | 52,504 | 0.049139 | 0.216161 | 0 | 1 |
| **Political instability** | 52,504 | 0.09824 | 0.297642 | 0 | 1 |
| **Informal_sector** | 52,504 | 0.102354 | 0.303116 | 0 | 1 |
| **Tax_admn** | 52,504 | 0.038607 | 0.192657 | 0 | 1 |
| **Tax_rates** | 52,504 | 0.130047 | 0.336359 | 0 | 1 |
| **Transport** | 52,504 | 0.039349 | 0.194427 | 0 | 1 |

The descriptive statistics of all variables are reported in Table 2. The results in Table 2 show that we do not have any outliers in our data. This means the regression results, presented in Table 3, do not suffer from the biases generated by the presence of outliers.

**Table 3**

**Results of Tobit Regression**

| | Overall CU | Developing CU | Developed CU |
|---|---|---|---|
| **Mng_exp** | -0.0544*** | 0.0346 | -0.0678*** |
| | (-5.17) | 1.5 | (-5.82) |
| **Age** | 0.000615 | 0.000731 | 0.000219 |
| | 0.08 | 0.05 | 0.03 |
| **Large_own** | 0.0046 | 0.02* | 0.00136 |
| | 0.82 | 1.95 | 0.21 |
| **Forign_own** | -0.00348 | -0.0182 | 0.00723 |
| | (-0.23) | (-0.70) | 0.41 |
| **Govt_own** | 0.0068 | 0.1 | 0.0089 |
| | 0.24 | (-0.80) | 0.3 |
| **Legel_status (Share_non_trd as reference category )** | | | |
| **Sharetrd** | 0.0016 | 0.25 | -0.114 |
| | 0 | 0.24 | (-0.17) |
| **Sole_prop** | 1.777*** | 1.473 | 1.756** |
| | 2.79 | 1.1 | 2.45 |
| **Partneship** | 0.234 | 3.538** | -0.0716 |
| | 0.36 | 2.18 | (-0.10) |
| **Limited_part** | 0.393 | 7.008*** | -0.104 |

| | | | |
|---|---|---|---|
| | 0.63 | 4.55 | (-0.15) |
| **Others** | -0.341 | -3.849 | -0.145 |
| | (-0.33) | (-1.33) | (-0.13) |
| **Power_out** | -0.469* | -0.245 | -0.513* |
| | (-1.92) | (-0.43) | (-1.92) |
| **Own_web** | 2.576*** | 0.302 | 2.748*** |
| | (10.33) | (0.43) | (10.27) |
| **Total_exports** | -0.00966 | -0.0125 | -0.0138** |
| | (-1.55) | (-0.95) | (-1.98) |
| **Annual_Sales** | 0.0977*** | 0.0488*** | 0.104*** |
| | 17.24 | 3.59 | 16.76 |
| **Main_market (Local_mkt as reference category)** | | | |
| | | | |
| **National_mkt** | 2.471*** | 1.871*** | 2.486*** |
| | 9.81 | 2.62 | 9.23 |
| **International_mkt** | 4.375*** | 2.416** | 4.681*** |
| | 7.56 | 2 | 7.12 |
| **Informal_comp** | -0.0671 | -1.323** | -0.28 |
| | (-0.28) | (-2.08) | (-1.08) |
| **Innovation** | 0.580** | 0.931 | 0.809*** |
| | (2.15) | 1.51 | (2.74) |
| **Inno_foreign** | 0.0103 | 0.00845 | 0.00649 |
| | 1.08 | 0.5 | 0.59 |
| **Finance** | 0.0498*** | 0.0362*** | 0.0517*** |
| | 12.14 | 3.46 | 11.65 |
| **Purchase_credit** | 0.0430*** | 0.0735*** | 0.0360*** |
| | 6.32 | 4.82 | 4.8 |
| **Formal_traning** | 1.568*** | 0.36 | 1.856*** |
| | (6.06) | 0.65 | (6.47) |
| **Fulltime_employees** | -3.4E-05 | 0.00438** | -3.3E-05 |
| | (-1.44) | 2.63 | (-1.36) |
| **Obstacles (Access_finance as reference category )** | | | |
| **Access to land** | 2.472*** | 1.776 | 2.446*** |
| | 3.77 | 0.67 | 3.57 |
| **Business licensing &permit** | 1.996** | 5.122** | 1.634* |
| | 2.83 | 2.72 | 2.14 |
| **Corruption** | 2.380*** | -3.328 | 2.507*** |
| | 4.94 | (-1.55) | 5 |
| **Courts** | -1.044 | 3.607 | -1.824 |
| | (-0.95) | 1.44 | (-1.50) |
| **Crime, theft and disorder** | 4.389*** | 3.712 | 4.421*** |
| | 4.58 | 1.4 | 4.31 |
| **Custom & trade_regulations** | 3.518*** | 4.674** | 3.412*** |
| | 5.51 | 2.4 | 5.03 |
| **Electricity** | 2.985*** | 1.987 | 2.985*** |
| | 6.44 | 1.17 | 6.15 |
| **Inadequatly_educated_worker** | -3.454*** | -2.896** | -3.686*** |
| | (-6.93) | (-2.44) | (-6.3) |
| **Labor_regulations** | 4.079*** | 4.382*** | 4.032*** |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
|                       | 7.11     | 2.95     | 6.43     |
| **Political instability** | 2.399*** | 3.866**  | 2.285*** |
|                       | 5.1      | 2.44     | 4.6      |
| **Informal_sector**   | 3.633*** | 2.45*    | 3.709*** |
|                       | 8.03     | 1.67     | 7.75     |
| **Tax_admn**          | 3.331*** | 4.163*** | 3.085*** |
|                       | 4.83     | 2.8      | 3.89     |
| **Tax_rates**         | 3.037*** | 4.021**  | 2.864*** |
|                       | 7        | 3.29     | 6.07     |
| **Transport**         | 5.721*** | 6.887*** | 5.454*** |
|                       | 9.16     | 4.47     | 7.92     |

Table 3 shows how capacity utilization is influenced by a variety of factors across different economic conditions. Managerial experience has a strong negative effect on capacity utilization in developed countries; seasoned managers frequently utilize risk-reducing tactics, which may lower utilization levels (Teece, 1993; Bertrand & Schoar, 2003). However, in developing countries, managerial expertise has insignificant impact, possibly due to varying economic situations and management practices. Firm age also appears to have no influence on capacity utilization across different economies, implying that factors such as management style and technological adoption may be more important in operational efficiency than the firm's age (Coad & Rao, 2008; Evans, 1987).

Ownership concentration has a somewhat favorable effect in underdeveloped countries, but has no meaningful effect in developed countries. This suggests that concentrated ownership may be beneficial in situations with poor governance, as larger stakeholders frequently enforce greater increase operational efficiency (Claessens et al., 2002; Gorton & Schmid, 2000). Foreign ownership, on the other hand, has insignificant impact on capacity utilization, despite the fact that it can lead to increased production. This conclusion shows that, while foreign ownership offers advantages such as improved management and market access, they do not always translate into increased capacity utilization (Douma et al., 2006; Xu & Wang, 1999).

Compared to the non-government owned enterprises, government owned enterprises do not have higher capacity utilization rates because bureaucratic problems impede their use. However, under favorable governance conditions SOEs can compete with private companies, but this is rare (Shleifer & Vishny, 1997; Estrin & Pelletier, 2018). Legal status is more of an advantage in developing countries. Because they produce an efficient environment for business, strong legal frameworks that protect investor rights and reduce transaction costs are linked to improved capacity utilization (La Porta et al., 1998; Claessens & Laeven, 2003). Compared to the shareholder firms with non-traded shares, sole proprietorship in developed and partnership bases companies have higher capacity utilization.

Power outages in developed countries are also costly as they reduce capacity utilization because infrastructure reliability is also important. Frequent power outages impede the operating efficiency and highlight the benefit of building robust electricity infrastructure (Allcott et al., 2016; Grainger & Zhang, 2017). For instance, interestingly, businesses in industrialized nations tend to focus more on digital operations than they do on physical capacity and having a website has a positive relationship with capacity utilization (Brynjolfsson, 2014; DeStefano et al., 2018). The consideration of exports seems to lower capacity utilization for firms marketing internationally, presumably because of hideously complex export rules that distract capacitive resources from managing domestic capacity (Bernard et al., 2006; Greenaway & Kneller, 2007). In total, however, the findings show that managerial techniques, good track infrastructure and legislative environments facilitate capacity.

Also, the reliability of the infrastructure is important since power interruptions limit capacity use, more so in an industrialized country. Findings show that export activities can contribute to productivity and growth increase, but if not under control, export can reduce capacity utilization in industrialized countries. Consequently, robust Overall, the results provide evidence that ownership

structure, business age, and the type of enterprise has a weaker impact on capacity use than it does on management skills or proper infrastructure. However, in both developed and developing countries, annual sales have a significant positive effect on capacity utilization since sales revenue can increase investment in capacity enhancing technologies and thus improve operational efficiency (Hall & Weiss, 1967). when compared to local market, capacity utilization is increased by participation in both national and international markets (Bernard & Jensen, 2004). In developing countries, competition also increases capacity utilization because firms in these economies become more efficient under competitive constraints (Aghion et al., 2009), whereas in rich economies competition has less effect since firms may already be efficient. As expected, the annual sales of the firms are positively correlated with the capacity utilization of the firms. Results also show that the firms targeting international and national markets have higher capacity utilization, as compared to those which sell their products in the local market. Informal competition seems to reduce the capacity utilization of the firms in developing countries.

Innovation has a mixed effect, overall, it is found that the capacity utilization of innovative firms is higher than the non-innovative. This effect seems insignificant in developing countries; this fact can be linked to the poor quality of innovations in such countries. However, the firms operating in developed countries have positive association between innovation and capacity utilization (Nwogugu, 2019). The interaction term of innovation and foreign ownership shows no effect on the capacity utilization of the firms. Access to financing, on the other hand, considerably improves capacity utilization by allowing firms to invest in productivity-enhancing resources, in both developing and developed countries (Beck et al., 2005). Purchase contracts also encourage capacity use in developing and developed markets where reliable supply chains and resource management are critical (Kumar et al., 2012). Formal training shows a positive impact on the capacity utilization of the firms, particularly in developed countries. (Becker & Huselid, 1998). The developing countries seem not to take advantage of formally trained individuals. This fact can be linked to the low quality of formal training in developing countries Workforce size improves capacity utilization in underdeveloped countries, where labor-intensive procedures raise operational production, but capacity utilization in rich economies is more dependent on technological efficiencies (Syverson, 2004). Addressing key obstacles improves capacity utilization, especially in developed countries where overcoming constraints such as supply chain concerns and regulatory hurdles promotes operational resilience and resource efficiency (Porter & Heppelmann, 2014). Our results show that access to finance is the biggest obstacle, because all other obstacles have higher and positive coefficients compared to access to finance. Only inadequately trained labor is observed to be a larger obstacle than access to finance, both in developed and developing countries.

## 5    Conclusion

This paper examines capacity utilization of the firms in developed and developing countries from 2007 to 2023, using data for more than hundred World bank Enterprise Surveys. Capacity utilization, a key indicator of operational efficiency, illustrates how well businesses use their productive resources. The study discovers that firms in poor countries face significant problems, such as power outages, competition from informal businesses, and limited access to finance, all of which impair capacity utilization and efficiency. Firms in developed countries, on the other hand, often achieve higher capacity utilization as a result of continuous availability to capital, reliable energy, and strong infrastructure.

The ownership structure has a significant impact on capacity use in developing countries. Results also show that innovating firms have higher capacity utilization than the non-innovators. Results show access to finance and availability of inputs on credit have crucial role capacity utilization of the firms. Results show that formally trained workers improve capacity utilization of the firms working

in developed countries, however in developing countries the number of full time workers employed ply more important role in improving the capacity utilization instead of formally trained workers.

The findings show that policymakers in developing nations should prioritize reducing external shocks by improving infrastructure, stabilizing the political environment, and enhancing financial access. Digitalization and foreign investment are both significant drivers of increased capacity utilization. In developed countries, there are strong regulatory frameworks and innovation. Overall, this study underlines the importance of context-specific strategies in boosting firms' global competitiveness through better capacity use. The comparative method provides substantial insights into the elements that influence capacity utilization under diverse economic conditions, establishing the framework for future research on emerging trends and their impact on operational efficiency.

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