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Impact of Energy Saving Companies on OPEX Reduction of Mobile Network Operators in Pakistan

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Abstract: ***Energy Saving Companies (ESCOs) are considered as one of the key factors which helps in reduction of Operational Expenses (OPEX) by reducing the consumption of capital power. In this study, through a Questionnaire, the OPEX reduction potential is compared between ESCOs who and their counterparts who charge for their service. SPSS 21 is used to analyse the data. The result shows that ESCOs have offered substantial savings on capital expenditure when compared with their counterparts. This study analyses the effect of Energy Saving Companies (ESCOs) on the Operational Expenses (OPEX) reduction of Mobile Network operators (MNOs) in Pakistan Telecom Sector. The analysis suggests that mobile operator may reduce its OPEX including Fixed Costs and Variable Cost due to reduction in the unit cost for network upgrade works, planning for end-to-end solution for better future network availability and maintenance period should be reduced. The following study has been performed considering a model which distributes energy consumption by fixed cost method in the form of installed capacity. This study explored the potential of ESCOs to reduce OPEX in Pakistan Telecom sector by discussing and analysing the main issues relating to Energy Saving Solutions (ESSs) that are already established in Pakistan. In this context, it focuses on understanding the energy saving potential of mobile operators through reducing operational expenses through high-impact energy management solutions based on smart metering and renewable energy sources.***

Keywords: Energy Saving Companies, ESCOs, Mobile Network Operator (MNO), OPEX reduction, Energy Cost, Energy Saving Solutions (ESSs).

I. INTRODUCTION

This research study is mainly focused on analysing the latest advancements in the telecommunication sector of Pakistan due to outsourcing of energy requirements by the MNOs specially after the incorporation of Energy Saving Companies (ESCOs).

The main driver of energy usage by the telecom sector is mobile base stations. These use as much energy as a small town per annum. Their energy consumption is very high, and the demand is rising day by day in all parts of the world, including developing countries like Pakistan. The service providers like Mobile Network Operators (MNOs) need to cut down on their Energy costs before the government forces them to follow more environmentally friendly equipment and pay lower taxes on their revenues. To reduce their Operational Expenses (OPEX), Service providers, in general, have started implementing Energy Saving Companies (ESCOs) which include the installation of high-efficiency transformers and solar pan-els for lighting, and installing a high-efficiency ventilation system in Base Stations and cooling towers to provide 24/7 services to its customers.

The ESCO sector in Pakistan has been introduced to build an independent market for the power industry, promote and improve efficiency and quality of services, and seek dynamic ways to produce energy and mitigate the associated environmental effects [1]. The rapid growth rate in the commercial load and industrial sector is expected to continue over the next few years. This will be followed by the transformation of this power generation resource base through diversification, de-concentration, and corporatization of the power system that will provide opportunities for ESCO players provide latest statistic be-tween energy supply usages for Pakistan.

Due to the rapidly expanding urban population, the use of cutting-edge equipment and technology, and the growth of users' networks, energy consumption and demand are rising at a high rate internationally. Energy scarcity and rising energy consumption are issues in several nations worldwide. Since many years ago, Pakistan has likewise been dealing with a serious energy dilemma. Energy shortages occurred frequently; now, there are is-sues with energy supply, distribution, and line losses. The population of the nation is increasing at a 2% annual pace. While urban populations in South Asia are expanding at a rate of 3% annually. Nearly half of the nation's population is expected to reside in urban areas by 2025, according to the United Nations Population Division.

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Pakistan is an energy-scarce nation with issues, and the lack of energy, particularly electricity, is having a negative impact on the country's economy.

The nation's power shortfall was over 4,000 MW in 2008, and by the end of 2010, it is anticipated to be over 8,000 MW. Since national energy demand is also rising at an average yearly rate of 5.67%, this issue will only get worse in the future [2]. Pakistan's industrial sector has been severely impacted by the country's electrical crisis, which has also decreased exports overall. An energy ser-vice company, or ESCO as it is more commonly known, is a for-profit or commercial enterprise that provides a variety of energy solutions, including designing and implementing energy savings projects, retrofitting, employing energy conservation methods and models, contract-ing out power generation and energy supply, as well as calculating and managing risk.

Private businesses known as ESCOs design, construct, and finance projects. An energy service company is a business that provides a wide range of comprehensive energy solutions, including power generation and distribution, risk management, energy conservation, energy project designs and execution, and infrastructure outsourcing. The ESCO thoroughly investigates the property, offers an energy-efficient solution, installs the required parts, and maintains the system to ensure energy savings during the payback time. Savings on energy costs are typically reinvested in the project or used to fund capital enhancements that would not be financially feasible over a five- to twenty-year period otherwise. The ESCO will step in if the project doesn't generate a profit on the in-vestment [3].

ESCOs play a significant role in reducing OPEX of Mo-bile Network Operators (MNOs). Energy service companies (ESCOs) are emerging as one of the key asset management players by selling energy efficiency services to telecom operators. ESCOs have been working with MNOs since long time and they now provide solutions to the challenges faced by MNOs in reducing their energy costs. ESCOs play a key role in reducing OPEX of MNOs and drive for continuous cost reduction. The ESCOs enter into an agreement with the MNOs to provide them on-going services related with their networks such as network infrastructure maintenance and management, asset optimization and network management services. Additionally, ESCOs help reduce costs by offloading the responsibilities from MNOs' balance sheet

A. Research Problem

Due to several problems, including rising capital costs, unchecked international competition sparking price wars, customer mobility, and a high cost of services, the Pakistani telecom sector has been experiencing significant financial difficulties over the past several years. Pakistan is experiencing severe electricity shortages. Because of its inadequate domestic energy resources, the nation is severely dependent on importing fossil fuels from overseas.

Energy supply must be sufficient for economic progress. Pakistan has a little industrial capability and would thus require considerable energy inputs to take off. The supply of reliable energy supplies in the future will be a difficult undertaking due to the country's limited energy resource potential. Therefore, now the companies are adopting alternatives options such as ESCOs.

B. Purpose of Study

The Energy Performance Contracts (EPC) gives the consumer a guaranteed amount of energy savings and gives the ESCO a steady stream of income.

Energy performance contracts for most customer-ESCO agreements serve as the foundation for (EPCs). Through the EPC, the client receives a guaranteed amount of energy savings, and the ESCO receives a steady stream of income. ESCO is essential in energy-saving, which further leads firms to reduce their expenditure and enhance their performance [4]. To the best of our knowledge, however, we were un-able to locate any research that looked at how ESCOs affect various companies' financial performance, particularly in the telecom industry. For this reason, it is tried to investigate how ESCOs affected the business performance of various companies in Pakistan's telecom sector.

In this study ESCOs have been playing a vital role in reducing the OPEX of MNOs by providing solar photo-voltaic panels and battery backup systems. This study explains the impact of ESCOs on the OPEX reduction of MNOs in the Pakistan Telecom sector. The adoption of ESCOs may offer the corporate sector to gain competitive advantages and performance of these firms; however, to the best of our knowledge, no study is found to study the impact of facility excellence of ESCOs on competitive advantages besides financial and non-financial performance of Telecom sector of Pakistan [5].

This study evaluates the OPEX reduction of MNOs in the Pakistan Telecom Sector. It analyses Mobile Network Operators' (MNOs) core business functions and their cost structure on a brand level. The study contributes both theoretically and practically. Theoretically, the study is essential as it will fill the existing gap in the literature [6].

C. Objectives of Study

This research aims to achieve below objectives:

1) To analyse the trends in ESCOs, e.g., what is their business model, the total number of ESCOs available in Pakistan, how do ESCOs play a role in reducing OPEX of MNOs, case studies from different countries related to ESCO-MNO partnerships.

2) To analyse the trends in telecom sector expenses reduction techniques, e.g., energy efficiency techniques, energy storage techniques, and energy au-dit techniques as compared to traditional Grid electricity supply.

3) To analyse Energy prices in Pakistan based on Hydroxyethyl Cellulose (HEC) or grid electricity suppliers as compared to traditional grid electricity supply.

4) To determine potential savings from investment by MNOs such as efficiency generated power plants through ESCOs.

5) To critically evaluate the impact of Energy Saving Companies (ESCOs) on the OPEX reduction of Mo-bile Network Operators (MNOs) in the Pakistan Telecom Sector.

The study objectives are to measure the significance level of ESCOs in the power consumption units [7]. The fundamental impartial is to examine the influence of ES-COs on the fiscal presentation of different companies in the telecom sector of Pakistan. Telecom is one of the sectors that is still developing, and the data is usually not utterly available about these firms. Thus, we decide to collect data primary by distributing a questionnaire sur-vey.

The major impartial are:

a) To examine the impact of service quality of ESCOs on competitive advantages of Telecom firms.

b) To inspect the impact of facility excellence of ESCOs on the financial and non-financial performance of different firms in Telecom sectors.

II. LITERATURE REVIEW

A. Energy Crises in Pakistan

The energy industry in Pakistan is in a dire situation. Significant and growing energy shortages, high energy prices, and inefficiencies that prevent the sector from covering all costs are major obstacles. In Pakistan, the biggest problem is the sudden lack of energy. In Pakistan, mostly industrial sectors use a lot of energy. They are susceptible to high rates of energy loss in a variety of industrial pro-cesses, which raises energy costs and reduces productivity. The industrial sectors are negatively impacted financially by this issue, and export markets are also impacted in terms of competitiveness. In various industrial sectors, the cost of energy as a percentage of overall production costs ranges from 20% to 50% [8]. As a result, practically the entirety of its investment programmed is largely dependent on government financing and subsidies. Three categories might be used to categorize specific solutions to the crisis. The first is to close the investment gap, which calls for least-cost investment strategies based on competitive markets, more efficient energy usage, and incentives to control consumer demand in addition to low-cost sup-ply sources (notable hydropower). Second, action must be taken to strengthen sector finances.

B. ESCOs

A for-profit business offering a wide range of comprehensive energy solutions, such as power generation, energy supply, risk management, and the planning and implementation of energy-saving measures, is known as an energy service company (Ensco), often referred to as an ESCO or Ensco. The ESCO thoroughly investigates the property to ensure energy savings over the payback period, proposes an energy-efficient answer, connects the necessary components, and upholds the scheme. Vigour cost investments are frequently put back into the project or utilized to pay for capital improvements that would otherwise be impractical over a five- to twenty-year peri-od. If the project does not provide returns on the investment, the ESCO is typically responsible for making up the gap. The energy efficiency of water pumping systems must be increased. the National Energy Efficiency & Conservation Authority (NEECA), the national focal organization charged with initiating, catalysing, and coordinating energy conservation activities globally, registered 14 private sector entities as Energy Service Companies (ES-COs). We are updating the database of energy auditing firms, energy conservation solution providers, and energy service companies in order to encourage energy efficiency financing. As concerns about global warming and rising as well as fluctuating energy prices develop, energy efficiency (EE) is seen as the cornerstone of sustainable economic growth and energy policy. It is expected that through im-proving EE, the objectives of Energy Saving (ES) and a decrease in overall energy usage may be accomplished in a way that is both effective and economical. This increases national security, lowers production costs, and boosts productivity overall while reducing CO2 (carbon chloride) emissions and other environmental impacts.

An empirical question is whether the ESCO sector raises a nation's EE and lowers its overall energy consumption. First, as mentioned in the previous paragraph, ES-COs offer ES via means of performance-based contracts. Calculating savings, guaranteeing proper equipment maintenance, and validating savings are challenging tasks. Due to their cheap cost, stipulated savings are frequently employed instead of proved savings. Stipulation data, however, cannot ensure either true EE or ES.

A rise in EE does not always mean that ES has been achieved. The effectiveness of EE measures might be de-creased or even eliminated by the rebound effect of an EE improvement. Since EE advancement may not keep up with GDP growth, overall energy consumption will probably continue to rise (i.e., no absolute decoupling happened even though a relative decoupling existed). Even while the creation of ESCOs per se might not even be effective, it is likely that the projects' improved aware-ness, established financial institutions, started policy changes, etc., would result in the consequences of ES. In conclusion, the empirical impact of the ESCO on liveliness usage is unknown, and the size of this result may vary among nations. In our hypothesis from the literature re-view, we conclude following variables:

- H1: ESCOs have positive impact on OPEX reduction of MNOs.
- H2: MNOs performance is positively associated with ES-COs.

C. Portable Construction Site on Solar System

The energy saving companies (ESCOs) in Pakistan Telecom Sector is one of the most effective ways to reduce operational expenses (OPEX) of mobile network operators (MNOs). It can be used by MNOs to save their cost on buying electricity and reduce their expenses. The ES-CO is a company that provides electric power supply to buildings, industrial complexes, offices, or other buildings using green energy. The ESCO gets its revenue from the customers who pay for the electric power supply. It uses a solar system or other renewable energy sources like wind or hydroelectric power to generate electric power and sells it to customers at a cheaper rate than what they could get from other sources such as kerosene oil, diesel, or natural gas.

In today's world where we are facing many challenges like global warming, pollution, energy crisis etc., ESCOs have emerged as a new solution for saving environment and improving economy as well.

The growth of social civilization propels clean, efficient, and practical energy demand in that direction. The transformation of energy production is fuelled by advances in science and technology, which ultimately lead to a balanced growth of human civilization and energy consumption [9]. As the detrimental effects of wireless technology on the environment are becoming more widely recognized, green networks have been designed with energy efficiency as a key component. We think about conserving electricity by turning off some of the base stations. This cost-saving measure has a trade-off: less coverage and a potential rise in the uplink transmission power of mobile de-vices. This might mean that the body was exposed to greater electromagnetic fields.

We use a simple model to estimate the OPEX reduction due to ESCO in Pakistan Telecom Sector. The SIMO (Single Input Multiple Output) based SIMO architecture is used for this purpose. The power consumption and OPEX are obtained for each base station as functions of its location and its operational status (i.e., active, or idle). The results show that ESCO can lead to significant OPEX re-duction for MNOs in Pakistan Telecom Sector. Indicative expressions for the uplink power and coverage probability are produced by our model. The uplink power is calculated using stochastic differential equations under the assumption of an exponential attenuation model for the case of non-negligible interference. We note that turning off base stations lowers the uplink power when the mobiles are not constrained by power, as opposed to little interference [10].

The most pressing issue on a global scale is the rise in energy consumption. Complex data-intensive applications' expansion and development have sparked the construction of massive data centres, which has increased the need for energy. The necessity of energy efficiency is underlined in this article by talking about how cloud computing plays a dual function in both contributing to an increase in energy consumption and reducing energy waste. Energy efficiency techniques are becoming more important in both the private and public sector. The re-duction of energy costs is a major factor that has contributed to the success of many companies. Energy-saving companies (ESCOs) have been instrumental in reducing OPEX and COGS of MNOs. The use of these companies is not just to reduce OPEX but also to increase their revenue by providing solutions that help in lowering consumers' electricity bills.

One of the most important and difficult problems for the development of mobile networks is power supply, which is caused by three causes.

1) The rapid expansion of mobile traffic anticipated raises concerns about the viability of the sector, which now accounts for 0.5% of global energy consumption.
2) The expense of running a network's power supply is now by far its greatest component.
3) It is strategically important to install network infra-structure in developing nations, yet the power grid in these nations is not always dependable. Utilizing renewable energy sources can help resolve these problems.

The occasional difficulty in predicting energy genera-tion profiles, however, is one of their key downsides. The ability to lower Base Station (BS) consumption and adjust it to the quantity of energy available will therefore determine whether a BS can be powered by a renewable energy source or not.

We discovered in the literature that a group of BSs were outfitted with energy storage systems and photovoltaic (PV) panels for electricity. Strategies known as Resource on Demand (RoD) are used to lower cluster energy use and modify it in response to energy availability. The findings demonstrate that resource-of-demand techniques may be successfully used to make off-grid BS deployment practical [11].

ESCOs play a significant role in reducing OPEX of MNOs by providing various services like demand response, energy efficiency and on-site generation. ESCOs are reducing OPEX by providing services to reduce load on the grid, thus saving costs for the MNOs. ESCOs play a role in reducing OPEX by acquiring and managing network elements as well as providing network support. The ESCO's value proposition to the MNOs is to provide access to a large base of potential partners and equipment vendors who can provide fully integrated solutions, act as an independent, objective advisor and provide all technical management services at a cost-effective price.

ESCOs, who can also be referred to as independent power producers or IPPs, are an integral part of the glob-al energy landscape. The emergence of ESCOs in the power sector is not surprising given the fact that ESCOs provide viable solutions to many issues faced by utilities, allowing them to do more with less. ESCOs, working on behalf of MNOs, deliver efficiency improvements through three core areas:

a) Asset management,
b) Load management,
c) Service activation/integration.

D. Operated Cost Parameter

Operated cost is a type of cost for telecom service providers which includes services such as calls, data usage, etc. It is one of the main drivers for the OPEX reduction of mobile network operators (MNOs). To reduce their OPEX, MNOs have been focusing on operational expenses by introducing ESCOs and other new technologies in their business processes.

As per the study conducted by JIBEC on behalf of ECOM-PAK, ESCOs have reduced the OPEX by over 10% in the last 2 years. The main reason for this is that ESCOs can provide services at a lower price than MNOs due to their economies of scale. The study suggests that there needs to be greater focus on operational efficiency at both the corporate level and at individual levels within organizations before any further savings can be made.

E. Theoretical Framework

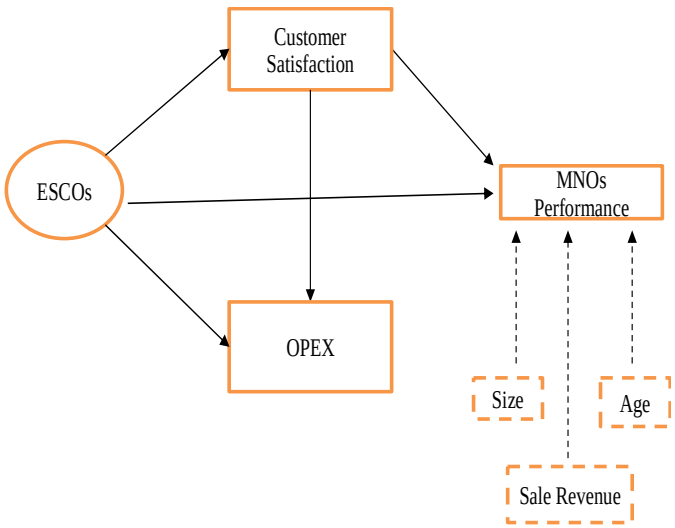


Fig. 1 Theoretical Framework of the Research

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III. RESEARCH METHODOLOGY

The research approach used cross-sectional and quantitative research designs. A self-administrated survey was used as the data collecting instrument in a survey approach. Due to the reduced response rate that an email survey offers, particularly in developing countries like Pakistan, we chose a hardcopy strategy to gather data.

A. Data Collection Process

Data from managers of the telecom industry operating in the twin cities of Rawalpindi and Islamabad have been gathered, and data will continue to be gathered throughout the re-search period. To determine how SECO's service quality affects competitive advantages and the telecom industry's financial and non-financial performance, the current study used a cross-sectional research approach. Because they are better knowledgeable about the strategy and performance of their companies, senior managers in the telecom industry were surveyed using a self-reported questionnaire [12]. Top telecom industry managers running their businesses in the twin cities of Rawalpindi and Islamabad serve as the study's analytical unit. Since all companies involved in Pakistan's telecom business are the study's target demographic, including Ufone, Mobilink PTCL, ZONG, and Telenor, it is not feasible to gather data from all these companies. Instead, we chose to compute data from twin cities like Rawalpindi and Islamabad. We gathered information from these companies' owners and managers, who are the decisions makers. A questionnaire was floated to the target audience to get data from them for the study, which is based on primary data. We used a standard random sample strategy to get the data. The convenience sampling approach was used in this investigation. When selecting them, it was ensured that the respondents had at least supervisory experience.

B. Definition of Proposed Variables

The study uses two dependent variables — firm performance to gauge service quality of ESCOs — and one independent variable — the service quality of ESCOs. The primary constructs in the study framework mentioned above are service quality, competitive advantage, and company performance. Based on the current literature, each of these criteria was quantified using five-point Likert scale statements ranging from strongly agree to strongly disagree.

1) *Independent Variables:* ESCOs (energy saving companies) are companies that have come into existence as a response to the growing energy consumption of the Pakistani industry and population. ESCOs High-quality services and superior features are set at competitive prices is our independent variable. This study analyzes the operation expenses saved by ESCO in Pakistan Telecom Sector.
2) *Dependent variable:* MNOs are the main electricity providers for rural areas of Pakistan. In the present study, we analyzed the cost and the effectiveness of ESCOs in the Pakistan Telecom Sector by using SPSS. The findings suggest that the use of ESCOs reduces OPEX of MNOs provided by reducing OPEX components and reducing OPEX by distributing activities to lower-cost units. On a Likert scale of 1 to 5, where 1 represents "strongly agree" and 5 represents "strongly disagree," the respondents were asked to evaluate themselves in comparison to their rivals before choosing the relevant response for their businesses.

IV. DATA ANALYSIS

The mean and standard deviation (SD) for the 350 respondents is shown in Table 1 below. The observed values for the root mean square (RMS), goodness of fit index (GFI), and comparative fit index (CFI), which should be more than 0.9 for GFI and CFI and less than 0.05 for RMR, were all within acceptable boundaries, as shown in Table 1 below.

TABLE I
DESCRIPTIVE STATISTICS

	N	Min.	Max.	Mean	Std. Dev.
ESCOs	350	1	5	2.81	1.034
Do ESCOs provide satisfactory Customization and custom designs at affordable prices?	350	1	5	2.19	1.331
Land Parameter Reduction Due to ESCOs will reduce OPEX of MNOs	350	1	5	2.14	1.244
Do you think that energy supply (WAPADA) Cost parameters reduce due to energy saving companies (ESCOs), will reduce OPEX of MNOs	350	1	5	2.23	1.328

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Battery backup parameter of MNOs will reduce due to ESCOs.	350	1	5	2.29	1.272
The parameter of windmill reduces due to the installation of ESCOS	350	1	5	2.19	1.305
Solar energy parameter reduces due to ESCOs.	350	1	5	2.31	1.293
The guards pay would decrease due to ESCO involvement	350	1	5	2.31	1.344
Land rent parameter reduces due to ESCOs, reducing OPEX of MNOs	350	1	5	2.15	1.295
ESCOs can reduce the OPEX of MNOs due to building maintenance parameter.	350	1	5	2.19	1.329
Reduction in regulatory authority parameter due to ESCOs	350	1	5	2.28	1.311
Valid N (listwise)	350				

Confirmatory Factor Analysis (CFA) in SPSS is used in this study to evaluate the psychometric properties of the constructs. An alpha value of less than 0.6 is considered to have moderate dependability, whereas an alpha value of more than 0.7 is considered to have high and improved reliability, According to Hair, Money, Samouel, and Page and Sekaran (2003) (2007).

Table 2 below shows the Cronbach's alpha value for a set of constructions. The constructs' psychometric qualities are assessed in this study using Confirmatory Factor Analysis (CFA) in SPSS. An alpha value of less than 0.6 is supposed to indicate a weak dependability, whereas an alpha value of more than 0.7 is thought to indicate a strong and increased reliability, according to Sekaran (2003) and Hair, Money, Samouel, and Page (2007). Table 2 also calculates the Cronbach's alpha value for the internal consistency of a set of constructs, which is close to 1.0, indicating great dependability (Sekaran, 2003). As a result, all constructions were shown to have appropriate dependability because they all above the threshold of 0.70. Additionally, this study's standardized There was a considerable factor loading (probability 0.05). It is established that convergence is valid.

TABLE 2 CORRELATIONS

		ESCOs	MNO
ESCOs	Pearson Correlation	1	.975**
	Sig. (2-tailed)		.000
	N	350	350
MNO	Pearson Correlation	.975**	1
	Sig. (2-tailed)	.000	
	N	350	350
**. Correlation is significant at the 0.01 level (2-tailed).			

The initial four steps were discussed in the beginning of a mediation.

1) First, there needs to be a meaningful relationship between the independent and dependent variables.
2) Second, the independent and mediating factors need to be strongly correlated.
3) Third, there must be a high degree of correlation between the mediating variable and the dependent variable.
4) Fourth, the influence of the independent variable on the dependent variable must no longer be substantial to show that the mediating variable fully mediates the relationship.

These four procedures will help us find the outcomes of the first model, "ESCO's Impact on MNO's Performance Relationship." With a path coefficient of 0.15 (p b 0.001) and the basic fits (CFI = 0.921; GFI = 0.951; RMR = 0.035), they demonstrate a substantial and favorable association between the impact of the ESCO and the performance of the MNO.

TABLE 3 CASE PROCESSING SUMMARY

		N	% age
Cases	Valid	350	100.0
	Excluded *	0	0.0
	Total	350	100.0
* Listwise deletion based on all variables in the procedure.			

TABLE 4
REALITY STATISTICS

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.974	.972	11

TABLE 5 SUMMARY ITEM STATISTICS

	Mean	Min	Max	Range	Max/ Min	Var	N
Item Means	2.28	2.14	2.81	.67	1.32	.04	11
Item Variances	1.65	1.07	1.81	.74	1.69	.04	11
Inter-Item Covariances	1.27	.435	1.76	1.33	4.05	.15	11
Inter-Item Correlations	.76	.313	.996	.68	3.18	.04	11

TABLE 6 SCALE STATISTICS

Mean	Variance	Std. Deviation	N of Items
25.11	158.301	12.582	11

Consequently, hypothesis one is supported in addition to meeting the first need for proving mediation. After the mediators were included and the second model was run to assess ESCO and mediation factors, as well as mediation variables and MNO's performance, were shown to be significantly correlated in H2 and H3. It is important to note that the relationship between the performance of the MNO and the impact of the ESCO has changed significantly (CFI = 0.908; GFI = 0.939; RMR = 0.031). It demonstrates how greater levels of customer satisfaction and contribution advantage completely moderate the relationship between CSR and business performance. H1 and H2 are therefore also supported. (Table 1). Despite all the associations in Fig. 1 being standardized, the results in Table 2 (the penultimate step in the route model to validate mediation effects) are based on unstandardized estimations.1 were generated using standardized beta values. The whole mediated relationship in Table 2 has been confirmed by the findings. There is a considerable association between ESCOs as the independent variable and OPEX Reduction, as well as between competitive advantage and the hypothesized mediating factors, according to Baron and Kenny's (1986) steps to construct a mediated relationship (meeting second step). The dependent variable is predicted by both reputation and competitive advantage gained via customer satisfaction (meeting third step). The association between OPEX and firm performance in the final model is no longer significant when compared to the direct effect model, thereby fulfilling the third condition for proving mediation. The dependent variable, often known as a feedback model, may lead to the mediator. The dependent variable is predicted by both reputation and competitive advantage gained via customer satisfaction (meeting third step). The association between OPEX and firm performance in the final model is no longer significant when compared to the direct effect model, thereby fulfilling the third condition for proving mediation. The dependent variable, often known as a feedback model, may lead to the mediator: GFI, RMR, and CFI are all equal to 0.918. The conventional mediation model (CFI = 0.908; GFI = 0.939; RMR = 0.031) has a little advantage over the reverse model despite the tight relationship between the two fit indices. The standard route model is thus preferred in this study over the reverse path approach. Results and analysis on multiple survey questions are given below.

TABLE 7
ESCOs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	10	2.9	2.9	2.9
	Agree	180	51.4	51.4	54.3
	Not Known	40	11.4	11.4	65.7
	Disagree	105	30.0	30.0	95.7
	Strongly disagree	15	4.3	4.3	100.0
	Total	350	100.0	100.0	

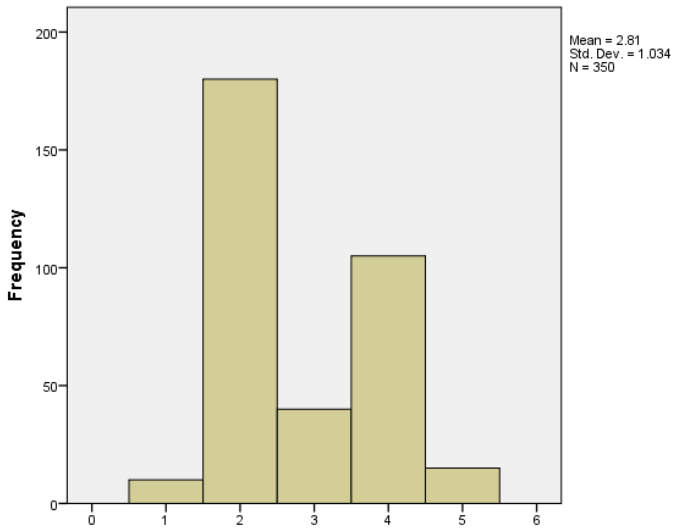


Fig. 2 ESCOs Vs. Frequency

TABLE 8
SURVEY: DO ESCOS PROVIDE SATISFACTORY CUSTOMIZATION AND CUSTOM DESIGNS AT AFFORDABLE PRICES?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	154	44.0	44.0	44.0
	Agree	70	20.0	20.0	64.0
	Not Known	64	18.3	18.3	82.3
	Disagree	29	8.3	8.3	90.6
	Strongly disagree	33	9.4	9.4	100.0
	Total	350	100.0	100.0	

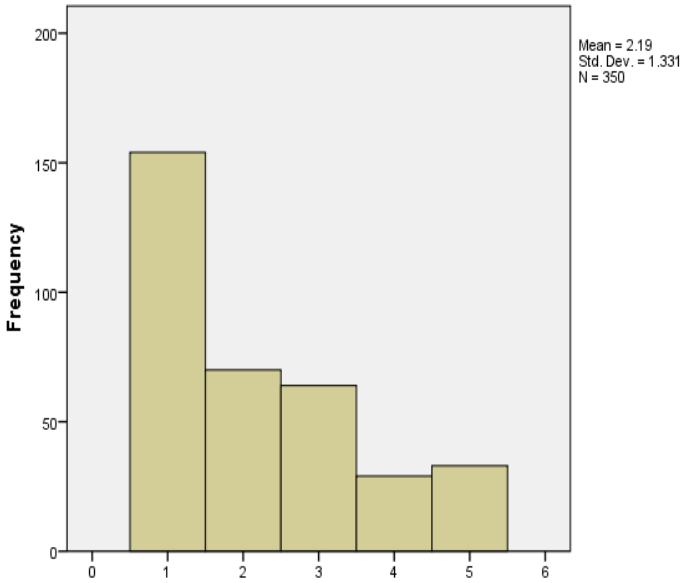


Fig. 3: SURVEY: DO ESCOS PROVIDE SATISFACTORY CUSTOMIZATION AND CUSTOM DESIGNS AT AFFORDABLE PRICES?

TABLE 9
SURVEY: LAND PARAMETER REDUCTION DUE TO ESCOS WILL REDUCE OPEX OF MNOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	146	41.7	41.7	41.7
	Agree	85	24.3	24.3	66.0
	Not Known	70	20.0	20.0	86.0
	Disagree	22	6.3	6.3	92.3
	Strongly disagree	27	7.7	7.7	100.0
	Total	350	100.0	100.0	

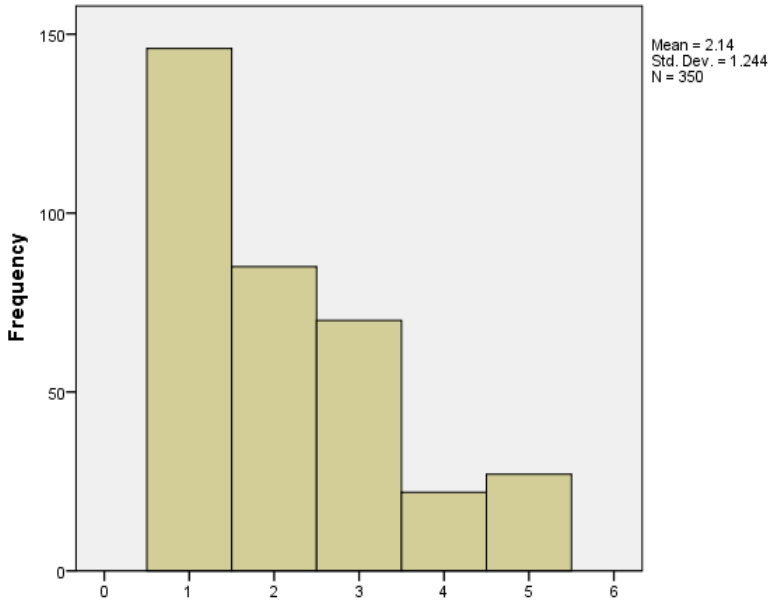


Fig. 4: SURVEY: LAND PARAMETER REDUCTION DUE TO ESCOS WILL REDUCE OPEX OF MNOS

TABLE 10
SURVEY: DO YOU THINK THAT ENERGY SUPPLY (WAPADA) COST PARAMETERS REDUCE DUE TO ENERGY SAVING COMPANIES (ESCOS), WILL REDUCE OPEX OF MNOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	152	43.4	43.4	43.4
	Agree	58	16.6	16.6	60.0
	Not Known	81	23.1	23.1	83.1
	Disagree	26	7.4	7.4	90.6
	Strongly disagree	33	9.4	9.4	100.0
	Total	350	100.0	100.0	

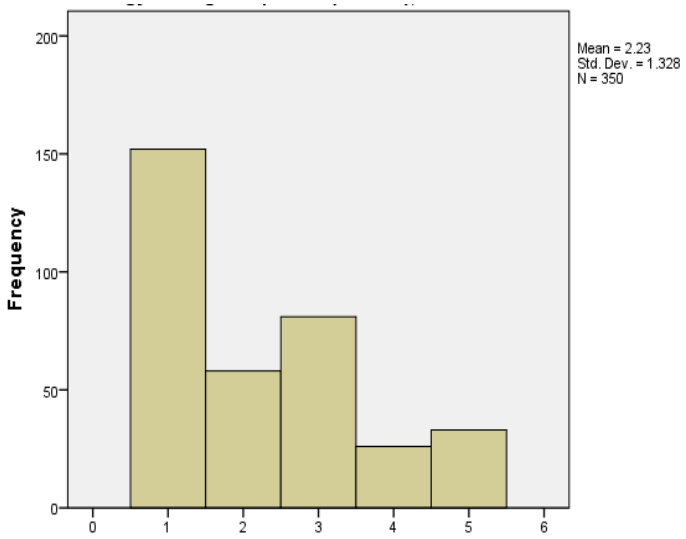


Fig. 5: SURVEY: DO YOU THINK THAT ENERGY SUPPLY (WAPADA) COST PARAMETERS REDUCE DUE TO ENERGY SAVING COMPANIES (ESCOS), WILL REDUCE OPEX OF MNOS

TABLE 11
SURVEY: BATTERY BACKUP PARAMETER OF MNOS WILL REDUCE DUE TO ESCOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	123	35.1	35.1	35.1
	Agree	92	26.3	26.3	61.4
	Not Known	76	21.7	21.7	83.1
	Disagree	27	7.7	7.7	90.9
	Strongly disagree	32	9.1	9.1	100.0
	Total	350	100.0	100.0	

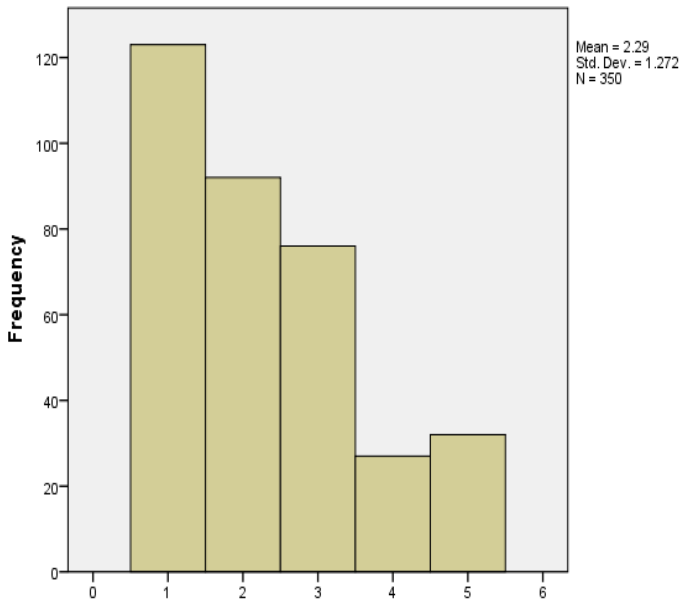


Fig. 6: SURVEY: BATTERY BACKUP PARAMETER OF MNOS WILL REDUCE DUE TO ESCOS

TABLE 12
SURVEY: THE PARAMETER OF WIND-MILL REDUCES DUE TO INCORPORATION OF ESCOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	148	42.3	42.3	42.3
	Agree	75	21.4	21.4	63.7
	Not Known	71	20.3	20.3	84.0
	Disagree	23	6.6	6.6	90.6
	Strongly disagree	33	9.4	9.4	100.0
	Total	350	100.0	100.0	

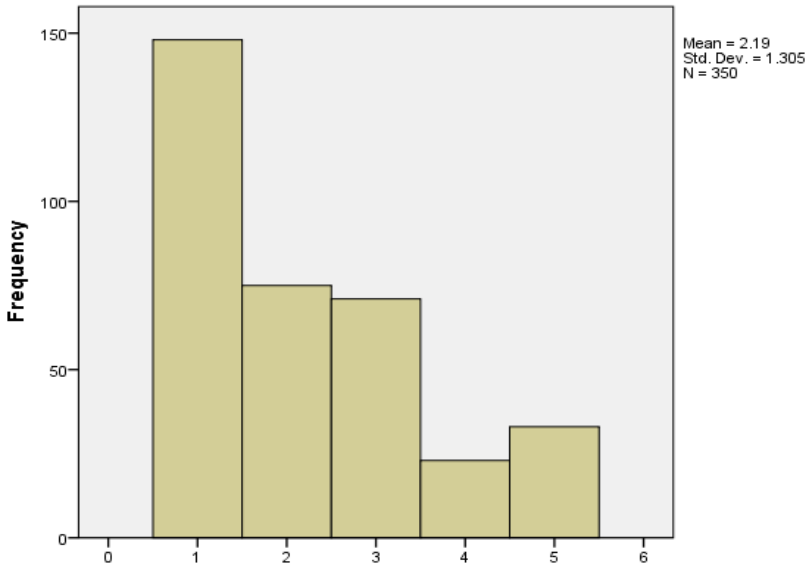


Fig. 7: SURVEY: THE PARAMETER OF WIND-MILL REDUCES DUE TO INCORPORATION OF ESCOS

TABLE 13
SURVEY: SOLAR ENERGY PARAMETER REDUCES DUE TO ESCOS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	129	36.9	36.9	36.9
	Agree	76	21.7	21.7	58.6
	Not Known	82	23.4	23.4	82.0
	Disagree	32	9.1	9.1	91.1
	Strongly disagree	31	8.9	8.9	100.0
	Total	350	100.0	100.0	

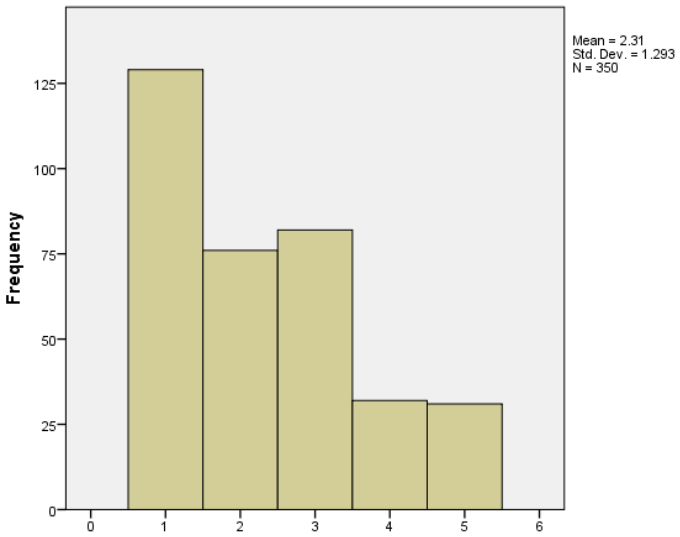


Fig. 8: SURVEY: SOLAR ENERGY PARAMETER REDUCES DUE TO ESCOS

TABLE 14
SURVEY: SITE GUARDS PAY WOULD DECREASE DUE TO ESCO INVOLVEMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	139	39.7	39.7	39.7
	Agree	69	19.7	19.7	59.4
	Not Known	73	20.9	20.9	80.3
	Disagree	34	9.7	9.7	90.0
	Strongly disagree	35	10.0	10.0	100.0
	Total	350	100.0	100.0	

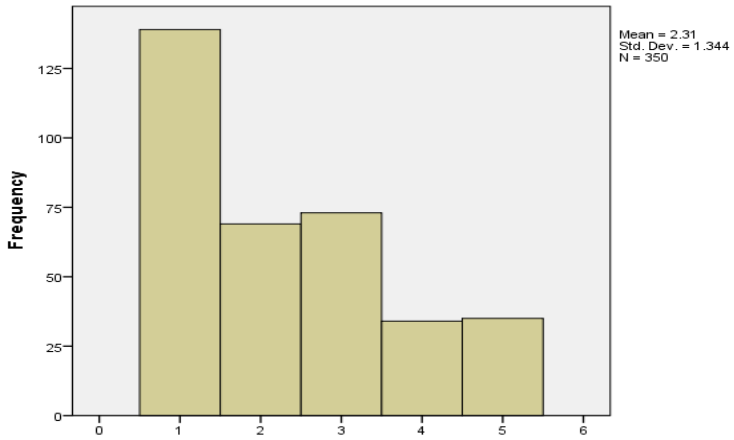


Fig. 9: SURVEY: SITE GUARDS PAY WOULD DECREASE DUE TO ESCO INVOLVEMENT

V. CONCLUSIONS

This research leads to three conclusions:

1) ESCOs have an impact on the performance of MNO.
2) Performance relationship in ESCOs and MNO is completely mediated.
3) Higher customer satisfaction and reputation operate as mediators in this relationship.

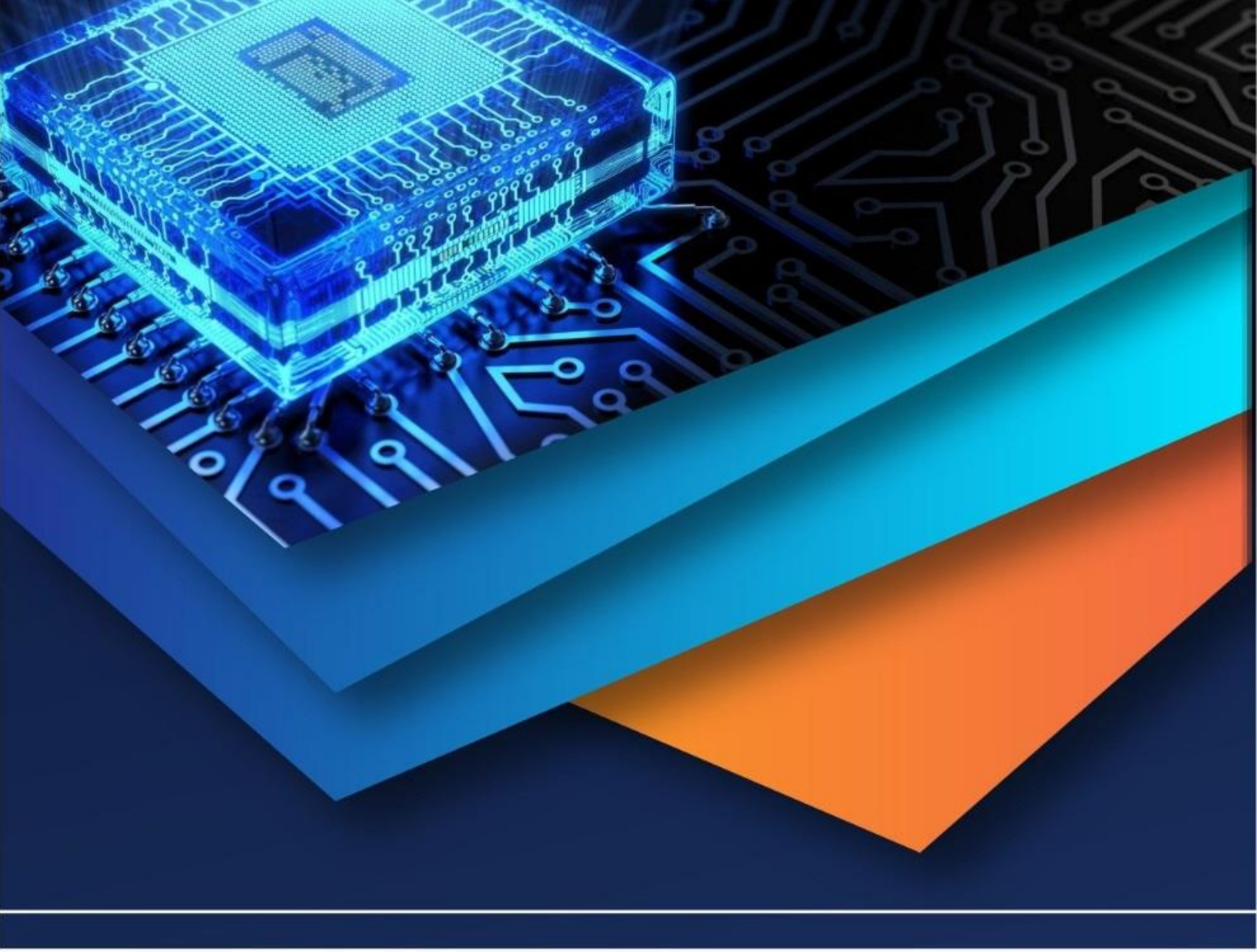
Although evidence reveals that the impact of ESCO was not sufficiently studied in the past in Pakistan's corporate and scholarly contexts and that the amount of ESCOs that enterprises' stakeholders require is high as compared to ESCOs being provided through MNOs (Salehi & Azary, 2009). The outcomes are in line with earlier study, primarily conducted in wealthy countries, which suggested effect of ESCOs was positive.

The outcomes of the present research have a lot of positive effects in the field of ESCO. Along with information, it also contributes in a useful way. By suggesting a mechanism that allows understanding of how ESCO's influence works, reducing a little mystery surrounding the relationship of ESCO's and MNO's performance while increasing the academic contribution on ESCO's impact and knowledge is added that may be related to MNO's performance. Papagiannakis and Lioukas (2012) suggests that managers' perceptions, attitudes, and values significantly affect how an MNO responds to environmental issues, especially in light of stakeholders' rising environmental concerns. The results deepen Iranian company leaders' comprehension of the "Impact of the ESCO's" as an approach to form intangible resources like durable competitive.

Further research must be done concentrating on service industry or similar sectors throughout time as this cross-sectional study only examined the Pakistani Telecommunication Sector and Consumer Industries. Further, it is advised that research on the subject be conducted in other developing nations in the future, as the findings may not be applicable to other nations. The findings from other sectors and nations might then be compared. Another critical problem for future study to enhance MNO’s Performance in the literature is to identify the obstacles that prevent MNOs in Iran and other developing nations from following ESCO’s strategy.

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