Structural Reforms, Services Quality, and the Performance of Distribution Utilities in Pakistan

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Abstract

The study examines the services quality standards and administrative performance of distribution utilities in Pakistan. Study uses the time span of 2014 to 2019 and computes the growth of services quality variables in comparison to 2014. The analysis shows that on average, services delivery of distribution utilities has remained satisfactory. However, the administrative failure of electricity distribution utilities has created hurdles in reducing system losses, number, and duration of interruptions, detecting illegal consumption, and recovering fines that further increases the financial losses in distribution network. Based on the analysis, NEPRA is suggested to enhance the autonomy of distribution utilities allowing them to effectively enforce law and to take legal actions against illegal consumers.

Keywords: Services Quality, Administrative structure, System Losses, Distribution Utilities, Pakistan

Introduction

The electricity markets around the world have experienced market-oriented reforms since the mid of 1980s (Jamasb, 2006; Jamasb, Nepal & Timilsina, 2015). The objectives of these reforms were to disintegrate the state-owned natural monopolies, to unbundle the public sector enterprises, to establish an autonomous regulator, to introduce competition among different market players by allowing private investment in electricity generation, distribution, and retail (Ljung, 2007; Qazi, Jahanzaib & Hussain, 2017). The process of unbundling varies across different countries in terms of ownership structure, legal frameworks, accounting, and functional separation of market segments (Jamasb et al., 2015). However, all types of regulations include adoption of smart technologies, advanced financial schemes, community involvement and cost-reflective pricing schemes (Prasad, 2008). The dynamics of electricity market reforms are different in developed and developing countries (Wamukonya, 2003). Developed countries aim to enhance the efficiency of electricity network whereas, developing countries have focused to minimize the burden of subsidies, recover costs, reduce system losses, and improve service quality (Newbery, 2004; Joskow, 1998).

The reforms process in electricity market is an ongoing process that needs continuous enhancement to optimally reap the efficiency gains (Jamasb et al., 2015). Evidence from developed countries indicates that reforms in electricity market have brought efficiency in terms of reducing losses, improving services quality, and ensuring system reliability (Nepal, Carvalho & Foster, 2016; Sultana et al., 2016; Williams & Ghanadan, 2006). Since the inception of the reforms, various market models have evolved over time. In the beginning, wholesale market model was introduced to allow competition in electricity market so that the consumers can enjoy economical tariffs and incentives (Wolak, 2015). This model was followed by retail market model, which allowed multiple sellers and distributors in electricity market and facilitated consumers with various options to buy electricity (Qazi & Jahanzaib, 2018).

Following the international suit, Pakistan introduced electricity reforms to improve financial, administrative, and operational performance of the sector. An independent regulatory body NEPRA was developed to ensure competition and to protect the interests of customers and buyers (Malik, 2007). In the first stage, reforms resulted in the unbundling of electricity generation, transmission, and distribution segments (See Figure 1). In next stage, a wholesale market was created to introduce private participation in electricity generation which resulted in the involvement of twenty-four private companies in electricity generation. However, transmission and distribution networks are still under the

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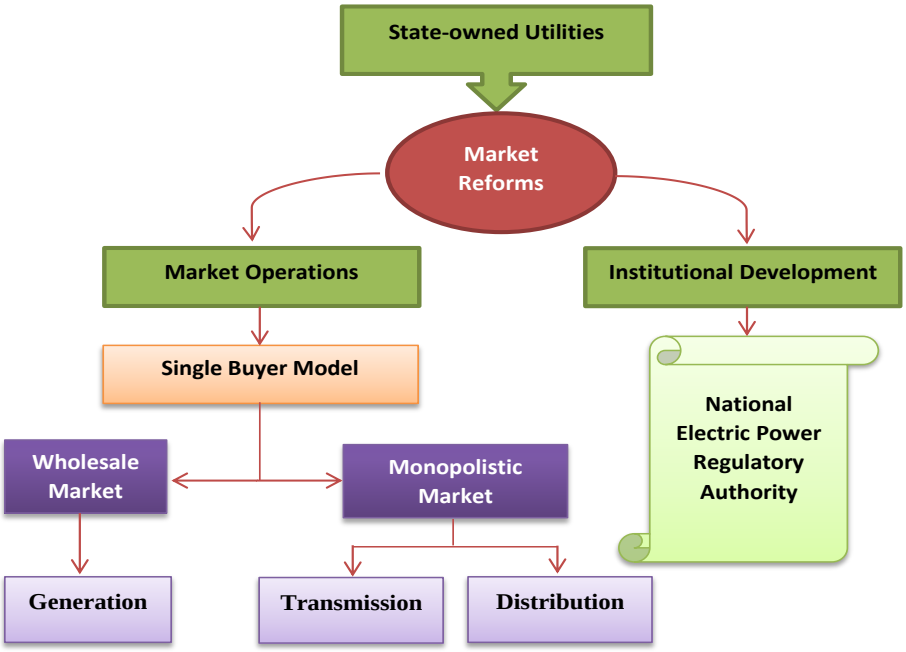
control of government, implying that Pakistan's electricity market is following single buyer model (Bacon, 2019; Qazi et al., 2017).

The relationship between electricity market reforms and services quality has been widely discussed in economics literature (Nepal et al., 2016). Services quality of distribution utilities is defined as minimum number and duration of power interruptions, reduced system losses and continuous supply of electricity (Asubonteng et al., 1996; Sersen & Vorsic, 2008). To reach the optimal level of services quality, distribution utilities must make cost and investment decisions. The decisions regarding operational and maintenance expenditures are essential for system upgradation which is necessary to reduce system losses. The services quality of distribution utilities has a direct impact on the capacity expansion (investment), costs (improved services quality), system losses (electricity theft) and customer satisfaction (uninterrupted supply). The relationship between services quality, cost, investment, electricity theft and electricity supply are presented in Figure 2.

Figure 1: Electricity Market Reforms in Pakistan

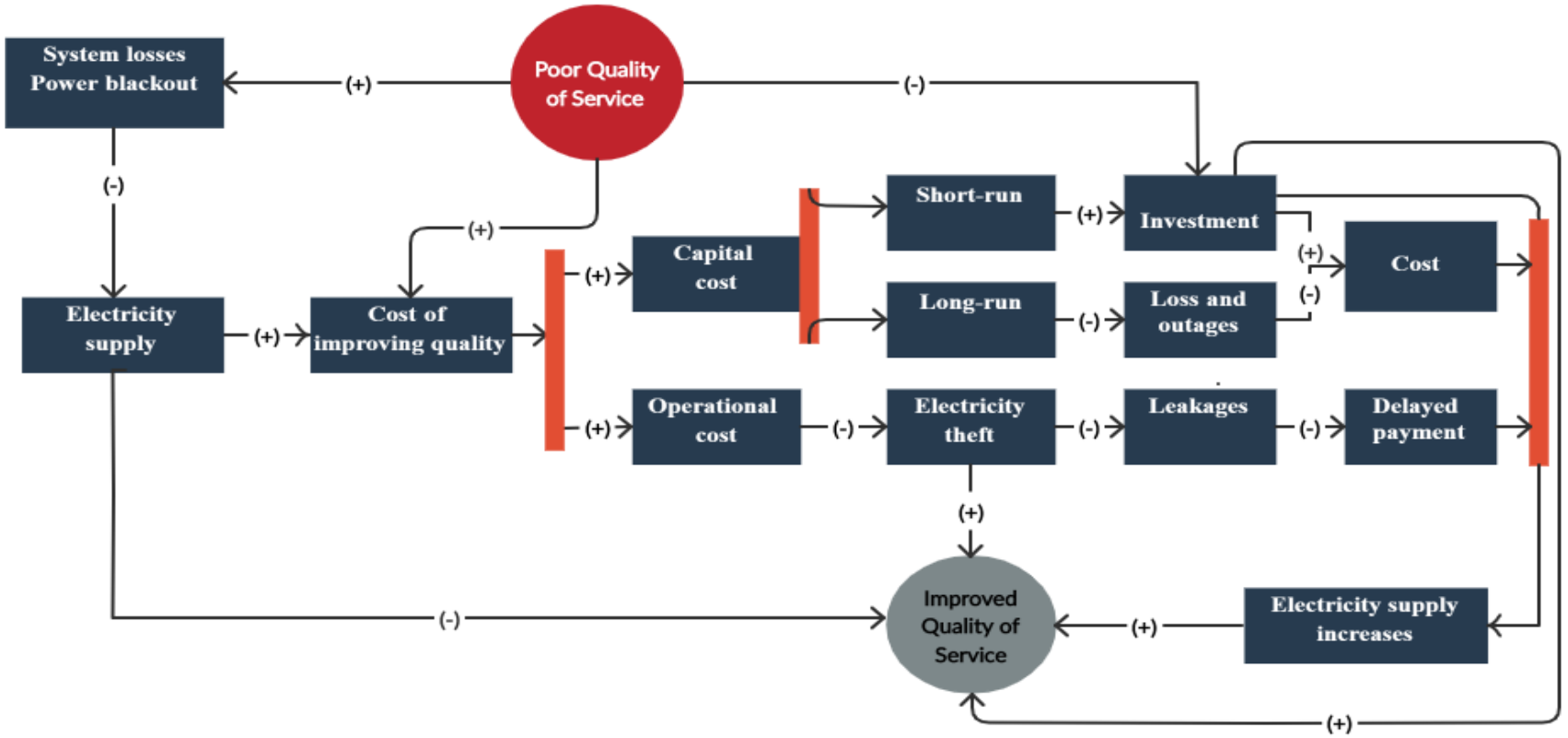


Source: Authors' Own Effort

To enhance the performance of distribution utilities, regulators introduce services quality standards which include the desired and optimal level[i] of customer services (Tahvanainen et al., 2004). NEPRA has also introduced performance standard parameters to improve the performance of distribution utilities (NEPRA, 2015). These standards ensure the performance of distribution utilities by continuously monitoring these parameters. However, evidence suggests that the service quality parameters of distribution utilities are not up to the mark that is significantly affecting the technical efficiency of distribution utilities (Mirza, Rizvi & Bergland, 2021). Therefore, this study contributes to the literature by reviewing the impact of vertical separation on service quality parameters of distribution utilities in Pakistan.

This study fills the gap in existing literature by assessing the performance of distribution utilities in various dimensions including services quality standards and administrative measures and helps to identify the causes of poor performance. Literature shows that structural reforms are essential to ensure services quality of distribution utilities whereas administrative measures are conducive to overcome the problem of electricity theft and system losses (Sersen & Vorsic, 2008; Steadman, 2009; Jamil & Ahmad, 2014). In this regard, this research helps to identify the causes of poor performance of distribution utilities and provides a unique approach solution to policymakers to plan some target-oriented policies to strengthen the performance of electricity distribution utilities. Rest of the paper is structured as follow: section 2 describes the history of structural reforms in the electricity market of

Figure 2: Relationship between Services Quality, Cost, Investment, Electricity Theft and Electricity Supply



Source: Authors' Own Effort, (Adom, Agradi & Bekoe, 2019; Jamasb, Orea & Pollitt, 2012; Cullmann & Nieswand, 2016; Poudineh & Jamasb, 2014)

+ and – sign shows positive and negative effect on variables, respectively.

Pakistan. Section 3 explains electricity distribution network in Pakistan while section 4 discusses the reforms and services quality of distribution utilities. Section 5 examines the role of reforms in improving the administrative structure of distribution utilities in Pakistan whereas section 6 concludes the paper and suggest policies to improve the performance of distribution utilities.

History of Structural Reforms in Pakistan's Electricity Market

Water and Power Development authority (WAPDA) was established in 1958 and remained the semi-autonomous body to oversee the water and power sector projects till 2007 (Kessides, 2013). Transmission and distribution losses remained an important performance indicator of distribution utilities in Pakistan because these losses grew continuously during the 1990s. Although the system losses as percentage of total electricity generated started decreasing during 1980s, the pattern of this fall reversed in 1991. To reduce these losses, the restructuring plan for the development of power sector was approved in 1992.

Although various governments took initiatives to increase investment in the power sector but WAPDA- the state-owned utility remained unable to generate optimal revenues (Khalid & Iftikhar-ul-Husnain, 2016). WAPDA was the centralized authority dealing with various energy resources, which increased the burden on management causing delays in decision making leading to the prolonged hours of load shedding. The inept performance of electricity market adversely affected the economic growth from 1980s and created financial burden for the governments (Khalid & Iftikhar-ul-Husnain, 2016).

In 1992, government of Pakistan decided to take loan from international lending agencies including IMF and World Bank to adopt neoliberal theory and decentralize the power sector to increase electricity generation. As a result, National Power Policy, 1994 opened the operations for private sector investment in the power generation sector. Although, a power policy to set up the private sector Build-Own-Operate (BOO) power plants in the electricity market of Pakistan had been in place since 1986, but the progress regarding private investment remained slow, particularly because of institutional constraints. Therefore, to attract the private investment in the sector, Government of Pakistan created the Private Power and Infrastructure Board (PPIB) in 1994 (Zuberi, 2008).

At the same time, policy framework and package of incentives for private sector transmission line projects in Pakistan were prepared that provided new rules of trade, energy prices and investment in the sector. Under this initiative, Private Sector Energy Development Fund (PSEDF) was established in collaboration with World Bank, USAID, and other lending agencies (GoP, 1995). Later, Kot Addu power plant was constructed in 1996 and NEPRA Act was approved by the National Assembly in 1997. Later, National Power policy 1998 was announced and restructuring process of electricity market in Pakistan started with the unbundling of WAPDA into separate generation, transmission, and distribution segments. The decentralization process ended with 15 entities including 4 generation companies (GENCOs), one transmission company (National Transmission and Dispatch Company, NTDC) and eight distribution utilities (DISCOs) which were later increased to ten[ii] (Rizvi, 2019).

To facilitate the electricity market reforms, ADB supported the country through Energy Sector Restructuring Program (ESRP) (ADB, 2018). The program was intended to increase electricity supply and to stabilize the financial position of the economy of Pakistan. Key reforms under ESRP include the privatization of Karachi Electric Supply Corporation, restructuring of WAPDA, improving the regulatory framework to strengthen power sector, and resolving issues of Independent Power Producers (IPPS). To further increase the investment, energy sector received a series of loans in 2000s under ESRP (ADB, 2014).

The National Power policy was amended in 2002 and ESRP was abandoned because of delays in the privatization of KESC (Saleh, 2020). Although the reforms had been introduced to enhance the performance of power sector, but the sector witnessed an increase in system losses as a percentage of total generation in 2002. As the losses directly affect the performance of distribution utilities, therefore, NEPRA decided to introduce the Performance Standards (distribution) Rules (PSDR) in 2005 (NEPRA, 2018).

Meanwhile, KESC was privatized to meet the requirement of ADB under ESPR (ADB, 2019; Bacon, 2019).

Later, in 2007, WAPDA was further unbundled into two separate entities namely WAPDA and Pakistan Electric Power Company (PEPCO) (IFC, 2006; Qazi et al., 2017). WAPDA is now only responsible for the development of water and hydropower projects. PEPCO is fully responsible for the management of thermal power generation and electricity transmission and distribution, whereas GENCOs, DISCOs and NTDC are working under an independent and autonomous board of directors. In 2007, NEPRA approved the regulatory instruments including distribution codes, grid codes and performance standards for transmission and distribution companies (Khalid & Iftikhar-ul-Husnain, 2016).

National power policy was amended again in 2008 while WAPDA Computer Centre (WCC) was restructured as Power Information Technology Company (PITC) in 2010. During 2012, PPIB was given a statutory authority under the PPIB Act 2012. A national power policy was approved in 2013 and the role of PPIB was further expanded. Under this Act, PPIB was allowed to formulate power policies and to facilitate the infrastructure development projects of IPPs and to construct the hydro power plants in collaboration with provincial governments (Ikram, Su & Fiaz, 2018).

Power generation policy was introduced in 2015 where PEPCO was restructured as Central Power Purchasing Agency (CPPA-G) and was mandated to handle the market operations of NTDC under the rule-5 of NEPRA market operator (Saleh, 2020). The major functions of CPPA-G include power purchase on behalf of distribution utilities, corporate affairs, market development and finance (Valasai et al., 2017). CPPA-G has started working on transition of electricity market from single buyer model to the competitive market. This mandate has helped CPPA-G to change the market model by introducing competition in electricity generation and retail, however, transmission and distribution networks are still regulated and work as natural monopolies (Bacon, 2019). More recently, Alternative and Renewable (ARE) energy policy has been announced to increase the share of renewable energy in overall energy mix of Pakistan (GoP, 2019; Waleed & Mirza, 2020). Electricity generation capacity of Pakistan is increasing to meet the rising demand while at the same time system losses as percentage of generation are increasing. A series of reforms has been introduced to improve the performance of electricity market, but the problems associated with the system losses are getting more pronounced. Therefore, this study reviews the impact of reforms on performance of distribution utilities in terms of services quality standards and administrative management.

Electricity Distribution Network in Pakistan

Electricity reforms resulted in the creation of geographically dispersed distribution utilities that purchase electricity from generation companies through Central Power Purchasing Agency (CPPA-G). Electricity generated in power plants is transferred to the transmission network under monitoring by National Transmission and Dispatch Company (NTDC). Distribution utilities carry this electricity through distribution lines and reduce the voltage level using step-down transformers and supply electricity to residential, commercial, and agricultural customers.

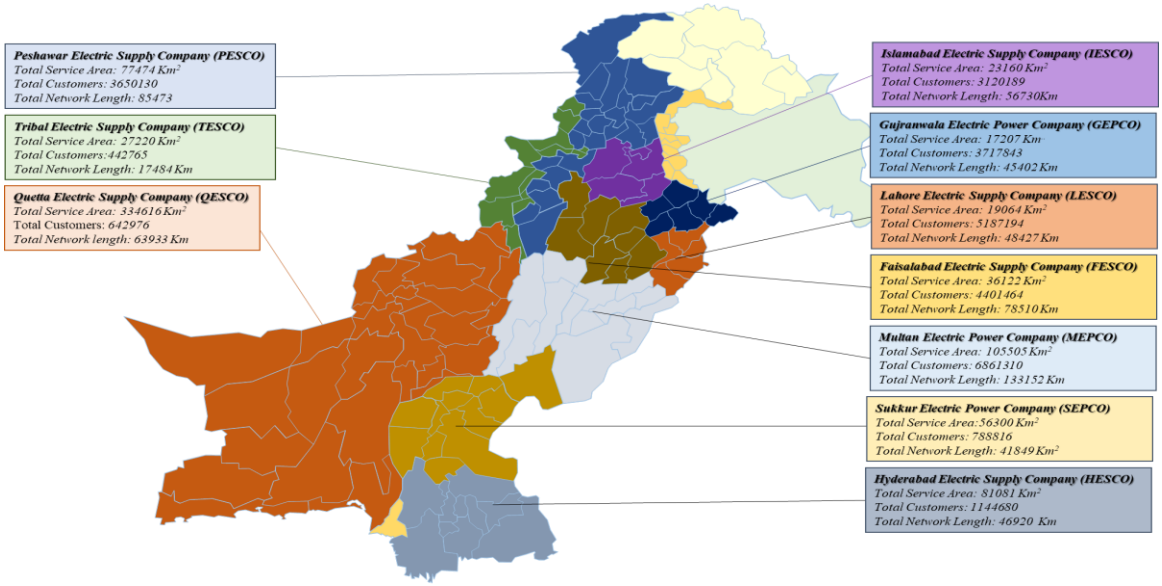
Distribution network in Pakistan is composed of ten electricity distribution utilities that supply electricity throughout Pakistan except for Karachi where electricity is distributed through K-Electric. Figure 3 shows the services areas covered by each distribution utility, indicating that various distribution utilities supply electricity to whole province which significantly increases the cost burden of these utilities. For instance, PEPCO is supplying electricity to whole province Khyber Pakhtunkhwa. HESCO supplies electricity to whole province of Sindh except the areas covered by K-Electric. Similarly, QESCO covers the whole area of Baluchistan except Lasbela whereas MEPCO delivers electricity to all areas under Southern Punjab. TESCO and SEPCO are newly established distribution utilities and are responsible to supply electricity in tribal areas and 56300km^2 area of Sindh, respectively. The services areas shown in Figure 3 clearly depicts that the major problem of distribution network in Pakistan is a small number of utilities which increases their cost and investment burden. Due to provision of services in very large area,

distribution utilities must increase network length and with excessive spread of voltage lines, utilities remain unable to curtail technical and non-technical losses.

Reforms and Services Quality Standards

In the wake of market reforms, NEPRA has introduced required performance indicators to ensure the reliability, quality and safety of electricity supplied to customers. Moreover, time frame for new connections and hours of load shedding have also been included as assessment indicators for

Figure 3: Electricity Distribution network in Pakistan in 2020



Source: NEPRA (2020), Authors' Own Calculation

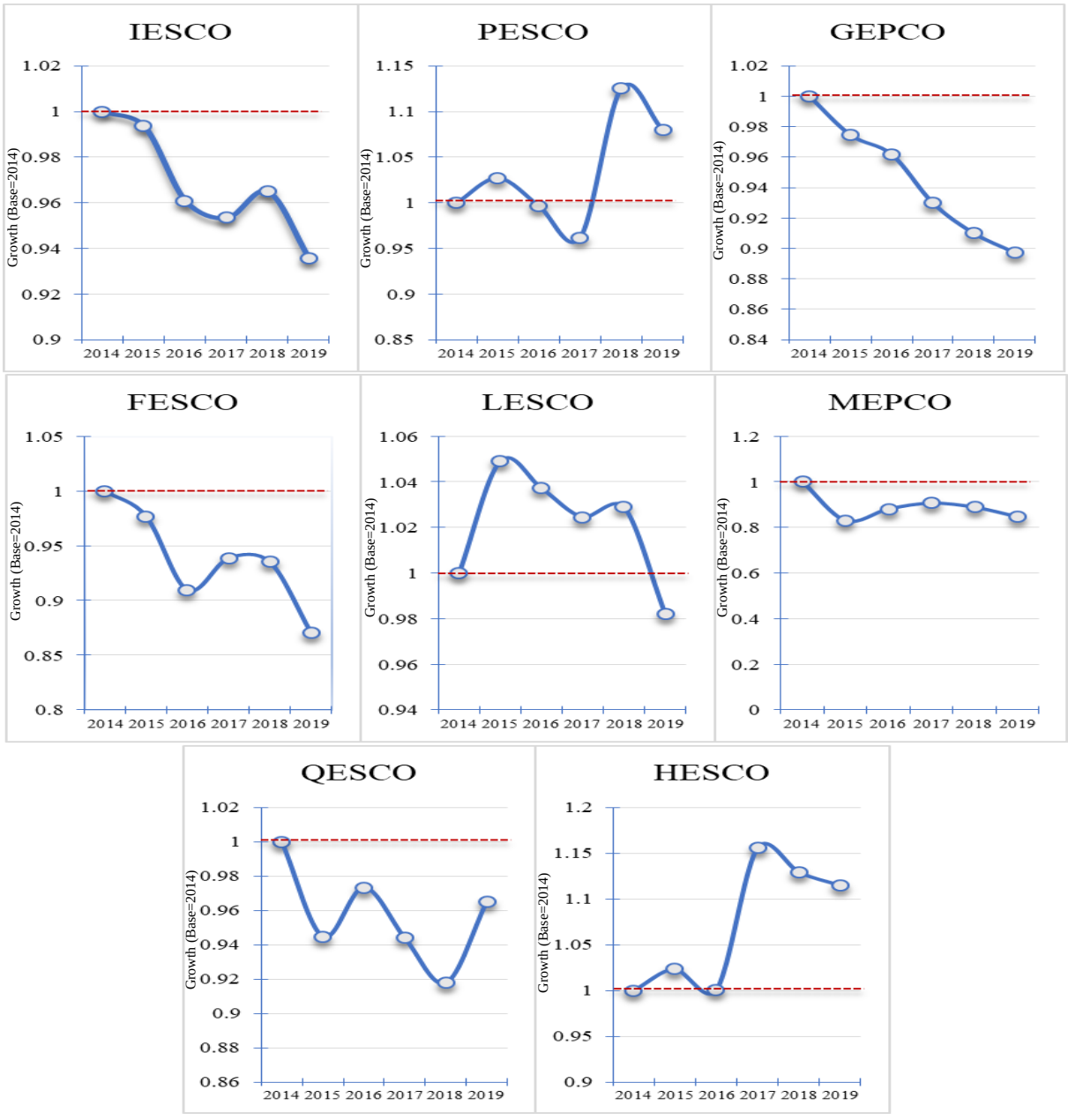
Distribution Losses.

Distribution losses are defined as the difference in electricity that enters the distribution system and leaves the system at customer end (Qazi & Jahanzaib, 2018). Losses include both technical and non-technical losses. Technical losses emerge because of outdated network, overloaded distribution lines and poor installation whereas non-technical losses include electricity theft, hook-ups, and meter tampering (Rizvi, 2019). Distribution losses have remained the issue of highest concern for regulators because distribution losses have the highest share (68 percent) in total transmission and distribution losses alone (NTDC, 2018). Distribution losses are difficult to manage because of poor administrative and managerial capacity of distribution utilities. Although NEPRA gives higher performance ranking to those utilities that minimize their losses, but losses are continuously growing and breeching the targeted level (NEPRA, 2018). Overall, distribution losses stood at 18 percent of electricity generated in 2019 (NEPRA, 2019).

The analysis indicates that distribution utilities have reported a slight decline in distribution losses as compared to the losses in 2014. Figure 4 reflects that IESCO witnessed the drop of 1 percent in losses in 2015 as compared to the losses in 2014. Likewise, the same trend continued in 2018 in which losses dropped by 4 percent as compared to 2014. However, this decline is not satisfactory as GEPCO and QESCO witnessed a drop of 10 percent during the same period. MEPCO has reduced losses considerably in 2018 as it experienced 12 percent reduction in losses compared to 2014. HESCO and PESCO remained poor performing utilities in terms of reducing system losses as both utilities have reported an increase in distribution losses compared to 2014. In comparison to 2014, HESCO reported an increase in the share of distribution losses from 0.02 percent in 2015 to 0.12 percent in 2018 (see Figure 4).

The growth of system losses from 2015 to 2018 showed significant difference in operational efficiency of distribution utilities. Overall, the analysis of share of distribution losses reveals that performance of distribution utilities is unsatisfactory and requires serious attention of policymakers. Although distribution utilities are increasing costs and investment expenditures, but they have remained unable to curtail network losses mainly due to poor financial condition (Qazi & Jahanzaib, 2018). NEPRA has initiated several projects and allocated funds to each distribution utility for upgrading network lines and for reducing technical and non-technical losses. Despite these measures, the performance remained poor which created the need for network upgradation and installation of advanced infrastructure including new grids and installation of new distribution lines (NEPRA, 2017).

Figure 4: Growth of Distribution Losses



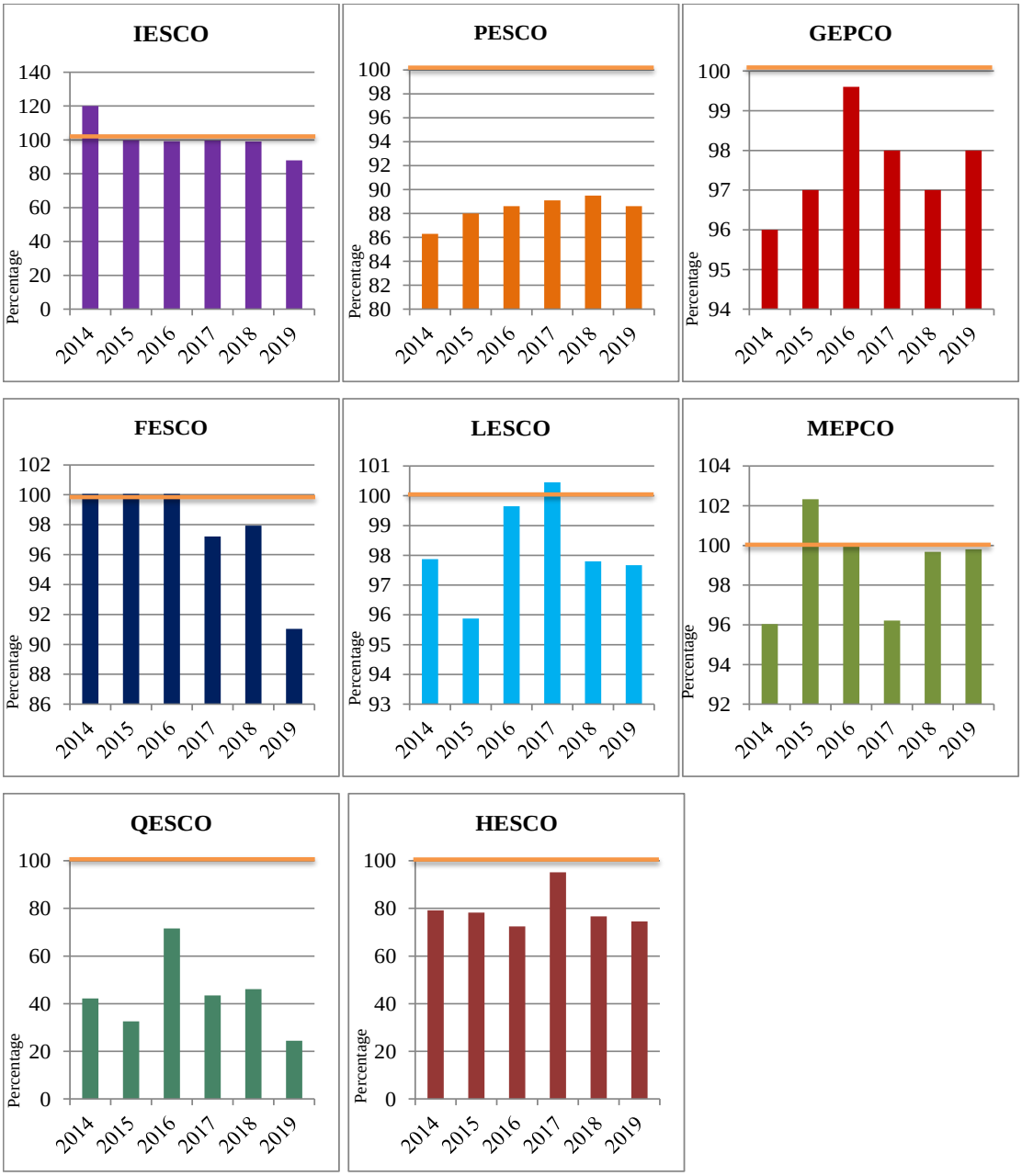
Source: NEPRA (2017-2019), Authors' Own Calculation

The poor performance of distribution utilities to curtail system losses adversely affects the financial position of these utilities. Lengthy distribution lines, poor installation of distribution transformers and limited size of conductors are the main causes of high technical losses which further necessitate the investment and cost expenditures in the network (Qazi & Jahanzaib, 2018; NEPRA, 2018).

Bills Recovery.

The financial loss associated with poor bills collection rate is the major reason for increasing circular debt in Pakistan (Khan, 2014). The analysis of revenue recovery of distribution utilities shows that majority of electricity distribution utilities are not performing efficiently in recovering their bills. Along

Figure 5: Revenue Recovery Rate of Distribution Utilities



Source: NEPRA (2017-2019), Authors' Own Calculation

with transmission and distribution losses, bills recovery is another important services quality parameter which directly affects the financial health of electricity distribution utilities. According to PSDR (2005), recovery is considered as an essential indicator for measuring the performance of distribution utilities and for healthy performance, where each utility is required to obtain 100 percent recovery in bill collections (NEPRA, 2005).

Figure 5 shows the bill collection rate of distribution utilities from 2014 to 2019. IESCO has showed highest recovery rate in 2014 reporting recovery of 120 percent bill in respective year, however, in following years, the recovery rate of IESCO dropped with 88 percent of recovery in 2019. On average, the performance of HESCO and QESCO remained far from satisfactory showing considerable drop-in recovery rate. The revenue recovery rate of HESCO dropped from 79.2 percent in 2014 to 74.5 percent in 2019, whereas the revenue collection rate of QESCO dropped from 42.2 in 2014 percent to 24.4 percent in 2019.

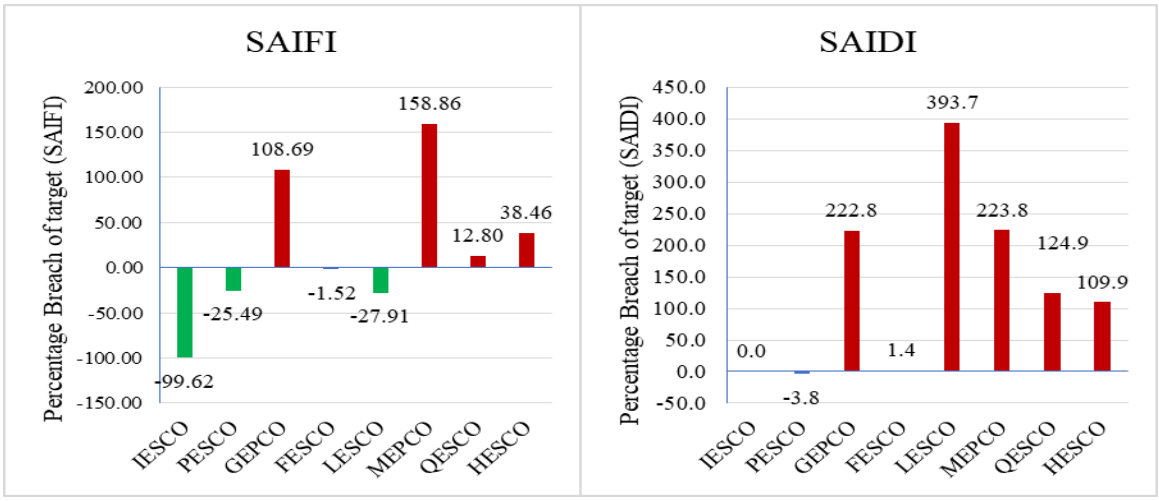
The poor performance of QESCO highlights the lack of administrative measures taken by QESCO to recover 100 percent of bills. FESCO performed better in terms of bills collection during 2014 to 2016 however the bills recovery rate of FESCO has shown decreasing trend since then. The analysis of recovery reveals that size of distribution utilities plays an important role in reaching the target level of recovery because distribution utilities covering small services areas are collecting more bills as compared to other utilities. This could be mainly because these distribution utilities have strong administrative power to recover bills. The outstanding performance of IESCO and FESCO in collection rate shows that these distribution utilities have taken important administrative actions against bill defaulters while the poor administrative power of QESCO, HESCO and PESCO highlights the management issues in these utilities. These utilities are advised to follow the administrative strategies of IESCO and should take serious actions to reach target of 100 percent bills collection. Each year, NEPRA calculates the financial losses associated with the breach of target regarding losses and bill recovery. Overall, the electricity distribution sector experienced financial loss of Rs 171.5 billion as distribution utilities remained unable to recover bills while transmission and distribution losses contributed about Rs 38 billion in loss to NEPRA during 2019 (NEPRA, 2019).

Reliability of Distribution System.

Customer satisfaction is based on reliable and continuous provision of electricity which is possible only if the distribution utilities ensure uninterrupted supply of electricity. NEPRA uses the System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) to examine the reliability of electricity supply. SAIFI is average number of interruptions a customer experiences during a year and a distribution utility must ensure that the limit of SAIFI does not exceed thirteen (NEPRA, 2005). SAIDI is the average duration of power interruption a customer experiences during a year and a reliable distribution network shall ensure that the number of SAIDI does not exceed fourteen (NEPRA, 2005).

Similar to losses, NEPRA determines the target of SAIFI and SAIDI for distribution utilities and measures the performance in comparison to the target set. The analysis of performance of distribution utilities in reducing power interruptions indicates that PESCO, FESCO, IESCO and LESCO performed better as their limits for SAIFI did not breach the target set by NEPRA in 2019. However, in 2019, MEPCO, GEPCO, QESCO and HESCO crossed the allowed target of SAIFI by 158 percent, 108 percent, 12 percent and 28 percent, respectively (see Figure 6). Similarly, Figure 6 shows that all distribution utilities except PESCO, IESCO were unable to reduce duration of interruptions within the targeted limit.

Figure 6: Breach of Target for SAIFI and SAIDI Determined by NEPRA in 2019

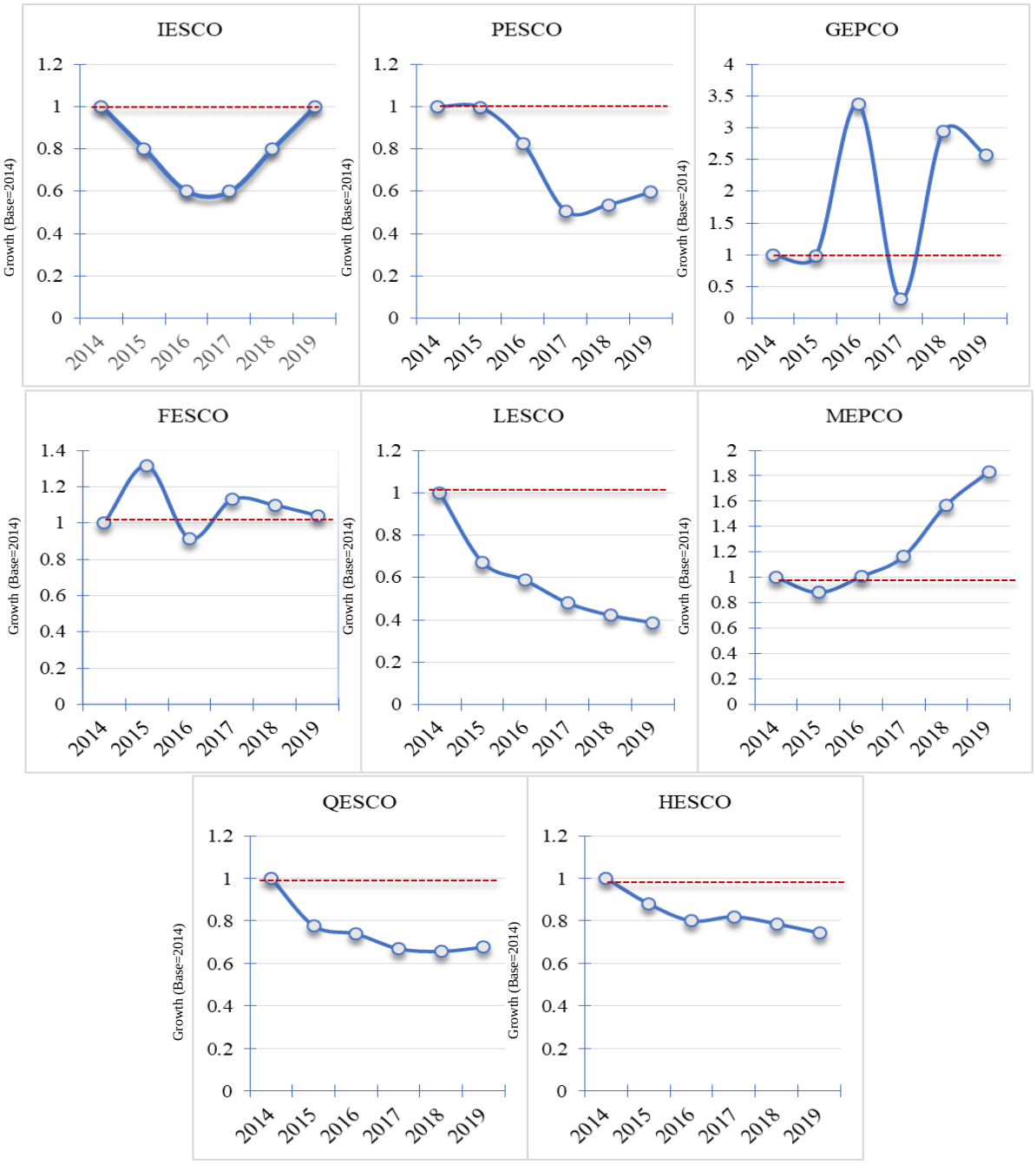


Source: NEPRA (2018), Authors' Own Calculation

The growth of SAIFI in comparison to number of interruptions during 2014 for all distribution utilities (see Figure 7) indicates that GEPCO, FESCO and MEPCO have experienced a sharp increase in number of power interruptions. Compared to 2014, GEPCO reduced the number of interruptions during 2015, followed by 2.3 percent and 1.94 percent increase in SAIFI during 2016 and 2018, respectively. Likewise, MEPCO reported an increase of 0.16 percent and 0.56 percent in 2017 and 2018 compared to 2014. IESCO showed a decline of 0.2 percent, PESCO showed decline of 0.47 percent, LESCO reported a fall of 0.58 percent, QESCO showed decline of 0.35 percent, and HESCO showed the decline of 0.22 percent in number of interruptions compared to the reference period, 2014.

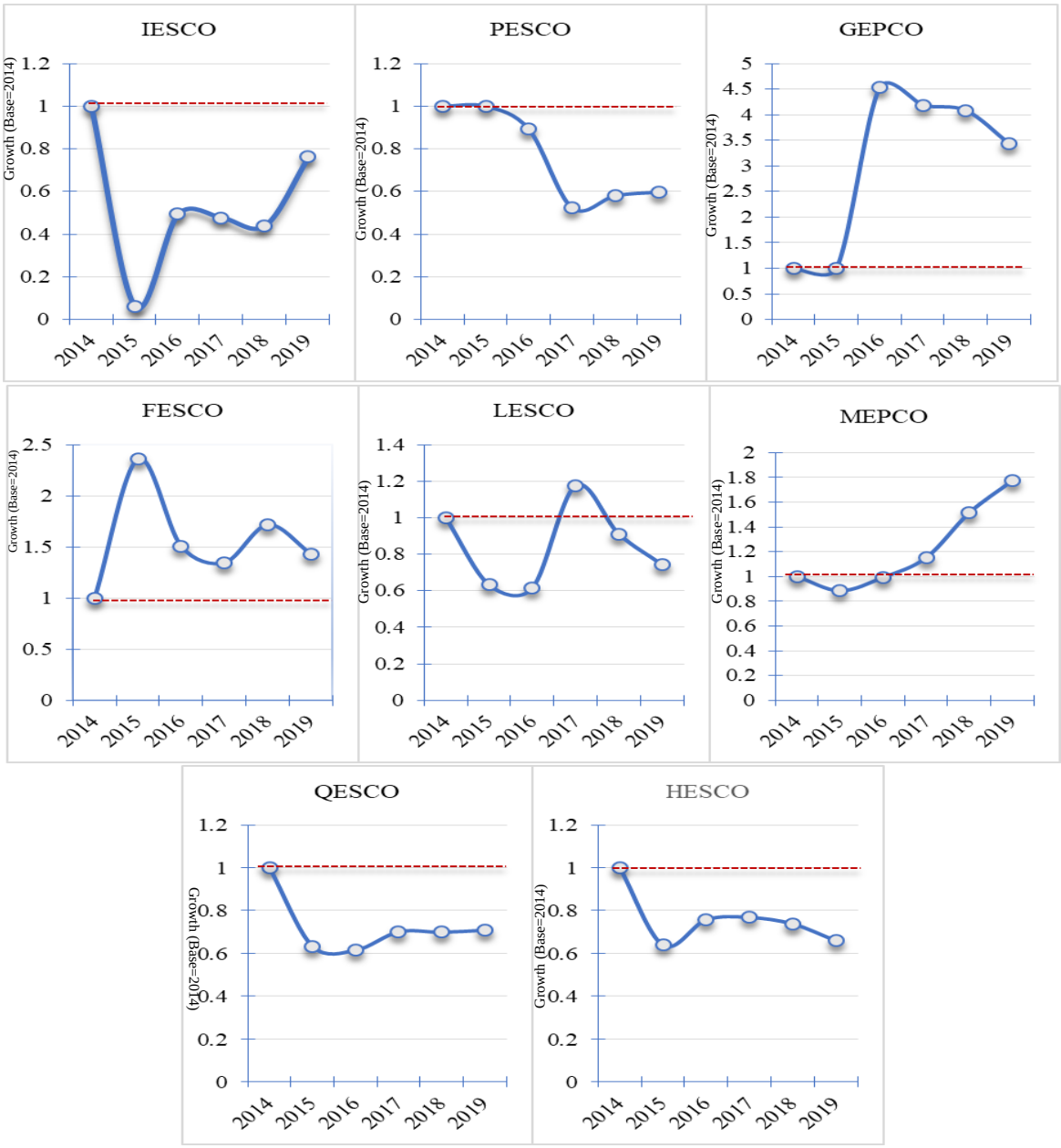
The growth analysis of SAIDI also reveals similar picture when compared to the duration of interruptions in 2014. Like SAIFI, figure 8 shows that GEPCO, MEPCO and FESCO experienced a sharp increase in the duration of interruptions since 2014. Compared to 2014, the duration of interruptions in GEPCO rose by 3.01 percent in 2018. Likewise, the minutes of interruptions reported by MEPCO and FESCO increased by 0.71 percent and 0.51 percent in 2018 compared to 2014, respectively. Other utilities have shown significant reduction in the duration of interruptions. Relatively better performance of system reliability for IESCO, PESCO and LESCO indicates that distribution utilities are using operational and capital expenditures effectively to strengthen the reliability of network, whereas poor performing utilities including GEPCO, MEPCO, FESCO should adopt the strategies of other utilities to minimize the number and duration of interruptions.

Figure 7: Growth in System Average Interruption Frequency Index (SAIFI)



Source: NEPRA (2017-2019), Authors' Own Calculation

Figure 8: Growth in System Average Interruption Duration Index (SAIDI)



Source: NEPRA (2017-2019), Authors' Own Calculation

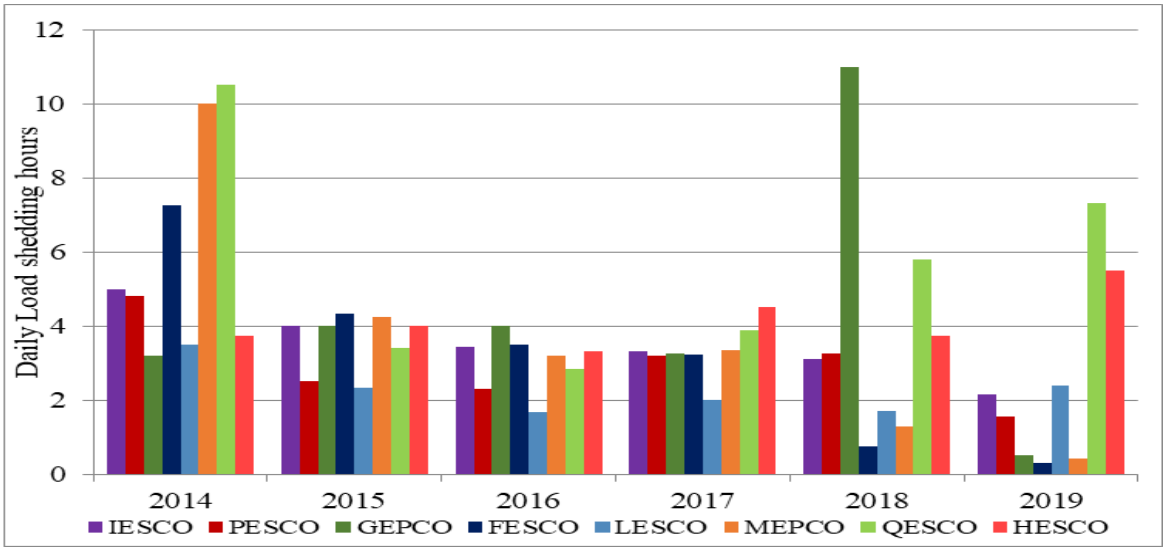
Hours of Load Shedding

Load shedding is an important indicator to monitor the deficit between demand and supply of electricity. The performance standards rules, 2005 state that distribution utilities should plan and schedule the hours of load shedding up to 30 percent of the connected load, which must relate to separate block and can be disconnected upon the instructions from National Transmission and Dispatch Company (NTDC). NEPRA determines the performance of distribution utilities based on hours of load shedding. Similarly, utilities with high revenue recovery, reduced theft and line losses are allowed to shed light for less time as compared to other utilities (Qazi et al., 2017).

Figure 9 shows the average hours of load shedding from 2014 to 2019. The comparison of each distribution utility indicates that on average, all distribution utilities have successfully reduced the number of hours of

load shedding. On average, the performance of QESCO remained poor in this regard as it has shed the light for about 7 hours in a day. Contrary to this, MEPCO has dropped the load shedding hours from 10 to 0.43 per day, indicating considerable improvement in providing continuous electricity to customers.

Figure 9: Hours of Load Shedding

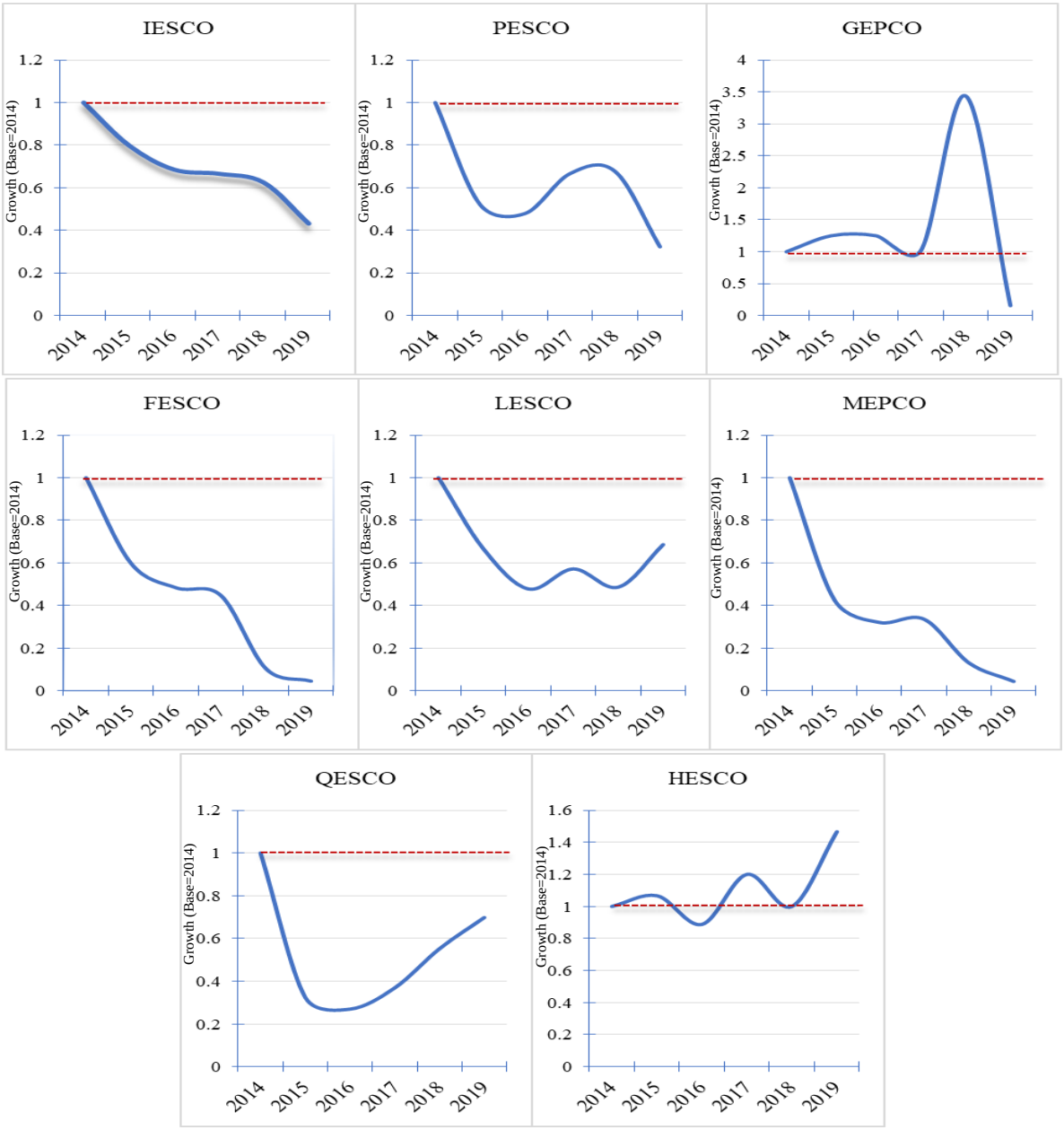


Source: NEPRA (2017-2019), Authors' Own Calculation

The variation in the hours of load shedding per day among distribution utilities coincides with the variation in performance which is reviewed by comparing the annual growth in load shedding hours using 2014 as reference period. Figure 10 indicates that all distribution utilities except for GEPCO and HESCO have performed better in terms of reducing the number of hours to shed the load.

The growth of number of hours of load shedding indicates that IESCO reported a decrease of 0.57 percent in hours of load shedding in 2018 as compared to 2014. Similarly, PESCO reported a decrease of 0.68 percent, FESCO reported the decrease of 0.96 percent while MEPCO reported the fall of 0.95 percent and QESCO reported the fall of 0.31 percent in the hours of load shedding. Compared to 2014, the performance of GEPCO remained worst as it experienced an increase of 2.43 percent in hours of load shedding in 2018. However, in 2019, GEPCO reduced the hours of load shedding by 0.85 percent compared to 2014. The analysis reveals that compared to 2014, hours of load shedding have decreased for majority of the distribution utilities in Pakistan.

Figure 10: Growth in Hours of Load shedding



Source: NEPRA (2017-2019), Authors' Own Calculation

Administrative Performance of Distribution Utilities

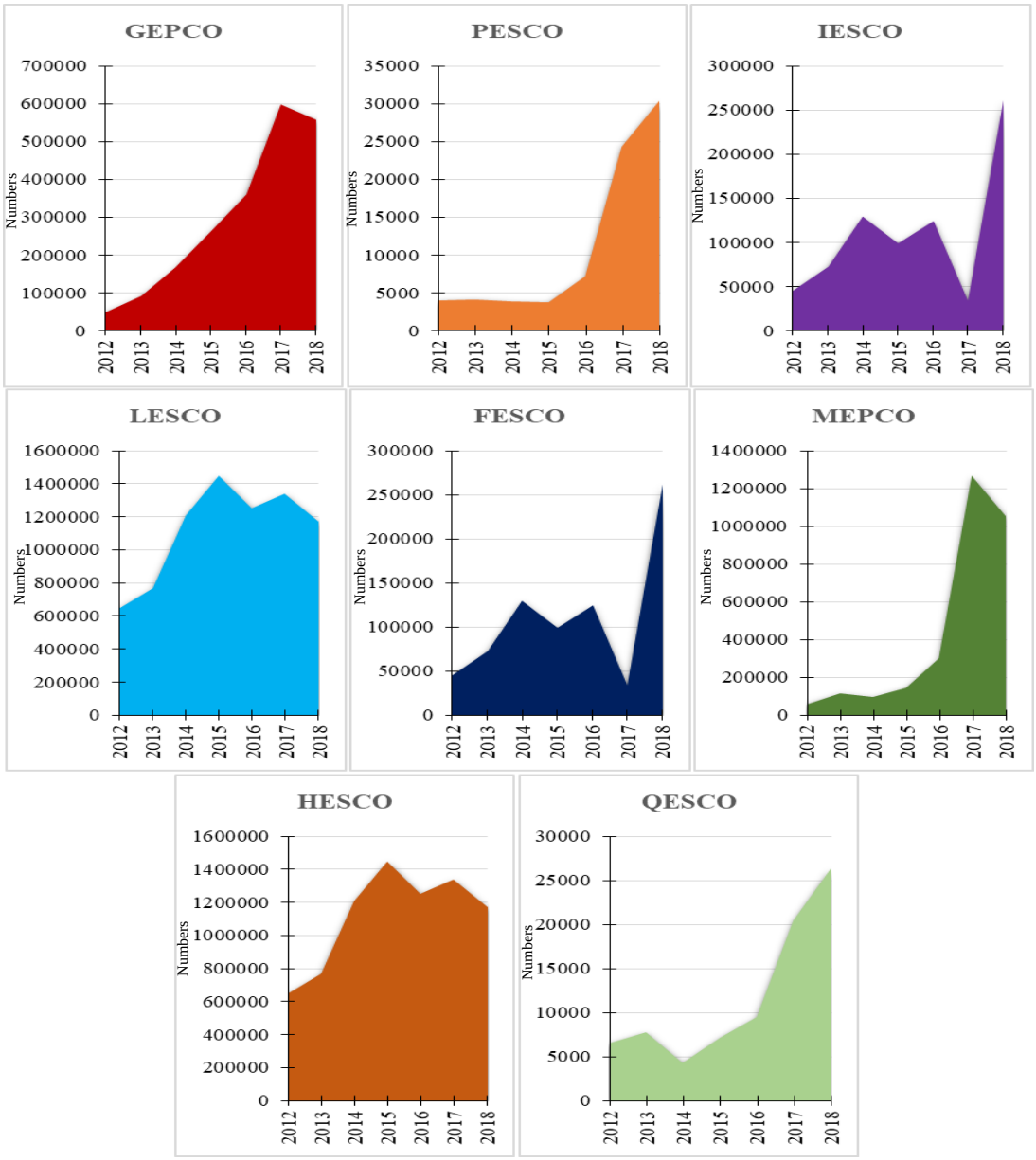
The historical analysis of system losses depicts that despite introducing market-oriented reforms and structural shifts in electricity market, transmission and distribution losses have not been curtailed significantly. Therefore, the impact of administrative factors on the performance of distribution utilities has been analyzed. The administrative power of utilities helps them to monitor the distribution network, to effectively target the defaulters and to reduce Transmission and Distribution (T & D) losses. The law enforcement and conviction rates vary among distribution utilities and among regions while effective law enforcement successfully helps in monitoring the network (Silva, Kahn & Zhu, 2007). Administrative management of distribution utilities is mainly linked with non-technical losses as they can be minimized by

enforcing laws and installing effective monitoring system. However, sharp increase in system losses and occurrence of electricity theft raises the importance of law enforcement to detect illegal customers. Distribution utilities in Pakistan use variety of administrative actions to reduce system losses and to improve their financial condition. These measures include detection of customers consuming illegal electricity and charging fine to recover loss (Bar-Ilan & Sacerdote, 2004). The administrative performance of distribution utilities is examined using the time span for 2012 to 2018.

Detection Bills

Figure 11 shows the number of detection bills for each distribution utility from 2012 to 2018, indicating that the operational performance of all distribution utilities improved as the number of cases pertaining to the use of illegal electricity detected increased from 2012 to 2018. The increase in the number of detections indicates that the monitoring system of distribution utilities allowed utilities to target the customers which are stealing electricity.

Figure 11: Number of Detection Bills (2012-2018)



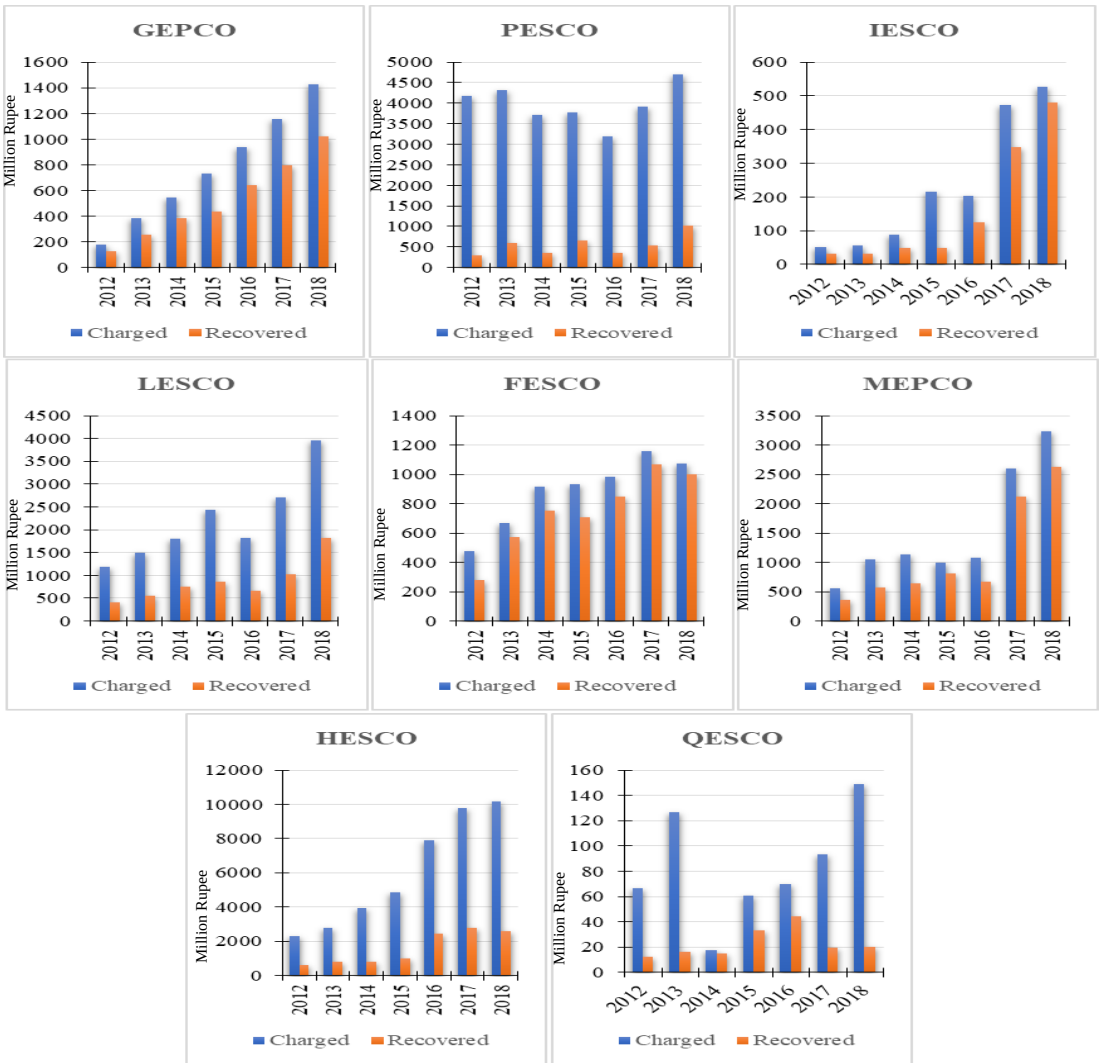
Source: NEPRA (2012-2018), Authors' Own Calculation

The number of detection bills under MEPCO rose from 62,217 in 2012 to 1,054,774 in 2018 while detection bills of HESCO increased from 647,903 in 2012 to 1,166,990 in 2018. The operational performance of MEPCO and HESCO is observed to be better than other utilities as these utilities have reported a sharp increase in number of detections. It is evident from the analysis that distribution utilities serving more customers (MEPCO, FESCO and HESCO) have experienced high numbers of detections as compared to small utilities. From the analysis, it is argued that increase in the number of distribution utilities could help the sector in effectively monitoring the networks which will help in curtailing the system losses as well.

Recovery of Fines

The comparison of fine charged and recovered is another indicator used to examine the administrative performance of distribution utilities (Jamil & Ahmad, 2019). Once the cases of illegal consumption of electricity are detected, distribution utilities charge fine to recover their losses. The higher difference between fine charged and recovered shows the poor administrative performance of distribution utilities, restricting them to effectively enforce the law to reduce losses. Contrary to this, lower difference between these indicators signifies improved administrative performance of distribution utilities.

Figure 12: Fine Charged and Recovered (2012-2018)



Source: NEPRA (2012-2018), Authors' Own Calculation

The analysis of fine charged and recovered by each distribution utility is presented in Figure 12 which depicts an alarming situation. None of the distribution utility in Pakistan has completely recovered the amount of fine charged during 2012 to 2018. The fine recovery rate of MEPCO and FESCO and IESCO is much better than other distribution utilities. Although, MEPCO, FESCO and HESCO have been performing well in detecting illegal use of electricity, but these utilities have not completely recovered the bills and the fine. The amount of fine charged by GEPCO has increased from Rs 178 million in 2012 to Rs 1424 million in 2018 but the utility was not being able to recover Rs 51 million in 2012 and Rs 400.83 million in 2018. PESCO charged Rs 4710 million in 2018 but remained unable to recover fine of Rs 3695.66 million, whereas LESCO charged fine of Rs 3956 million in 2018 and recovered only Rs 1825 million. The administrative performance of HESCO remained poor during 2018 as it reported difference of Rs 7588 million in fine charged and recovered. The poor performance of distribution utilities in recovering fines highlights the lack of administrative power and poor law enforcement in recovering the bills and curbing the illegal consumption of electricity.

Conclusion

The objective of this study is to analyze the services quality and administrative performance of electricity distribution utilities in Pakistan. Study separately reviewed the role of structural reforms and unbundling on services quality, and administrative performance of distribution utilities. The growth analysis of services quality dimension reveals that on average, services delivery of distribution utilities has remained satisfactory. However, the distribution utilities have performed poorly in terms of reducing system losses, recovering bills, reducing number and duration of interruptions.

Despite the reforms, the distribution utilities remained poorly managed because these utilities are unable to recover even half number of fines charged on detection of illegal consumption. The administrative failure of distribution utilities has created hurdles in reducing system losses, collecting bills, detecting illegal consumption, and recovering fines which further increases the financial losses in distribution network.

Therefore, to enhance the operational performance of distribution utilities, NEPRA is suggested to increase the number of distribution utilities which will help in reducing the financial burden of existing utilities. Furthermore, NEPRA should announce monetary rewards for distribution utilities performing well and penalize those which are not meeting the targets set by regulatory body. To improve the administrative performance of distribution utilities, NEPRA should increase the autonomy of distribution utilities which will allow them in rightfully enforcing law and take legal action against consumers involved in electricity theft.

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[i] According to Council of European Energy Regulators ASBL (2008), the optimal level of electricity supply may vary among regions and customers and evolves with market size, customer demand, and investment cost.

[ii] Islamabad Electric Supply Company (IESCO), Gujranwala Electric Power Company (GEPCO), Lahore Electric Supply Company (LESCO), Multan Electric Power Company (MEPCO), Faisalabad Electric Company (FESCO), Peshawar Electric Supply Company (PESCO), Hyderabad Electric Supply Company (HESCO), Quetta Electric Supply Company (QESCO), Sukkur Electric Power Company (SEPCO), Tribal Electric Supply Company (TESCO)