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Innovations in Operational Risk Management and Business Continuity Planning Methodologies of Transmission System Operators: Implications of the Operational Security Network Code

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Abstract
The ongoing liberalisation of national electricity markets and legislations to further reform electricity markets raises important issues regarding the operations of the interconnected transmission systems. To ensure compliance with new regulations, operational risk management (ORM) and business continuity planning (BCP) methodologies need to be reviewed in European Transmission System Operators (TSOs).In our current paper, we address key trends in ORM and BCP within the energy sector. We analyse the implications of the operational security network code within the context of the relationship between innovation and organizational performance.By raising ORM and BCP to strategic level within European TSOs and focusing on innovation, which complies with the European regulatory environment, system operators could achieve a significantly higher level of operational security. They would also be more flexible to regulatory changes while improving organizational performance.To improve operational security, innovations need to make the transmission system more robust and more resilient. The improved robustness expresses the better ability to predict and prevent incidents, while the more resilient system returns from the incidents more efficiently. The optimal security performance can be based on the balance of both areas. Therefore, future research has to improve parallelly the robustness and resiliency. Innovations in this context include specific technological and organizational solutions, as well.
Keywords: operational risk management, business continuity planning, innovation, performance, TSO, operational security, European electricity market

1. Introduction

The ongoing liberalisation of national electricity markets and legislations to further reform electricity markets raises important issues regarding the operations of the interconnected transmission systems. (Jamasb and Pollitt 2005) To ensure compliance with new regulations, operational risk management (ORM) and business continuity planning (BCP) methodologies need to be reviewed at European TSOs.

1.1 Operational risk management and business continuity planning

The focus on ORM has strengthened even more since the 2008 financial recession. Most global companies still feel that there's a long way to go in establishing an effective, risk-aware culture – even chief risk officers (CRO) are introduced to the executive staff (HBR Survey 2011).

The energy sector also belongs to the top three sectors with strong ORM best practices next to the financial services and health care sector. A survey shows that companies agree on the basics: effective risk management can be achieved by integrating risk management principles with corporate goals and overall strategy. (HBR Survey 2011) There is a need of pro-active risk handling and mapping most complex risks that have damaging effects for the organization in the long run.

The integration approach of ORM serves as a real basis for sustainable development of energy sector organizations, resulting in an efficient management system for most risks. (Zeko 2014)

According to recent research, it's more effective to focus on the consequences on possible events than on evaluating the probability or possible impact of extreme events. This is especially important in the energy sector, where organizations have shifted from predicting accidents to preparing for eventualities. (Taleb et al. 2009)

It is also important to consider "soft" risks involving corporate culture, reputation or conflict of interest that are hard to measure or quantify. (Aghili 2010)

Organizational culture may even be an obstacle in implementing ORM methodologies; hence, there may be a need to establish an ORM friendly cultural environment, as it would improve the results of risk management deployment. (Kimbrough and Componation 2009)

Operational risk management has to be run at the highest level of the organization and be connected to the performance through strategic planning, such as business continuity planning. (Kimbrough and Componation

2009)

Although it is considered as important as ORM, business continuity is often not translated into concrete plans and on-going actions within most organizations, even if BCP can be considered as a competitive advantage. (Seow 2009)

A recent survey shows that there is a return on investment that justifies the costs and expenses of BCP and provides intangible benefits such as closer alignments with business goals, increased credibility, quality improvement and even cost reduction. (Copenhaver and Lindstedt 2010)

According to Glendon, a robust response to seen and unseen risks is the '3Cs' of effective business continuity:

- contingency planning,
- continuity capability, and
- crisis response.

Contingency planning is effective for addressing risks that have known probability. In case of continuity capability the company focuses on preparedness rather than prediction by setting priorities for the organization when facing restricted availability of essential resources. Crisis response is required to deal with events that go beyond the reasonable planning assumptions established under continuity capability and contingency planning. (Glendon 2013)

A recent paper suggests that BCP improves organizational performance, similarly to risk management. (Sawalha and Hanna 2013)

BCP needs to be lifted from its operational level and needs to be integrated into corporate long-term planning and corporate strategic management just as ORM has to. Wong also agrees that an effective BCP helps the business to perform better and ensure future competitiveness. (Wong, 2009)

1.2 Operational risk management and business continuity planning in transmission system operators of electricity

While creating an ORM and BCP system in an organization, it is key to take into account the industry characteristics and the features of the company itself. This is especially important when talking about transmission system operators (TSO) of electricity as they are expected to meet demand with high level of reliability, flexibility and quality while also complying with security guidelines.

This paper focuses on TSOs because the energy grids are the pivotal point of dependencies and cascading effects at a European scale within the energy sector, therefore it is important to construct ORM and BCP methodologies at this level. (EURACOM 2009)

Currently, if we are talking about risk management within TSOs the focus is mainly on information exchange among these operators, with regards to operational experiences, data relevant to the secure operation of the power system, commercial data, information on specific methods applied e.g. to calculate capacity, outcomes of contingency analyses, etc.

This may also include joint trainings on a regular basis between TSOs to improve knowledge on the characteristics of neighbouring grids, along with overall communication and coordination. (EURACOM 2009)

The growing share of electricity generated from renewable energy sources as well as increasing market-based cross-border flows are leading to rising uncertainties in transmission network operation. As a result, further development of common grid tools is one of the major challenges that European TSOs will face in the mid-term. (Liu et al. 2012) The TSOs therefore need to be up to the challenge to maintain high quality and security complying with regulations while still improving performance.

2. Operational Security Network Code – implications for ORM and BCP

The ENTSO-E recently introduced the Operational Security Network Code, which will provide the basis for the power system to function with a satisfactory level of security and quality of supply, as well as efficient utilization of infrastructure and resources. It focuses on common operational security principles, pan-European operational security, coordination of system operation, and some important aspects for grid users connected to the transmission grid. (ENTSO-E 2013a)

This new Network Code also includes some aspects in regards to risk management and business continuity for TSOs.

The Operational Security Network Code defines five System States for TSOs and actions to take in each state to prevent damages and minimize risks. For example, if a TSO is not in its Normal State it has to take remedial actions and inform the directly interconnected transmission and distribution system operators, as well as the Significant Grid Users involved in the system defence and restoration. This is aimed at maintaining or restoring secure operation and preventing the risk of widespread disturbance across connected TSOs and also providing situational awareness for users and external operators. Sufficient real-time measurements are required for state estimation and forecasting as well; the results need to be provided to other TSOs for the above-mentioned reasons.

The Operational Security Network Code also reflects on the need for greater cooperation and coordination

between interconnected TSOs to select the actions, which would optimise between the highest overall efficiency and lowest total costs for all involved parties. The TSOs also need to monitor a wider area beyond their own systems.

Each TSO shall ensure availability, reliability and redundancy of the critical tools and facilities required for system operations. Furthermore, a Security Plan shall be established and regularly reviewed to maintain business continuity.

In case of a fault, a TSO, however, does not need to incur very high costs balancing actions or implement demand control against the next fault immediately after the first incident. Corrective actions are necessary, however, if there is enhanced risk of the next fault. (ENTSO-E 2012)

Mainly the Network Code on Operational Security focuses on a wider situational awareness ordaining TSOs to establish Business Continuity Plans, Risk Assessments and Remedial Actions, furthermore it promotes a higher level of cooperation and coordination between connected TSOs and other parties involved, such as DSOs and Significant Grid Users.

3. Innovations and Performance

As stated earlier, most researchers agree that ORM and BCP significantly contribute to corporate performance. However, there is a debate going on in the scientific literature, whether this statement is also true for innovation. Schumpeter defined five different types of innovation:

- a new product,
- a new process,
- a new source of supply,
- a new market, or
- a new organization.

He believed that innovation creates temporary monopoly for a company, allowing significant profits until competitors and imitators appear. Innovation is necessary to provide incentives to create new products and processes within firms. (Schumpeter 1980)

Agarwal et al. were mainly focused on service providers: their research included 201 international hotels. Their starting point was a market orientation, which in their research positively correlates to subjective performance (e.g. quality of services, customer and employee satisfaction), as well as to objective performance (e.g. gross operating profit, market share). According to this paper, market orientation has a direct incentive effect on innovation, which in return increases subjective performance. Subjective performance will then increase objective performance, as well. (Agarwal et al. 2003)

The Blue Ocean Strategy concept also highlights the importance of innovation. The authors analysed 108 start-up companies in their research. Results show that organizations undertaking radical innovations (15 firms – 14%) would amount up to 38% of overall income and 61% of overall profits. Based on these data they concluded that radical innovation is necessary for companies to be successful in the long-term. Radical innovation would lead to new products or new processes which would radically change the market. (Kim and Mauborgne's 2005)

Bharadway et al. conducted a study with 134 samples. The samples were undertaken from 83 different studies between 1980 and 2003, and pulled from a meta-analytic database. The research investigated performance caused by three different types of innovation and 27 determinants, which resulted in positive correlation between innovation and excellent performance. Furthermore, they concluded that innovation has a partial intermediary role between financial performance and environmental and organizational variables. (Bharadway et al. 2004)

It is important to mention, that there are several studies, which did not find any connections between innovation and performance. According to Wolfe, despite broad interest and a vast literature, understanding of innovative behaviour in organizations is relatively undeveloped. The author criticizes past papers and calls them inconsistent. (Wolfe 1994)

Other scholars point out that companies in crisis do not focus on innovation, but on core competencies to improve efficiency and effectiveness. (Palmer et al. 1995)

Gerybadze et al. included 100 companies with the highest R&D costs between 1997 and 2007 as a basis for his research. Based on their research, the authors agree that only those companies can achieve long-lasting growth and strong financial performance that constantly improve their technological abilities and focus on developing new products. The authors see this type of innovation, however, as a necessary but not sufficient component of performance improvement.

In order to maintain a strong market position and long-lasting financial performance, the company needs to identify the right strategy, organizational capabilities and dynamic relationships with other companies. Several firms could successfully come up with innovations, but were not able to sustain their innovations in the long run. (Gerybadze et al. 2010)

Christensen pointed out that innovation might even cause the downfall of a company or at least the loss of its leading position. Examining several firms, he stated that innovations representing major breakthrough are at

first commonly rejected by customers, who can't even use these new products. According to Christensen, it is not only important to have a strong bond with clients, but also a specific management formula is needed to highlight the road to success and great performance. (Christensen 1997)

Summarizing the arguments for innovation contributing to performance: Agarwal pointed out that the incentives for innovation themselves lead to improving performance, while Kim and Mauborgne also reflected on the positive effect innovation had on profit and income. Bharadway et al. found a positive relation between innovation and performance in their study, although they even used past research that did not come to this conclusion. Scholars, who criticized past studies and their credibility, argue that innovation was not the key to increasing performance when companies were in crisis. Although Gerybadze agreed that innovation had positive effects, he did not see innovation as a sufficient criterion. Christensen in turn reflected on the downfalls caused by innovative products.

Taking into account the above detailed research we believe that innovation does contribute to higher business performance. The amount of it varies though on several factors, also highlighted in the literature.

4. Motivation towards innovative projects

As TSOs face new challenges regularly due to the nature of the energy sector, this results in new projects toward innovation.

The rise of R&D expenditure for such projects coming from ENTSO-E focus on creating more cost efficient processes while bringing innovation in the forefront to secure supply continuously and flexibly. Renewable energy sources still mean high uncertainties which need to be handled effectively to ensure long-term stable infrastructure and utilising capital assets appropriately. (ENTSO-E 2013b)

TSOs are therefore encouraged to create sustainable developments to achieve overall efficiency. Innovation activities are required to improve coordination between networks while new market designs and mechanisms at European level are also in the loop to support security of supply and fair trading.

Current and future projects involve innovative tools to control and coordinate reliable and stable operation of the pan-European network; market mechanisms for ensuring system adequacy and efficiency in electric systems; providing control centres to improve power system security so that systems will operate closer to their limits without increasing risk levels; and creating improved defence and restoration plans. (ENTSO-E 2015) All these objectives strongly relate to ORM and BCP methods, the target is to minimize risk and ensure continuity by using innovative tools, establishing consistent collaboration between TSOs and their long term strategy for R&D activities in pursuit of a fully integrated energy system.

5. Conclusion

TSOs need to adapt to the new requirements of the Operational Security Network Code, with a great emphasis to operational risk management and business continuity planning. This also leaves room for significant opportunities of innovation within these areas. As a consequence, new management methodologies and organizational processes could also contribute to the improvement of overall business performance.

As TSOs will have to make decisions that would impact other interconnected systems, it is essential to assure a decision-making and operating environment, where ORM and BCP plays key roles. As mentioned in the Operational Security Network Code, information and knowledge sharing will have a key role in the future of these organizations. The data coming from each TSO need to be up-to-date and relevant. In case of emergency, it is important that the interconnected TSOs are quickly notified to prevent further spreading of damages, and remedial actions can be taken in time.

Risk based assessments can be the basis for anticipated system states within TSOs, based on which remedial actions and security plans can be developed. These actions can be tested and optimised on simulated risks depending on capacities, different time scales, demand and supply fluctuation, etc. Simulations could also be done for uncertainties of the growing demand for renewable energy sources next to market activities.

Proactive risk handling will be very important, creating actions of possible consequences rather than measuring probability of complex risks or predicting disturbances while also creating a risk management friendly organizational culture.

By raising ORM and BCP to strategic level within European TSOs and focusing on innovation, which complies with the European regulatory environment, system operators could achieve a significantly higher level of operational security. They would also be more flexible to regulatory changes while improving organizational performance.

6. Directions on future research

To improve operational security, innovations need to make the transmission system more robust and more resilient. The improved robustness expresses the better ability to predict and prevent incidents, while the more resilient system returns from the incidents more efficiently. The optimal security performance can be based on the balance

of both areas.

Therefore, future research has to improve parallel the robustness and resiliency. Innovations in this context include specific technological and organizational solutions, as well.

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