



Multiple Action Mechanism of Information and Communication Technology Requirements and Power Internet of Things Support

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Abstract

The current new economy era belongs to a network era, focusing on emerging technology, information economy and knowledge economy. Today's outstanding performance of the new economy era is the telecom industry. Information and communication technology not only has technology dependence, but also has cross-boundary nature. It will not only have an impact on people's life and work, but also have a certain impact on people's health. Through the analysis of ICT requirements, this paper deeply studies the multiple action mechanism of ICT requirements, in order to provide ideas for the future development of information and communication technology requirements.

Keywords

Information and communication; Technical requirements; Multiple roles; Mechanism

Since the turn of the century, we have gradually entered the information age, and all industries have begun to focus on the application and popularization of information technology. To improve organizational communication and work efficiency, companies have explicitly required their employees to be compliant with current information and communications technologies. Information and communications technology refers to all electronic devices or related technologies that can collect, store, and transmit information (Ouyang, 2012). In today's workplace, information and communications technology plays a significant role in internal and external communication within organizations.

1. Information and Communication Technology Requirements and Characteristics

1.1 Technology Dependence

ICT requirements are often closely linked to emerging technologies. Poor ICT performance leads to a poor information experience for employees, which in turn creates demand for ICT. Furthermore, the inherent complexity of ICT creates high requirements for ICT (Liu, 2012). Across different companies, ICT requires technical personnel to be able to adapt to the company's specific characteristics and ensure compatibility. Employees also face compatibility issues due to a lack of effective early deployment, leading to the development of standards for ICT technologies. ICT technologies provide employees with increasingly rapid access to information, but the exponential growth in information volume reduces the time employees have to resolve information themselves. Consequently, rapid response times disrupt employee work rhythms and drive demand for ICT.

1.2 Transboundary

Compared to other work requirements, ICT requirements significantly cross boundaries. From a temporal perspective, ICT requirements enable employees to work 24/7. Employees should not simply focus on ICT technical standards but should also devote time and energy to their families. From a spatial perspective, some scholars studying the use of work-related communication tools suggest that the advent of ICT has diverted time and energy previously reserved for the family sphere. Consequently, work pressure is permeating the workplace and into the home sphere, creating conflict between work and family. From a psychological perspective, ICT requirements have reduced employees' psychological detachment during non-work hours, impacting their recovery experience (Zheng, 2012).

2. Multiple Mechanisms of Action of ICT Requirements

2.1 Pressure Loss Mechanism

The stress-dissipation mechanism also applies to individual traits. If employees have a strong sense of self-efficacy and are confident in their work processes, they are less likely to interpret ICT use as a job requirement, resulting in relatively low stress. Within the stress-dissipation mechanism, the use of work resources can mitigate some of the negative impacts of employees' own behavior (He, 2012). Therefore, when employees have a strong sense of job control and self-efficacy, their performance is less likely to be significantly negatively impacted by ICT requirements.

2.2 Restoration Blocking Mechanism

The recovery-hindering mechanism, also known as the effort-recovery model, involves ICT-related technological standards. ICT-related standards can cause employees to consume significant resources while working, leading to certain work behaviors. Once resources are depleted, employees experience increased stress. Furthermore, ICT requirements can hinder recovery after experiencing negative impacts. Because employees' resources are limited in their ability to effectively recover, their personal lives, work, and productivity decline. The impact of ICT requirements on recovery varies across individuals. Generally, older employees with moderate economic status tend to be more relaxed about using ICT (Ren, 2011), experiencing less disruption from ICT requirements and experiencing faster recovery. Furthermore, employees with a strong sense of control over their work often find ICT within their control, so resource allocation is less hindered by ICT requirements. This mechanism helps managers adopt more effective approaches to help employees recover quickly (Fu, 2012; Ai, 2012).

2.3 Boundary Penetration Mechanism

The boundary permeability mechanism, also known as the work-family boundary model, separates work and family into two distinct domains, between which people constantly shift roles daily. By creating and maintaining boundaries, individuals manage their roles in each domain, meeting the requirements of each role and thus achieving work-life balance. Failure to achieve this balance can lead to problems such as work fatigue and family conflict. The unique nature of work demands leads to blurred boundaries between work and family, resulting in negative influences on employees' work and family dynamics. The use of ICTs transcends time and space constraints, increasing employees' workloads. Furthermore, external support can help employees manage their ICT needs. Specifically, family support can reduce employees' feelings of guilt about using ICTs, alleviating the impact of work-family conflict. This mechanism fosters a better understanding of employees' roles, enabling them to proactively adjust their mindsets and mitigate the negative impact of ICT needs (Liu, 2010; Hou, 2010).

3. How Information and Communication Technology Supports the Construction of Ubiquitous Power Internet of Things

3.1 Data Collection and Intelligent Application

The ubiquitous power Internet of Things (IoT) will utilize big data technologies, focusing on in-depth exploration of the potential value of key data. This will enhance the customer experience while minimizing power system costs and minimizing construction risks. Data visibility must be ensured, and the use of virtual data in its construction must be enhanced. Augmented reality technology, employed in this context, enables digital display of power facilities,

elevating the skills of professional technicians. Virtual reality technology not only enables visual control of power operations but also enables intelligent patrols, reducing grid workload and accelerating construction efficiency. Data information must be realistic. This type of network will primarily utilize AI technology to unlock the value of data, with a focus on big data to contextualize data. This will strengthen customer-centric service standards and ensure smooth network construction. Construction must ensure alignment with the needs of grid customers, ensuring they enjoy seamless power services (Wu, 2009).

3.2 Security Password Protection Technology

To ensure the implementation of emerging security protection technology systems, comprehensive security mechanisms must be employed, sometimes even requiring the use of scientific cryptographic techniques, ultimately meeting the emerging needs of the power grid. This comprehensive security protection system for the power Internet of Things (PoI) sometimes utilizes intelligent defense technologies, sometimes uses mutual trust interconnection technologies, and sometimes uses interactive security technologies. Targeted innovations within these technologies will ensure alignment with the requirements of the ubiquitous power Internet of Things (PoI). Intelligent protection technologies require proactive, comprehensive awareness to identify potential risks (Mei, 2017), automatically generate alerts, and coordinate responses. This allows for the development of diverse intelligent response plans, ensuring and enhancing network security. Mutual trust interconnection technologies can be implemented using lightweight identity recognition technology. Interactive security technologies can be combined with relevant data leakage prevention technologies to strengthen protection and security audits in unique scenarios, thereby enhancing interactive security.

The ubiquitous power Internet of Things (IoT) sometimes involves customer identification, data theft prevention, and data transmission. Emerging cryptographic technologies will be utilized and scientifically optimized to enhance security. Effective development of standards for application technologies, as well as standards for interface protocols and scientific determination of standards for communication protocols, will ensure enhanced security protection standards, reduce or prevent data alteration, minimize data theft, reduce illegal access, and prevent illegal interconnection (Zhu, 2012; Li, 2010).

3.3 Ubiquitous Network Technology

Advanced technologies can be selected to ensure comprehensive coverage of power facilities and their sensors, ultimately addressing potential issues. New air-space-ground communication network protocols can be implemented. For the ubiquitous power Internet of Things, it is crucial to ensure the scientific integration of different network protocols and communication modes. This essentially means achieving synergy between multiple protocols and communication methods (Wang, 2010; Wang, 2021). This will ultimately ensure the integration of air-space-ground communications and related information, effectively resolving issues within the power Internet of Things. When scientifically building a ubiquitous power communication network, satellite communications are a key factor. Scientific innovation in new air-space-ground communication network protocols is essential to facilitate the smooth collection and transmission of power grid data while ensuring resource sharing. 5G communication technologies need to be applied scientifically.

4. Conclusion

This article explores the multiple mechanisms of action required by information and communication technology (ICT), primarily manifesting in three key areas (Zhang, 2018): boundary penetration, pressure loss, and recovery obstruction. These three mechanisms impact employee health and their work and personal lives to a certain extent. Therefore, further research on these multiple mechanisms is crucial. This will provide valuable insights for future ICT development. Furthermore, it will provide key technical support for the development of the Power Internet of Things (PoT).

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