The Operational Model of Sharing Economy: A Power Bank Case

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Abstract: Sharing economy is an innovative economic form, and the validity of its operation mode needs to be verified by specific cases. This study focuses on the sharing power bank industry that has been deeply integrated into daily life, aiming to reveal the internal operation logic of sharing economy by analyzing this typical sample. The success of sharing power bank depends on a system composed of four pillars: resource allocation driven by data algorithm to accurately match supply and demand, multi-dimensional profit model centered on basic usage fee and extended to member and data value-added, operation management to realize efficient collaboration between offline network and online intelligent platform, and comprehensive risk control covering equipment security, user rights and compliance. Based on this, the research further refines the universal sharing economy operation framework, and in view of the challenges faced by the current model, puts forward the optimization path to fine, intelligent and ecological development from the above four dimensions, in order to provide theoretical reference and practical enlightenment for the healthy development of sharing economy in a wider range of fields.

1. Introduction

In recent years, the sharing economy model relying on internet platforms has witnessed rapid development on a global scale, profoundly transforming the traditional ways of supplying and consuming goods and services. Essentially, the sharing economy is a new economic form based on the temporary transfer of the right to use items or the provision of personalized services. Its core lies in efficiently connecting decentralized supply and demand sides through technological means, aiming to enhance the overall utilization efficiency of social resources. Practices in many fields, from shared mobility to shared accommodation, have demonstrated that this model has great potential in stimulating market vitality and innovating consumption scenarios. However, the concept of the sharing economy is broad, and its specific operational logic and sustainability can only be clearly presented through in - depth analysis of specific cases. Against this backdrop, sharing power banks, as a sub - field of the sharing economy that has successfully penetrated daily life, provide us with a typical sample for observing and analyzing the internal operational mechanisms of the sharing economy [1].

Since its emergence, the sharing power bank business has rapidly completed the process from market introduction to large - scale operation. Its development trajectory centrally reflects the key links and core issues involved in the implementation of the sharing economy. Different from some early sharing projects that were overly reliant on capital subsidies and had vague business models, sharing power banks have formed a closed - loop business model within a relatively short period and achieved a relatively stable cash flow. This phenomenon itself is worthy of in - depth exploration: how did it build a feasible operating system under specific market demands and technological conditions? Deconstructing its operating mode not only helps us understand the development logic of this industry itself but also enables us to extract common laws and core elements applicable to a broader range of the sharing economy. Therefore, this study selects sharing power banks as the entry point, aiming to penetrate the operational framework and internal mechanisms of the general sharing economy through a detailed analysis of their operating modes.

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2. Analysis of the Core Elements of the Operation Model of the Sharing Power Bank

2.1 Resource allocation: idle resource activation accurately matches supply and demand.

The resource allocation logic of sharing power bank does not follow the reuse path of personal idle goods emphasized by the early sharing economy theory, but evolves into a more intensive and specialized centralized resource supply mode. By purchasing or customizing standardized charging equipment centrally and putting them into various offline commercial scenarios, the operating entities build a distributed energy network that can be accessed by the public on demand. The core of this model lies in the redefinition and transformation of the concept of "idle", which activates not the idle power bank held by private individuals, but the huge gap between the potential and fragmented electricity demand in social scenarios and the instant power supply capacity that users cannot meet with them. The effectiveness of resource allocation is highly dependent on precise matching of supply and demand. Through GIS and data analysis, the platform dynamically connects scattered charging demand with the supply capacity of physical outlets. The algorithm continuously optimizes the density and location of equipment deployment according to historical leasing frequency, human flow tide law and regional consumption characteristics to achieve supply coverage at high frequency time and core space when demand occurs.

2.2 Profit model: basic charges, value-added services and diversified realization.

The profit model of sharing power bank is built on a clear and direct transaction basis, and its main revenue comes from the user's use fee for obtaining mobile device power supply. Basic charges are usually priced in time steps, which can balance short-term emergency and long-term demand. The rate structure is often carefully calculated to cover equipment depreciation, operating costs and reasonable profits. In order to improve user stickiness and revenue stability, membership system or subscription system has been widely introduced. By providing monthly or annual preferential usage rights, some random users are transformed into stable customers, which is essentially a performance of further "service" and "contract" of usage rights. Value-added services constitute the second level of the profit model, which includes sales of the power bank itself, advertising displays for specific brands, and additional charges for ancillary products such as charging cables. A deeper exploration of monetization points to data value and flow value [2]. During the operation of the platform, a large amount of anonymous data about user behavior patterns, consumption hot spots and stay times have been accumulated. After analysis and processing, these data can provide valuable business insights for business location, passenger flow analysis and accurate marketing, thus forming data service revenue for merchants.

2.3 Operation management: offline network layout and online platform control.

The operation management system of sharing power bank presents remarkable online and offline dual-track coordination characteristics. The core of offline operation lies in the network layout of physical outlets, which is not a simple equipment launch, but involves complex point expansion and relationship maintenance. Operators need to establish cooperative relationships with various offline commercial entities such as restaurants, entertainment, transportation hubs, retail stores, etc., and realize benefit sharing through rent sharing or service fees, so as to obtain valuable physical space entrances. The site selection strategy is directly related to the accessibility and frequency of service use, so it is necessary to comprehensively evaluate the quality of people flow, user stay time, consumption attribute and competitive environment of the site. The online platform, as a unified central control system, undertakes the core functions of user interaction, order processing, status monitoring and scheduling decision-making. Through mobile applications, the platform not only provides users with a unified interface for renting, returning and paying, but more importantly,

collects the operating status, battery power, geographical location and usage records of each device in real time. The operation and maintenance team relies on these data to achieve accurate scheduling, including timely replenishment or allocation of equipment inventory between different points, battery replacement for low-battery cabinets, and rapid positioning and maintenance of faulty equipment.

2.4 Risk control: equipment safety, user rights and compliance management.

The stable operation of sharing power bank business is inseparable from a set of risk control mechanism throughout the whole process. Equipment safety is the primary physical risk, involving the quality and reliability of the hardware itself, electrical safety standards, and loss and theft during use. Operators shall ensure that the equipment put on the market meets the national safety certification, has multiple circuit protection such as overcharge protection and short circuit protection, and formulates regular inspection and maintenance procedures to prevent potential safety hazards caused by equipment aging or failure [3]. At the user rights level, risk control focuses on fairness and transparency of the service process, as well as user personal information and financial security. Clear disclosure of pricing rules, accurate billing, compliant collection of deposits or credit authorizations and convenient refund mechanisms are essential. The collection and use of personal information must strictly comply with relevant laws and regulations to prevent data leakage and abuse. Compliance management constitutes a macro institutional framework for business development. This includes that the operating entity shall have corresponding enterprise operation qualification, the cooperation agreement with offline merchants shall be clearly defined, and the property management and fire safety regulations shall be complied with at the place where the equipment is placed. The pricing strategies of the business may be subject to scrutiny by market regulatory authorities regarding price-related behaviors, and its market competition behaviors may also draw the attention of anti-monopoly regulations. Establishing a comprehensive risk-control system covering three dimensions: physical device security, protection of user service rights and interests, and compliance with external regulations, is a necessary foundation for the sustainable development of the shared power - bank model and the avoidance of systemic risks.

3. Operation Model of Sharing Economy from the Perspective of Sharing Power Bank

Through the in-depth analysis of the operation model of sharing power bank, a sharing economic operation framework with universal explanatory power can be extracted. The framework consists of four interrelated core dimensions: resource allocation, profit model, operation management and risk control, which jointly support the whole process of sharing economic value creation and transmission. The practice of sharing power bank shows that the operation of modern sharing economy has transcended the simple exchange of idle items among individuals and evolved into an efficient economic system dominated by professional platform and systematically organized and dispatched by digital technology [4]. Table 1 summarizes the general sharing economic operation mode based on the case abstraction of sharing power bank from the above four dimensions.

Table 1. Sharing Economy Operating Model

Core dimensions	Pattern feature
Resource allocation	Specialized supply, networked layout, data-driven dynamic matching.
Profit model	Based on royalties, it combines membership, value-added services and data traffic monetization.
Operation management	Double-track coordination of offline network expansion and online platform intelligent scheduling and credit management.
Risk control	A multi-control system covering asset security, user rights protection and external compliance.

This model of operation reveals the inherent logic of sharing economy: platform as the core organizer, forms standardized supply resource network through investment or integration, and uses

information technology to reduce transaction cost and converge scattered and occasional demand into sustainable market. Resource allocation mode determines the source of value, profit mode is related to the acquisition of value, efficient operation management is the key to achieve scale expansion and cost control, and systematic risk control is the guarantee for the stable operation of the whole mode. These four dimensions are not isolated, but closely related and mutually supportive. The success of sharing power bank is the embodiment that this operation mode can be effectively verified in the specific scenario of mobile energy supply.

4. Optimization Paths of the Sharing Economy Operation Model

4.1 Resource allocation optimization path.

The key to optimizing the allocation of sharing economic resources lies in shifting from initial scale expansion to intensive cultivation of efficiency and sustainability. The first direction is to deepen the application of data intelligence in dynamic matching. This requires platforms to move beyond static layouts based on historical human traffic and simple geographic information to build predictive models that fuse multiple sources of data. The model should incorporate dynamic variables such as real-time weather, surrounding commercial activities, public transport flow and regional large-scale events to realize more accurate spatial-temporal prediction of resource demand, guide automatic pre-dispatch and elastic allocation of supply resources, and reduce structural contradictions of idle and shortage coexistence. Resource network needs to evolve from breadth coverage to deep operation and ecology [5]. The platform shall establish a deep interest binding beyond simple site leasing with partners, jointly design service processes, carry out joint marketing, embed sharing services deeper into the core business scenarios of partners, and enhance the service density and value of single sites. For physical assets such as power bank, it is necessary to establish a green cycle management system from production, launch, operation and maintenance to recycling, and adopt more durable, easy-to-maintain and recyclable materials and designs to reduce long-term environmental costs and resource consumption. The ultimate goal of resource allocation is to build an adaptive supply network that can intelligently respond to demand fluctuations, deeply integrate with offline ecology and be environmentally friendly.

4.2 Profit model optimization path.

First, the deepening of the profit model lies in shifting from simple transaction matching to the meticulous operation and in-depth exploration of user value. The users accumulated by sharing economy platforms are not homogeneous traffic but an aggregation of individuals with different preferences and behavioral characteristics. The primary direction for optimization is to implement refined user-segmentation operation. The platform should build dynamic user profiles based on user behavior data, identifying different groups such as high-frequency core users, potential-value users, and occasional users. For high-frequency users, a highly sticky subscription system or membership level system can be designed. By providing exclusive rights, priority services, or cross-scenario versatility, their long-term value can be locked in, converting unstable single-transaction revenues into predictable recurring revenues. For occasional users, models such as “service insurance” or “credit packages” can be explored to stimulate their willingness to use with a relatively low upfront cost and cultivate consumption habits. In addition, the introduction of a dynamic pricing mechanism based on the real-time supply-demand status is also crucial. This can not only more precisely regulate market balance and optimize resource allocation but also capture additional value during peak demand periods and stimulate incremental demand through discounts during off-peak periods, thus maximizing revenue.

Second, the broadening of the profit model depends on expanding from single-sided C-end charging to value co-creation that empowers B-end partners. Many sharing economy platforms connect a vast number of supply and demand sides, and their value extends far beyond transactions themselves. The platform should systematically develop service capabilities for the enterprise-side (B-end). For example, the industry data, user behavior trends, and regional popularity information

accumulated by the platform during operation, after being desensitized and aggregated, can be transformed into valuable data products or consulting services to provide decision-making support for cooperative merchants, government agencies, or research units, opening up new revenue channels for data services. More importantly, the platform can open up its traffic and digital capabilities to partners to jointly innovate marketing models. Through precise advertising push, joint membership programs, and scenario-based cross-selling, the platform helps partners improve business conversion and share in the value-added revenue. This shift from "charging tolls" to "becoming a growth partner" can build a deeper and more stable mutually beneficial relationship and form a virtuous business ecosystem.

Finally, the upgrading of the profit model requires exploring the ecological value extension beyond the core business. As a hub in a specific field, the sharing economy platform has a natural advantage in building a micro-ecosystem. The profit model should not be limited to the main transaction link but should extend to the upstream and downstream of the industry chain and related services around users' core needs. These ecological explorations can not only increase revenue sources but also enhance user stickiness and the overall value of the platform. Of course, all these explorations must be based on strict compliance, especially in terms of data use and market competition, to ensure the sustainability of innovation.

4.3 Operation management optimization path.

Operation management efficiency is the core competitiveness after the scale of sharing economic model, and its optimization needs to focus on cost reduction, efficiency enhancement and experience upgrading through technical empowerment. The optimization of offline operation focuses on the intelligence and prevention of operation and maintenance. By improving the Internet of Things level of the equipment itself, monitoring the status of key components, battery health and fault codes of each terminal in real time, and using algorithms to predict the possible faults and consumable replacement cycles of the equipment, the operation and maintenance mode is changed from passive response afterwards to active intervention beforehand, which greatly reduces the labor cost of on-site inspection and the equipment outage time. The optimization of online platform lies in the intelligence of decision-making and the personalization of service. The platform hub should integrate more advanced operation optimization algorithms, comprehensively consider scheduling costs, demand forecasting, traffic conditions and other factors, and automatically generate cost-optimal logistics replacement and equipment scheduling schemes. At the same time, personalized service recommendations are provided based on user preferences and real-time situations, such as giving priority to common brand outlets or providing optimal return path navigation to improve user satisfaction. Collaborative management with offline partners needs to be digital and transparent. By establishing a partner-specific data background, they can clearly understand the device usage, revenue sharing and user feedback related to them, enhance the sense of participation and trust of partners, and form a more stable alliance relationship.

4.4 Risk control optimization path.

With the expansion of business scale and the tightening of regulatory environment, the sharing economy platform must build a more forward-looking and systematic risk control system. At the asset and security risk level, more advanced technical protection measures need to be introduced. We embed tamper-proof unique identification and positioning modules for hardware devices, and record key circulation information in combination with blockchain technology to cope with the risks of asset loss and goods smuggling. At the same time, establish a full-chain safety management standard running through product design, production, quality inspection and on-site inspection, and formulate detailed emergency plans and rapid response mechanisms for extreme safety risks such as fire and leakage. At the user rights and data risk level, the platform should go beyond basic privacy policy notification and practice the principle of "privacy design". This means embedding concepts such as data minimization, user knowledge and control into service processes and system design at the very beginning, for example by providing clearer access management tools and easy-to-understand data usage instructions. Establishing transparent and efficient customer complaint response and online

dispute resolution mechanism is also the key to resolving trust risk. At the level of compliance and market risk, companies need to establish regular policy monitoring and evaluation mechanisms to actively adapt to rather than passively respond to regulatory requirements. In particular, areas such as pricing strategies, consumer protection, data security and antitrust require regular compliance audits and internalization of compliance requirements into business processes. Only by building a technology-driven, user-oriented and compliance-oriented three-dimensional risk control network can we ensure sustainable and stable operation.

5. Conclusion

The development process of sharing power bank reveals that successful sharing economy is not a simple information docking, but a complex ecosystem deeply integrating resources, technology, capital and management. In the future, the sustained vitality of the sharing economic model will no longer depend solely on the expansion of scale, but more on whether it can realize lean resource allocation and operation management through technological innovation, open up sustainable profit space through value restructuring, and win long-term trust between users and regulators by constructing a responsible risk management and control system. The experience and lessons learned from the practice of sharing power bank have important reference significance for sharing economy to expand new fields and explore new paradigms. Its evolution in the future will be a dynamic process of continuous interaction with macro-environment, technological change and social needs.

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