



Research of innovation in Retail based on CiteSpace Knowledge Spectrum

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Abstract. This paper retrieves and organizes the literature on the topic of retail innovation in Web of Science from 1994-2023, and analyzes the data with visualization of information such as the number of publications, regions of publication, and keywords. Furthermore, the visual literature analysis software CiteSpzce tool was used to analyze the literature for strongest citation and keyword clustering. The study found that the number of studies on the topic of retail innovation has grown rapidly over the past 30 years, with Europe and Asia leading the way in terms of the number of articles published; the hot words of interest in recent years include "value co-creation", "risk", "management" and "framework", the keywords that emerge with greater intensity are "firm performance" and "performance"; the keywords clustered significantly and with high confidence, and were applied to the innovation environment, business innovation, and retail innovation applications, respectively. Based on the above findings, the process model of "external drivers-core dynamics -corporate sustainability" is constructed by integrating the new retail wheel theory.

Keywords: Retail; Innovation; CiteSpace; Knowledge Spectrum

1 Introduction

The “wheel of Retailing” theory believes that new forms of retailing will eventually develop into high cost and high profit institutions. This in turn, opened the way for the next low-cost innovator: and so the “wheel” revolved ^[1]. As a consequence, however, low-cost innovation over and over again will ultimately lead to the disappearance of retail. In 1996, Japanese scholar Maso Nakanisi re-examined the traditional "The Wheel of Retail" ^[2] and put forward "The wheel of New Retail", which believed that the retail industry can get rid of price competition through technological innovation, emphasizing that the retail industry should be guided by technological innovation to improve the logistics distribution, cost control, information man-

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agement and other aspects, so that it can really promote the development of the retail industry.^[3]

Therefore, which areas and through which technologies do retail innovators keep the wheels revolving? Starting with research papers on retail innovation in Web of Science, this paper uses CiteSpace literature visualization software to analyze the country, institution, top citation Bursts and keyword clustering of the research papers involved, so as to gain an understanding of the current state of research and provide a valid basis for further research on retail innovation development.

2 Data Source, Research Methods and Tools

2.1 Data Source

The data in this article is obtained from Web of Science, with the theme of Innovation in Retail on May 30, 2023. The search formula is ((TS= "retailing industry" or "retail trade" or "retail business" or "retailing business") and (TS="innovation" or "innovate" or "creation" or "creativity" or "innovative" or "innovations")). 264 relevant literatures were eventually obtained in research areas including business economics, computer science, food science technology, etc. Furthermore, the scope of the literature was limited to articles and review articles, and the language was limited to English, resulting in 152 relevant literatures.

2.2 Research Methods and Tools

The data analysis in this article is performed using CiteSpace software and Microsoft Office Excel 2019. CiteSpace is the software development by Professors Chen C for bibliometric analysis and visualization.^[4] In our study, CiteSpace was applied to analysis of 152 literatures, involving country, institution, keywords of strongest citation bursts Analysis and cluster analysis. In addition, Microsoft Office Excel 2019 was used to conduct quantitative analysis of literatures.

3 Research Analysis

3.1 Quantitative analysis of publication literatures

The annual distribution of literatures on innovation in retail for the aged is shown in Fig 1. Judging from the growth rate of the number of publications each year the whole period can be divided into three parts: period I (1994-2010), period II (2011-2017), period III (2018-Present). From 1994 to present, the number of literatures published on retail innovation has shown an increasing trend. In period I, research on retail innovation was in an embryonic stage and the number of publications was extremely low. The number of issued literatures shows growth in the period II. With intense competition among enterprises, the rapid development of Internet technology and the new crown epidemic, many retail enterprises have been innovating in their operation

and management, and the number of published literatures has increased more significantly in period III.

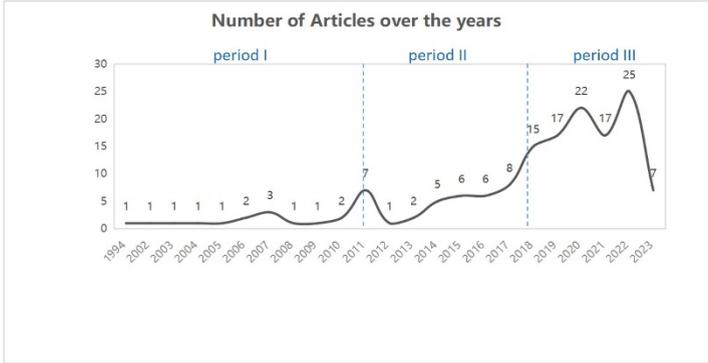


Fig. 1. Annual trend of Publication

These publications came from 65 countries. Table1 shows that top 10 countries are distributed in Europe(n=6), Asia(n=3) and North America(n=1). Among the countries, the country with the largest number of publications is England, with 18 publications. In addition, the centrality of the articles is 0.13, which is the third highest, indicating that the articles published in this country have a strong impact. Although the number of relevant papers published in France was low(n=5), the articles had the highest centrality(centrality=0.49) and the strongest impact.

Table 1. Top 10 countries on research of innovation in retail

Continent	Country	Count	Centrality	Year
Europe	ENGLAND	18	0.13	2016
North America	USA	14	0.2	2014
Asia	CHINA	13	0.04	2014
Europe	SPAIN	11	0.09	2015
Europe	GERMANY	9	0.27	2016
Europe	RUSSIA	8	0	2018
Asia	INDIA	7	0	2017
Asia	MALAYSIA	6	0.2	2017
Europe	TURKEY	5	0.05	2016
Europe	FRANCE	5	0.49	2015

3.2 Analysis of research themes in retail innovation

Strongest citation bursts analysis.

A keyword burst is a sudden increase in the number of keywords in a related field within a certain period of time. This is an important component of the study, as the keywords and titles of the articles are the best place to look for trends in a domain.^[5] In this study, only keyword emergence and analysis were performed on the literature, and synonymous keyword nodes were merged. The minimum time was set to 1 year, the state transition value was 0.5, and the state difference ratio was 2. As a result, the 14 keywords with the highest emergence intensity were obtained. (Fig. 2)

In terms of time dimension, the latest hot words include value co-creation, risk, management and framework. On the one hand, the sharing economy has disrupted the retailing industry by increasing competition as an emerging platform of service innovation.^[6] On the other hand, along with the plague of COVID-19 and the increasing uncertainties in the global economy, companies have made risk avoidance and prevention an important research mission. The hot word that spans a long period of time is “information technology” and “management”. Technology has changed the way retail operates, with things like technology sourcing, BIS and Industry 4.0 all contributing to the economic sustainability of businesses. It will also be an ongoing concern for researchers to breathe new life into business management. From the existing studies, researchers are more consistently focused on the construction of marketing strategies and marketing systems, for example, researchers believe that social media will drive innovation in retail businesses.^[7]

In terms of emergent strength, the words with emergent values greater than 2 are “performance” (2.13) and “firm performance” (2.28). This shows that corporate performance is one of the issues of great interest to researchers. From the above analysis of the literature related to emergent words, the determinants of business performance are investment in public facilities, business intelligence solutions, funding allocation, entrepreneurial perspective, organizational learning and strategy.

Top 14 Keywords with the Strongest Citation Bursts

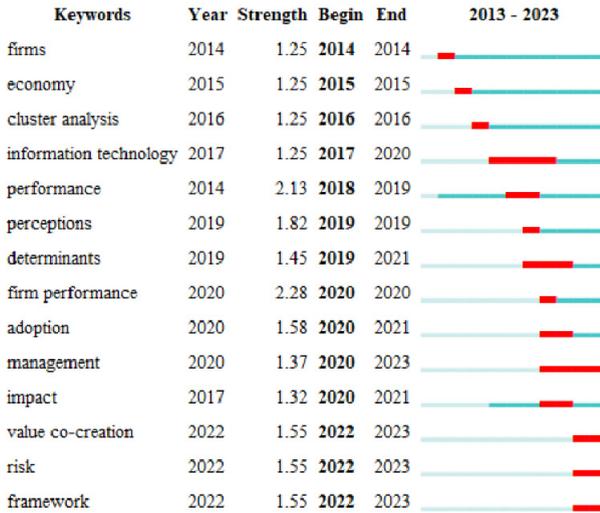


Fig. 2. Top 14 keywords with the strongest citation bursts

Cluster analysis.

In this study, the keyword network is clustered by the Log-Likelihood Rate (LLR) algorithm, and the name of the feature word with the highest value of the LLR operator in this class is used as the cluster name, and the clustering results are shown in Fig 3. In CiteSpace, nodes of the same cluster are covered with convex hull or only the boundary lines are shown, and clusters are numbered starting from 0, cluster #0 is the largest cluster, while cluster #1 is the second largest, and so on.

The keyword clustering network contains 10 clusters, 276 nodes, 617 links between nodes, and the three largest connected components include 187 nodes, accounting for 67% of the entire network. Mean Silhouette score is used to measure the average homogeneity of the whole network. The closer the score is to 1, the higher the homogeneity of the network. Silhouette=0.9009>0.7 with significant clustering and Harmonic Modularity=0.8765>0.7 with high clustering confidence. Therefore, the clustering result can be considered reasonable.

As shown in Figure 3, there is a more obvious overlap between clusters #2, #4, 5 and #6, while clusters #7, #8 and #9 are relatively independent. These 10 clusters can be divided into three areas: innovation environment, business innovation and innovation application of retailing. First of all, the innovation of retail companies is based on the external environment driven by the clustering information table (Table 2), as seen in the “emerging economies” with feature words extracted under the #6 metropolitan level clustering, the #3 empirical research clustering with feature words “economic indicators” and the #9 regional organic food supply clustering with feature words

“metropolitan areas” and “Berlin”. The feature terms “exploring multi-stakeholder value co-creation”, “entrepreneurial approach”, “global retailer” and “regulatory intermediaries” were extracted under cluster #8 reflect that in the era of globalization, retail innovation needs to stand in the perspective of a community of destiny to build a common value system. Secondly, based on the “wheel of retailing” theory, traditional retail yea and emerging business will keep turning like a wheel, such as the feature word “large shopping supermarket” extracted from #3, which heralds the traditional retail business into the era of self-innovation, and the feature word “generic retail business model” extracted from #4, which means that a number of retail models integrating traditional and emerging development will emerge under the modern retail system. Finally, the most information about keyword clustering is finally found at the innovative application level.

Consumer-driven retail innovation.

Because a retailer can survive only if it can profit from providing a given mix of services, consumers ultimately determine the market formats. [8] The feature terms “mobile shopping adoption”, “customer experience”, “customer engagement”, and “customer loyalty” taken out by cluster#0, #3, and #4 corroborate that consumer shopping behavior, shopping psychology, etc. are among the important factors driving the application of retail innovation practices.

Data-driven retail innovation.

Digital technology development is the process from "underlying digital technology" to "digital technology practice", which is the expression of the intensity of digital technology application in enterprises. [9] Clusters #0, #1, and #2 focus on technology adoption, data-driven definition, and data-driven retail ecosystem, with the above clustering terms highlighting the development of existing digital technologies that support retail change and innovation.

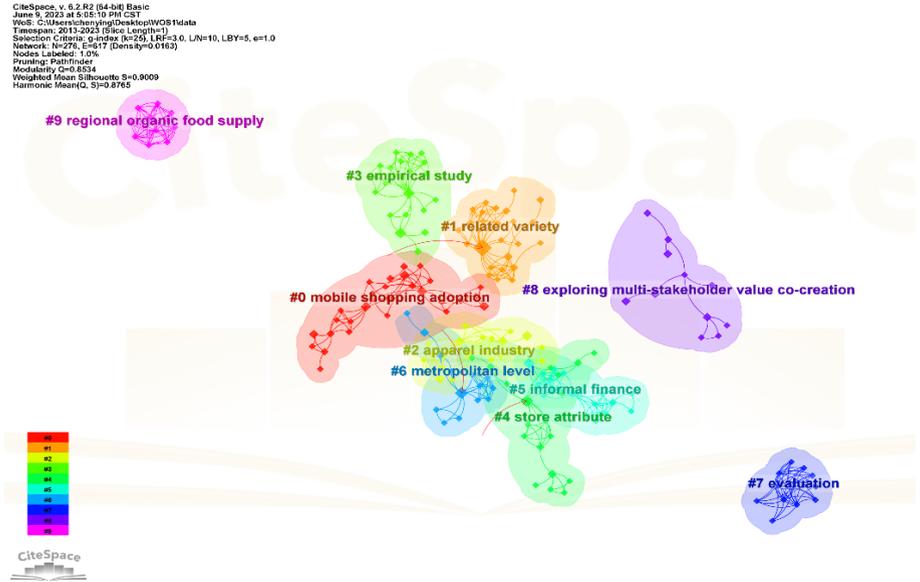


Fig. 3. Keyword clustering analysis visualization mapping

Table 2. Clustering information

ClusterID	Size	Silhouette	Label (LLR)
0	28	0.956	mobile shopping adoption (22.41, 1.0E-4); using behavioral reasoning theory (22.41, 1.0E-4); understanding determinant (22.41, 1.0E-4); retail trade industry (17.83, 1.0E-4); technology adoption (17.83, 1.0E-4)
1	26	0.989	related variety (24.83, 1.0E-4); urban milieu (24.83, 1.0E-4); tourism-company differentiation (24.83, 1.0E-4); data-driven definition (20.6, 1.0E-4); gazelle companies (20.6, 1.0E-4)
2	22	0.952	apparel industry (24.34, 1.0E-4); sustainable textile (24.34, 1.0E-4); business intelligence system (24.34, 1.0E-4); data-driven retail ecosystem (20.2, 1.0E-4); creating new tech entrepreneur (20.2, 1.0E-4)
3	20	0.909	empirical study (24, 1.0E-4); large shopping supermarket (24, 1.0E-4); customer loyalty (24, 1.0E-4); economic

			indicator (17.85, 1.0E-4); new damage function (11.8, 0.001)
4	19	0.898	store attribute (20.89, 1.0E-4); customer experience (20.89, 1.0E-4); customer engagement (16.03, 1.0E-4); qualitative comparative study (15.57, 1.0E-4); generic retail business model (15.57, 1.0E-4)
5	17	0.975	informal finance (26.75, 1.0E-4); past present (17.37, 1.0E-4); ongoing evolution (8.48, 0.005); related variety (0.19, 1.0); apparel industry (0.19, 1.0)
6	14	0.922	metropolitan level (19.23, 1.0E-4); highway investment (19.23, 1.0E-4); industrial sector (19.23, 1.0E-4); firm service innovativeness (12.69, 0.001); emerging economies (12.69, 0.001)
7	12	1	evaluation (9.39, 0.005); furosine (9.39, 0.005); fast chromatographic approach (9.39, 0.005); pasta quality marker (9.39, 0.005); related variety (0.13, 1.0)
8	11	0.964	exploring multi-stakeholder value co-creation (18.85, 1.0E-4); pennine pub (18.85, 1.0E-4); entrepreneurial approach (18.85, 1.0E-4); global retailer (12.45, 0.001); regulatory intermediaries (12.45, 0.001)
9	10	1	regional organic food supply (8.48, 0.005); food chain type (8.48, 0.005); metropolitan region (8.48, 0.005); qualitative analysis (8.48, 0.005); berlin (8.48, 0.005)

4 Conclusions: Model Construction

“The wheel of new retail” theory explains the basic motivation and underlying logic of the dynamic sustainability of the retail industry. The literature is able to answer this question in a more systematic way: the external drivers for the sustainable rotation of the new retail wheel depend on the current state of the global economy and consumer behavior, while the sustainable rotation of the wheel depends on the dynamic capabilities of the company, including the innovation of its technological applications and business model innovation. Ultimately, good performance, continuous renewal of all

business elements and new business ideas are the lubricants that drive the sustainable rotation of the new retail wheel. (Fig. 4)

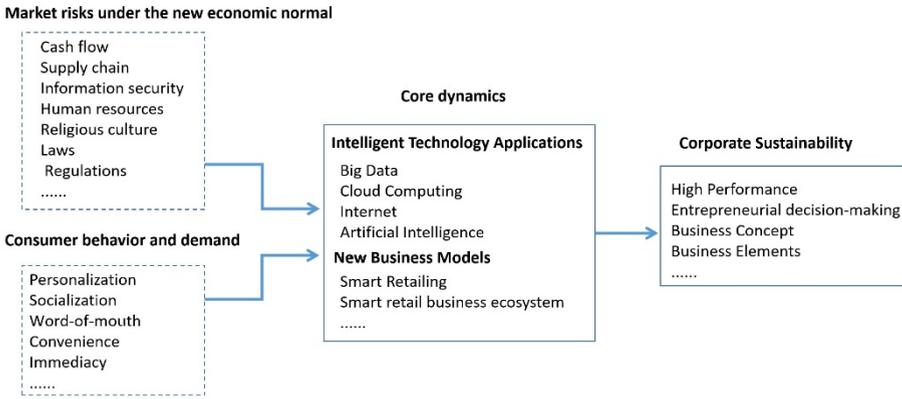


Fig. 4. New retail wheel revolving process

4.1 External drivers

Market risks under the new economic normal.

Nowadays, many developed countries have entered a new economic normal stage, and the country's economy has gradually shifted from high-speed development in the past to medium-to-high-speed development. For retailers, the overall strategic development must shift from the past factor and investment-driven to innovation-driven, making it a priority for many retailers to resist external risks under smooth and sustainable development. Retailers will be faced with possible problems in cash flow, supply chain, information security, human resources, religious culture, laws and regulations, etc. Therefore, faced with such a great variety and complexity of uncertainties, retailers must form intelligent risk management systems with algorithms developed to be interactive, which are implemented in a cycle of identifying risks and finding management techniques until each risk is controlled.^[10]

Consumer behavior and demand.

Generation Z consumers (born between 1995 and 2009) are gradually becoming a major consumer force, born seamlessly into the online age and eager to use digital products. Their consumption behavior has become personalized, social, word-of-mouth, convenient and instant. Retailers need to study the differences between online and offline sales systems to enhance the service experience of consumers at different points in time and space.

4.2 Core dynamics

The speed of the new retail wheel depends on the strength of the company's dynamic capabilities. Dynamic capabilities are defined as the behavioral orientation of a company to continuously integrate, allocate and renew integrate, allocate and reengineer resources and capabilities by continuously upgrading and reconfiguring its core competencies to adapt to changes in the volatile market to gain or maintain its competitive advantage.^[11] The development of a company is a dynamic process that responds positively to its environment, and dynamic capabilities are essential to the evolution and development of a company. The ability of retailers to flexibly use advanced digital technologies, respond to customer needs, reduce costs and increase efficiency, and create new business models will be necessary to ensure the turning of the wheels of new retail.

Intelligent technology applications.

Big data, cloud computing, internet and artificial intelligence are among the core drivers of innovation in the retail industry. Payment systems, unmanned retail, and contactless services are all active applications of digital technology in practice, facilitating consumer decisions, reducing business labor costs, and improving efficiency.

New business models.

Online retailing and offline retailing have entered an era of complementarity and integration, and many new business models have been birthed by retailers. For example, in some countries, the smart retailing and Smart retail business ecosystem have become the mainstream of business, which can change the level of organizational management and sales activities.

4.3 Lubricants: corporate sustainability

Based on these core dynamics, retailers are able to grow sustainably. Nevertheless, the external environment is changing in real time. Maintaining the high performance of existing companies, the right decisions by entrepreneurs, business operation concepts adapted to market developments and responsive factor inputs ensure the constant rotation of the new retail wheel.

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