

# **In the Pursuit of Convenience-Oriented Stores: Leveraging ICT to Support a Smaller-Format- Multi-Store Retail Model**

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NEC Corporation



## Executive summary

Rapid urbanization, demographic shifts and technological advances are causing diversification of consumer lifestyles and dramatic changes in the shopping behavior. Today's consumers have access to a wealth of information on an unprecedented scale; this has redefined the importance of convenience for consumers, and only those retailers who are able to provide preferred type of convenience, become the 'retailers of choice'.

Retailers who want to continue as the preferred shopping destinations must change their strategies. One of the strategies to achieve this is 'to get closer' to the consumers by developing multiple smaller-format stores in proximity to target consumers. This paper provides insights on how to leverage ICT for creating a successful smaller-format-multi-store retail model.

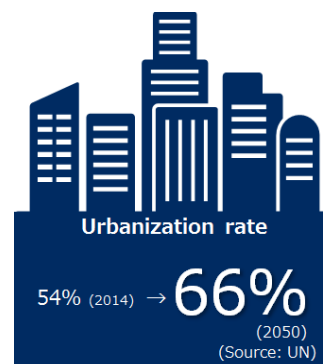
## 1. Changes in the External Environment Surrounding Retail

Environment surrounding the retail industry is changing significantly. Today more and more retailers are opening smaller-format stores, as the factors of economic development and population growth continue to contribute to the trends of worldwide urbanization, land regulations and higher land prices. Furthermore, factors such as aging population and changes in the household structure are causing

diversification of consumer lifestyles and shopping behavior. In addition to this, there have been remarkable technological advances, and some of these technological advances have led to the use of consumer IT in the enterprise environment.

### 1-1. Accelerating urbanization, increasing land prices and restrictions on larger-format stores

Figure 1. Rapid urbanization



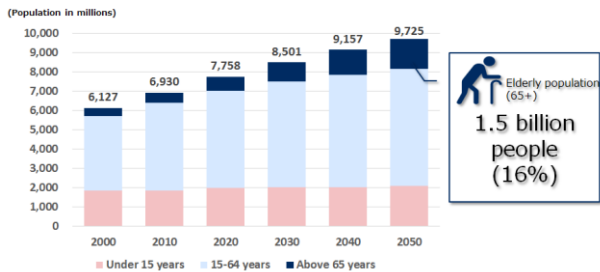
Today, trend towards global urbanization is only accelerating. In 2014, urbanization rate was 54%, and is expected to climb further up to 66% by 2050, with an urban

population of approximately 6.3 billion<sup>1</sup>. As urbanization continues, land prices across the major cities around the world also continue to rise. In this environment of rapid urbanization, many countries have imposed restrictions on the opening of new BIG-BOX or larger format stores, while smaller-format stores do not face such restrictions due to their smaller footprint. Such urbanization factors have contributed to an increase in the future opportunities for smaller-format stores, as retailers try to capture the demands of consumers living in the urban areas.

<sup>1</sup> UN, World Urbanization Prospects (2014)

## 1-2. Aging population and changes in the household structure and income

Graph 1. Changes in the population structure

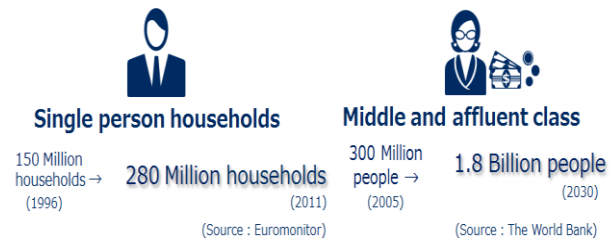


Global population has continued to increase. Year 2000 saw the population figures reach 6.1 billion people, and these figures are expected to reach 9.7 billion people by 2050. Especially the elderly population has increased globally, and it is predicted that elderly population will reach 1.5 billion by 2050<sup>2</sup>. Furthermore, the household structure is also undergoing transformation. Single person households increased from 153 million households in 1996 to 277 million households in 2011<sup>3</sup>. Even in the case of Japan, where the number of dual income households is less compared to the other advanced countries of the world, the numbers increased from 9.42 million households in 2000 to 11.14 million households in 2015<sup>4</sup>. Moreover, the middle and affluent classes in the emerging economies are expected to increase by approximately 1.5 billion people within a span of 25 years between 2005 and 2030<sup>5</sup>.

Factors such as aging population, changes in household structure and income are expected

to lead to the diversification of the shopping behavior of consumers.

Figure 2. Changes in household structure and income



## 1-3. Rapid technological evolution

In addition to the internet and mobile devices, technologies such as Internet of Things (IoT), Artificial Intelligence (AI), 3D printers, robotics are beginning to play an increasingly important part in the new retail revolution. Among these new technologies, AI and IoT are especially becoming the focus of retailers' attention. These technologies are expected to have a huge impact on the future of retail industry, and industry experts are expecting these technologies to contribute to the operational excellence and development of new services<sup>6</sup>.

For instance, one of the major US retailers, Macy's has started testing a pilot program dubbed as "Macy's On Call" using AI that allows customers to type in their inquiries using smart phone app and receive answers. Further, Japan's major retailer AEON has also started its own AI testing efforts by introducing a self-propelled robot to check store's inventory status in real time. In addition to this, IoT has enabled a comprehensive and unified management of in-store ICT devices and OT

<sup>2</sup> UN, World Population Prospects (2015)

<sup>3</sup> Euromonitor, The Family Structure of the Future (2013)

<sup>4</sup> Cabinet office, Whitepaper on Gender Equality (2016)

<sup>5</sup> World Bank, The Rise of the Middle Class (2013)

<sup>6</sup> Gartner, Hype Cycle for Retail Technologies 2016 (2016)

(non-ICT, Operational Technology)<sup>7</sup> equipment, thus helping to reduce store operation costs and prevent opportunity loss.

Table 1. Examples of AI and robotics business cases

Company	Technology Trials
Macy's	Tested a pilot program dubbed as "Macy's On Call" using AI that allows customers to type in their inquiries using smart phone app and receive answers
THE NORTH FACE	Tested an interactive platform over the website using AI that recommends products in accordance with the customer's preferences
Lowe's	Introduced autonomous robots to provide shopping support to the customers at 11 stores located in America's San Francisco Bay area. The robots also provides support to customers, and assists employees with inventory management
AEON	Introduced a self-propelled robot to check in-store inventory status in real time.

## 2. Changes in the Shopping Behavior

As the urbanization rate increases, consumers' living environment undergoes various changes, along with the changes in the household structure as well as income, leading to diversification of shopping behavior. The spread of the Internet and mobile devices have made consumers more powerful than ever, and now consumers find themselves in an 'era of choice', where they're free to choose a retail format depending on the needs of a particular moment. This 'era of choice' has seen an increase in the number of consumers seeking convenience as an important factor in addition to the functional values such as price and specifications, or emotional values, such as brand, which have traditionally been considered important. As a result, retail industry is required to satisfy the needs of convenience-oriented shopping behavior of each individual consumer.

<sup>7</sup> Gartner, IT Glossary

<sup>8</sup> Nielsen, Think Smaller for Big Growth (2016)

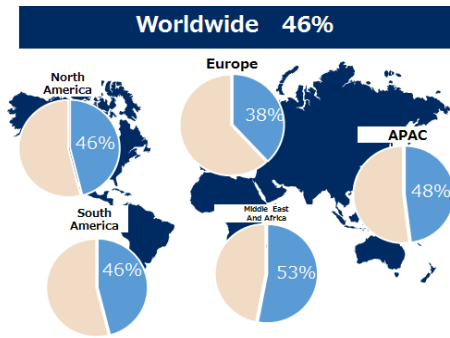
### 2-1. Neighborhood store-driven higher shopping trip frequency, with a smaller basket size

As the number of dual income households increases, time available for shopping also gets limited. This has created an increasing need for the people to shop 'efficiently' by shopping in the neighbourhood, such as close to their home, work location or the nearest station. Moreover, as the number of elderly people increases, there is a growing need for reducing shopping effort such as need to carry heavy items or time-consuming shopping, etc. In case of single households, people have changed their preference to 'top-up shopping' i.e. shopping less but more frequently instead of shopping in bulk over a weekend.

One research suggests that in fact, 46% of people consider shopping as a "chore", and there is a growing trend towards reducing the time spent on daily shopping as much as possible. Furthermore, research also suggests that for 56% of the consumers, 'proximity' is as important as 'pricing' when it comes to selecting a brick-and-mortar store<sup>8</sup>. On the other hand, the purchasing frequency increased in some regions between 2009 and 2011, as the number of people shopping more than thrice a week rose from 39% to 49%<sup>9</sup>.

<sup>9</sup> IGD, Shopper Trends (2012)

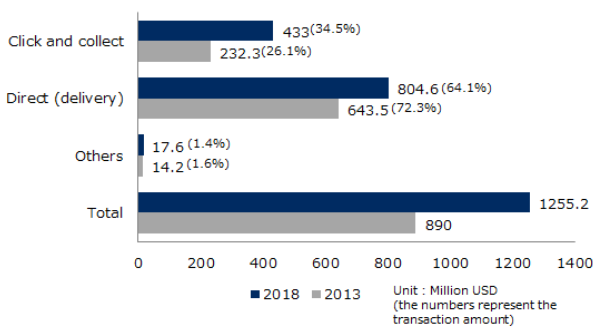
Figure 3. Ratio of people who consider shopping a chore



### 2-2. Growth of EC and store pick-up

The spread of the Internet and mobile devices has made it possible for the consumers to shop anytime and anywhere. The global EC market is expected to expand from 54.8 billion USD in 2001 to 1.98 trillion dollars<sup>10</sup>. Such changes have forced brick-and-mortar stores to assume new roles. There is a growing need for click & collect delivery method as one of the ways to pick up the good ordered online at a neighborhood store or at a designated locker. The period between 2013 and 2018 is expected to see an 8.4 point increase in the click & collect delivery<sup>11</sup>. These needs are also an indication of the convenience-oriented consumer behavior, and such needs can be satisfied by opening stores in proximity to the consumers.

Graph 2. Estimated market size of Click-and-collect delivery for EC



### 3. Smaller-format with Multi-stores: Need of Today's Retail

In order to cater to the consumers' 'convenience first' shopping behavior, we propose 3 main points that retailers need to take into consideration:

Point 1: Consumers shopping on EC platforms using their personal devices.

Point 2: Provide 'convenience' by differentiating and combining EC and brick-and-mortar outlets

Point 3: Offer convenient store outlets to consumers close to their neighborhoods.

The 3<sup>rd</sup> point is essential if retailers want their stores to be the 'preferred choice of customers' who would like to do their shopping close to their neighborhood. One of the ways to achieve this is by shifting towards a strategy of 'Consumer-Centric Retailing' combined with the 'Smaller-Format-Multi-store Retail Model'.

A retail business that combines smaller-format stores with a multi-store deployment model is required to think beyond conventional mass-merchandising that adopts to a store's trading area or the region. Smaller-format chain stores need to achieve a sophisticated localization that is capable of satisfying needs of every individual customer visiting the store.

On the other hand, there is a need to change the high cost structure that usually follows smaller-format stores, and aim for a high level of management efficiency by optimizing store operations. This store operation optimization

<sup>10</sup> Euromonitor, Passport data (2016)

<sup>11</sup> Barclays, The last mile report (2014)

cannot be achieved without leveraging ICT. This section discusses advantages of ICT from the perspectives of smaller-format stores and multi-store retail.

### **3-1. Essential aspects of smaller-format store operations and implementation**

Following three points are essential when considering a smaller-format store model while achieving sophisticated localization at the same time, and maximizing profit in spite of a smaller sales floor.

First of all, it is important to create a sales hypothesis through a detailed analysis of individual customer needs and shopping behavior to provide product assortment demanded by customers. Store visitors include not only the customers residing in the nearby area but also those passing by the store on their commuting route. In order to predict the consumer needs accurately, it is necessary to analyze preferences and shopping characteristics of individual consumer in addition to the POS sales records as well as consumers' reaction through advertisements and SNS. It is important that product assortment reflects the facts such as hit items or items that did not sell well at a single-item level. Furthermore, it is important to visualize in-store consumer behavior by leveraging sensing information and images obtained through IoT, and analyze this information at an individual customer level to get a clear picture of best-selling items and slow-moving items in

the real-time. This can prove crucial for store operations.

Secondly, maintaining an optimum inventory at all times is important since the inventory volume becomes limited due to store's smaller format. Although it is important to ensure optimum inventory for products with a shorter shelf life and shorter ordering cycle, if fast-moving items are ordered in huge quantities, it may result in loss of the excess quantity and reduce the overall store management efficiency. On the other hand, if the store staff orders minimum quantity necessary for replenishment to avoid excess loss, then it might lead to a stock-out situation due to a sudden or significant change in the consumer demand and result in an opportunity loss.

It is not enough to plan store operations based on location, but it is important to optimize operations for each individual store. Thus, it is necessary to base orders on a hypothesis that takes into consideration a balanced view of potential opportunity loss and waste loss by unique conditions of each individual store. However, this ordering balance requires long term experience in analysis and hypothesis verification.

Therefore, it is important to visualize the thought process and reference data used by an expert, and convert that expertise into a system, thereby enabling a certain standard level of hypothesis verification, irrespective of the experience or the skills of the person.

The third point is to leverage ICT to increase

operational efficiency and labor-saving. This is important since store operating costs tend to be relatively higher, as compared to the BIG-BOX stores or larger-format stores, creating pressure on profit margins. Therefore, it becomes essential for a smaller-format to reduce the work-load of the store associates and perform store operations with small number of staff. However, if the product assortment and ordering quantity are to be decided based on the needs of the individual customer and each store, it would require more time for a detailed data analysis and hypothesis creation.

Chart 1. Essential aspects of smaller-format store operations

Smaller-format-Multi-Store Retail Model: Key points of a successful smaller-format store	
Essential aspects	Implementation measures
<b>Product assortment tailored to individual customers</b>	<ul style="list-style-type: none"> <li>✓ Analyze individual needs</li> <li>✓ Collect information about store's surroundings and utilize it for product assortment</li> <li>✓ Create a mechanism to perform hypothesis development and verification in real time</li> </ul>
<b>Optimal inventory</b>	<ul style="list-style-type: none"> <li>✓ Effective utilization of display and inventory space.</li> <li>✓ Optimum ordering in accordance with the status of each store</li> <li>✓ Mechanism for ordering and verification based on hypothesis</li> </ul>
<b>Reduce staff workload by leveraging IT solutions</b>	<ul style="list-style-type: none"> <li>✓ Labor saving and automation using robots and AI</li> <li>✓ Reduction of operation cost</li> <li>✓ Power shift towards the store employees by enabling them to perform important operations</li> </ul>

Such operations can be performed in two ways. One way is by collecting as much information as possible on the store status and then analyzing the information at the headquarters to develop an order hypothesis; the second way involves authorizing stores to perform ordering operations and run the hypothesis verification cycle at each individual store. However, it is important to remember that if such operations are to be performed by the HQ, it becomes necessary to create a mechanism that can capture various changes in the store environment in real time, and analyze the vast data efficiently.

On the other hand, in case of store-driven

ordering, it is important to reduce the burden of operations such as stocking or arranging product display and use that time for higher level operations such as product assortment, ordering or customer engagement. For instance, automatic ordering for daily goods or products with longer shelf life can enable operational streamlining, while use of technologies such as robotics, IoT, AI can support automated inventory check, thereby enabling store associates to devote more time to product assortment and ordering.

### 3-2. Essential aspects of multi-store deployment and implementation

NEC believes there are 3 key points that retailers need to take into account for the successful planning of a multi-store retail model that provides locations in close proximity to their customers making it easier for the customers to buy the desired products at a time of their convenience.

First, the deployment of new stores in a short period of time. Second, the streamlining of business operations, and the third point is the non-stop around-the-clock store operations. It is imperative for retailers to implement these key strategies to reduce cost, manage and improve quality in order to achieve a successful store deployment.

The first point referring to a new store roll-out in a short time is important as it helps in responding to consumers' ever-changing needs and helps the store to continuously attract customers to its doorsteps. However, as the number of stores increase, the



management becomes more complex. This issue can be solved by standardizing roll-out operations to the best extent possible and by leveraging ICT to check the operations and progress status, thereby enabling reliable and speedy store deployment. Moreover, reducing operational mistakes during deployment helps to reduce cost.

The second point refers to operation streamlining which is important from the perspective of reducing the store operation cost which can be relatively higher for smaller-format stores as compared to larger-format stores such as BIG-BOX stores.

One of the ways to achieve this is to establish a mechanism by leveraging AI technology and provide information to the store employees as and when required, leading to better productivity and better quality control. Moreover, today’s retailers are also required to use robots for standardized operations, which can help them to reduce employee workload and the cost.

Third point refers to non-stop store operations. It is important that store operations are not interrupted since any malfunction of the ICT devices or OT equipment installed at a store can cause service or sales interruption resulting in the decreased levels of customer trust and opportunity loss. In order to ensure operational reliability, retailers can use IoT technology to obtain operational status of various in-store equipment in real-time and provide preventive maintenance or replacement for any equipment which has detected a malfunction. Furthermore, sensors can enable quick detection of the exact

component causing the malfunction, thereby helping a speedy recovery and minimizing the impact on store operations.

Chart 2. Essential aspects of multi-store deployment

**Smaller-format-Multi-Store Retail Model: Key points of a successful multi-store-format model**

Essential aspects	Implementation measures
<b>Deal with changes in consumer needs by deploying stores in a short period of time</b>	<ul style="list-style-type: none"> <li>✓ Streamline operations through standardization of deployment operations and ICT utilization</li> <li>✓ Reduce errors and cost through work progress management</li> </ul>
<b>Efficient store operations through cost reduction and productivity improvement</b>	<ul style="list-style-type: none"> <li>✓ Support store operations using AI</li> <li>✓ Use robots for store operations</li> </ul>
<b>Prevent opportunity loss through non-stop store operations</b>	<ul style="list-style-type: none"> <li>✓ Real time operation management of devices installed in the store using IoT</li> <li>✓ Preventive maintenance through advance detection of malfunction</li> </ul>

#### 4. Conclusion

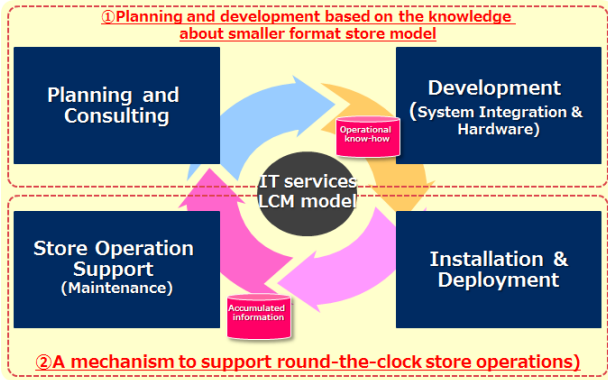
As urbanization progresses rapidly along with a rapid increase in the elderly population, and changes in the household structure, consumers’ expectations towards retailers are changing as well. Consumers are no longer satisfied with the functional value such as product pricing and specifications or emotional value such as branding, but their shopping behavior is gravitating towards convenience-oriented experience. In other words, convenience-seeking consumers are expecting retailers to provide a store location closer to their living sphere as well as provide value by enabling them to shop for items of their choice in an effortless way.

One of the ways to satisfy the needs of convenience-driven consumers is by creating a “Smaller-Format-Multi-Store Retail Model’ with a focus on Consumer-Centric Retailing. And, in order to create this model successfully, the use of ICT is indispensable. Further, such use of ICT will require adoption of a system that can



perform PDCA cycle for the overall retail chain as well as for each individual store. If smaller-format is to succeed, it is not enough to simply deploy the same system used by larger-format for a smaller-format model.

Figure 4. NEC's IT Service LCM model



NEC has a long and successful track record of supporting various retail formats including major convenience store retailers. This experience has helped us in developing a strong expertise in the areas such as streamlined operations of smaller-format stores as well as non-stop operations for multi-store retailers. NEC has brought all this retail expertise under the single banner of "IT Service LCM (Lifecycle Management) to offers superior store systems, packages and maintenance support necessary for a successful Smaller-Format Multi-Store Retail Model.

Chart 3. NEC's IT service LCM: Overview

Planning and Consulting	<ul style="list-style-type: none"> <li>✓ Provide IT strategy formulation support for business expansion</li> <li>✓ IT platform and business system design</li> </ul>
Development (SI and Hardware)	<ul style="list-style-type: none"> <li>✓ Hardware and application development to support store operations</li> </ul>
Installation & Deployment	<ul style="list-style-type: none"> <li>✓ Simultaneous system deployment for super-large number of stores (hardware installation and application update)</li> </ul>
Store Operational Support (Maintenance)	<ul style="list-style-type: none"> <li>✓ Call center operations, store devices information gathering and management.</li> <li>✓ Proactive and preventive maintenance through remote ICT support.</li> </ul>

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## Company Overview

Company Name : NEC Corporation  
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### Business Overview:

NEC has been a leader in the field of industrial technology, and we have been a driving force behind the development of cutting-edge technologies in the three areas of computing, network, and software solutions. We have been also promoting various research and development initiatives that look into the future in the advanced areas of data science and artificial intelligence (AI).

As a 'Value Provider' we are focused on the values of "Safety," "Security," "Efficiency," and "Equality" through our Solutions for Society business, as we work to solve social issues from a global angle with the ultimate goal of helping people live more prosperous lives.

### Brand message:

"Orchestrating a brighter world"

NEC brings together and integrates technology and expertise to create the ICT-enabled society of tomorrow. We collaborate closely with partners and customers around the world, orchestrating each project to ensure all its parts are fine-tuned to local needs. Every day, our innovative solutions for society contribute to greater safety, security, efficiency and equality, and enable people to live brighter lives.