

Fujitsu Future Insights

Digital Transformation in Retail

Future Shopping Experience

As she enters the store, she is biometrically validated and presented with some recommendations. The store system selects items that reflect her preferences. The choices are based on information linked to her authorized personal account such as meal purchase history, stocked refrigerator items and health information as well as the store's product data including seasonal items and special nutritional foods.



Once the couple finalize their selections from the menu of recommendations, the products are collected and packed at the food counter, with ingredient volumes optimized to minimize waste. As they leave the store payment is confirmed.

Your favorite drug store allows you to manage the way your personal health data is used and you can always confidently discuss a variety of ailments. When you talk to a staff member about changes in your health since the last visit, they might suggest some effective supplements for you to take. These recommendations could be based on your personal data, such as your prescription history and latest vital signs readings. The reliability and trustworthiness of staff and the appropriate management of customers' personal data are important factors in choosing a store that best suits your needs.





These girls are chatting about cosmetics used by their favorite online influencer. Joining their chat, as usual, is an AI virtual assistant who recommends the lipstick used by the influencer in similar shades of the brand. Of course the girls could make an immediate purchase with their mobile devices, or they may be invited to visit a store to have their cosmetics applied by a famous makeup artist.

When the girls arrive at the store, the AI software has already pinpointed their preferences, having read their clothing rental data and browsing history of favorite influencers. In an instant, the girls are shown a selection of personalized apparel choices. The shop's stylist sparks up a conversation with the girls about the best fashions for them, guided by the knowledge of their preferences.



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Fujitsu Future Insights

Every year, Fujitsu publishes the Fujitsu Technology and Service Vision. This is the company's global vision for the future, looking at how businesses and society will use technologies to drive innovation. Fujitsu Future Insights looks at specific fields in order to provide a deeper analysis of challenges and the impact of technologies. It also offers suggestions for possible future scenarios and strategies related to those fields.

[Website]

Fujitsu Technology and Service Vision
<https://www.fujitsu.com/vision/>

Fujitsu Future Insights
Digital Transformation in Retail
<https://www.fujitsu.com/global/vision/insights/wp3/>

Megatrends in Retail



How will technology transform the retail industry? By investigating digital transformation developments in the current retail business, we have identified five key factors that we expect to have a major impact on the industry's future:



Discontinuity in values and behavior of consumers



Regaining control of data by consumers



Diversifying relationships between people and machines



Human-centric ecosystems



Redefining the nature of consumption

Fujitsu suggests that it is necessary to consider these key factors for the future of retail business.

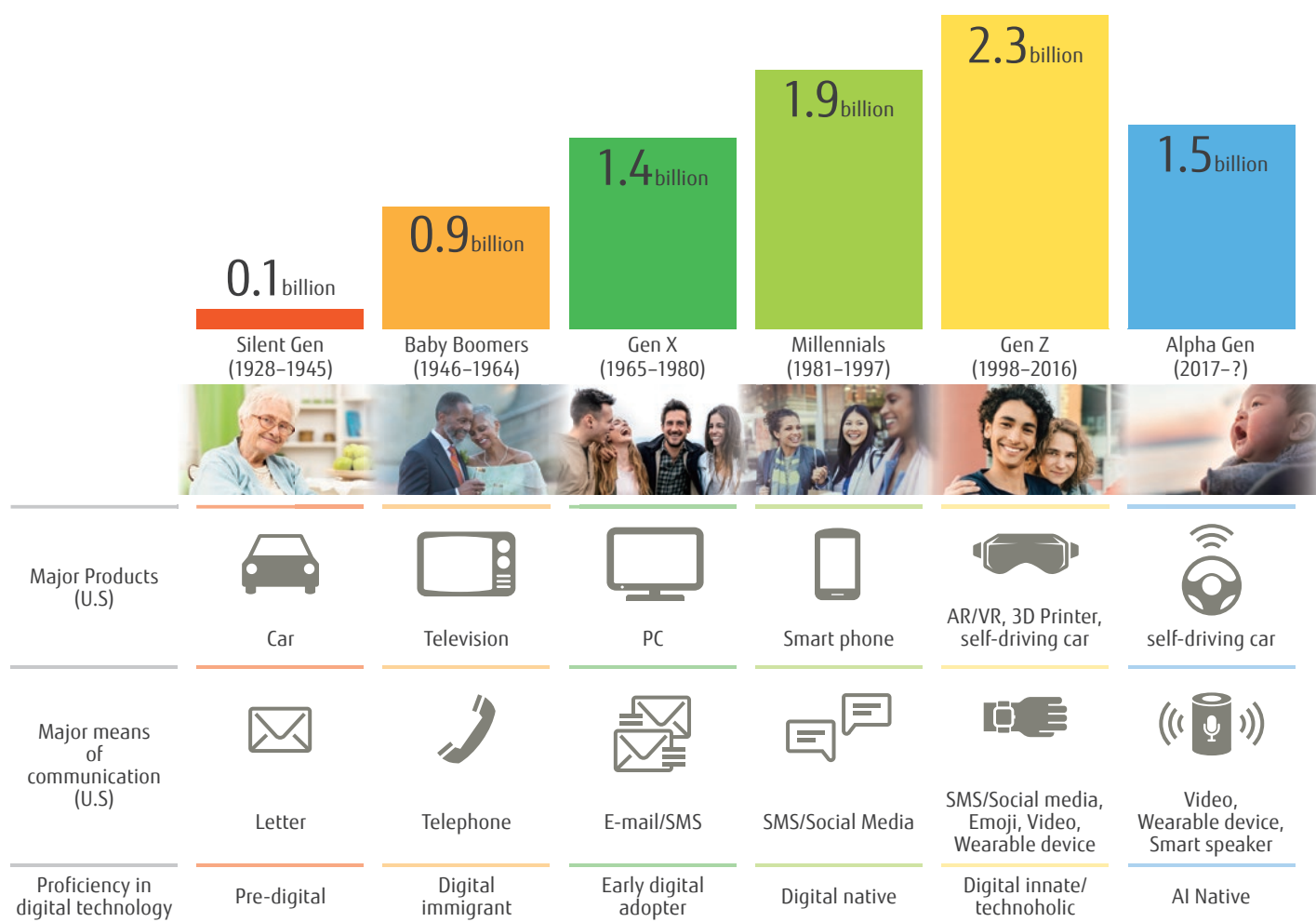


Discontinuity in values and behavior of consumers

By 2030, there will be six generations of consumers. Having lived through different periods of history, each generation will have differing values and their behaviors will be discontinuously changing. Values and behaviors of consumers are already diversifying, and retailers will need to view consumers as belonging to micro-segments even more differentiated than generational categories. Recent advances in technology have also significantly altered the values and behavioral traits of each generation. This is because when consumers make purchasing decisions they are heavily influenced by information. In a recent global survey, respondents were asked if their buying decisions

were affected by bloggers or video bloggers. Younger generations had higher positive response rates – 54% for Gen Z, 51% for Millennials (Gen Y), 35% for Gen X, and 20% for Baby Boomers and the Silent Generation. This confirms that Gen Z and Millennials are greatly influenced by the opinions of influencers, and not only by corporate and brand marketing information.

In 2013, when Millennials were around 20 years old, the penetration level of smartphones in the United States surpassed 50%. Technological advancements, driven by smartphones, have highlighted the generational differences in ability and way of using digital technology. As a result, the way in which consumers interact with retailers is changing and expanding. In the future, these differences will lead to discontinuous changes in values and behavior of consumers and their purchase journeys.



Fujitsu created the chart based on the "A.T. Kearney Global Future Consumer Study" and JETRO's report about millennials and generation Z.

Consumption in the coming decade will be driven by Millennials who, by 2027, will account for around 40% of the working-age population. Born and raised in an environment where digital technology grew and blossomed, Millennials easily make full use of digital devices, such as smartphones and tablets. They represent a generation of digital natives who instinctively use smartphones and digital technologies to make purchases and connect with friends on social media.

Millennials are very different from previous generations regarding their sense of values. Whereas earlier generations preferred to acquire and consume physical goods, Millennials tend to place more importance on empathy and experiences, such as attending events. They value social contribution and connections, and they seek purpose in their work and in the products and services they purchase.

The next generation, Gen Z, is a large group that, in the U.S., accounts for 25% of the population and promises to become the most influential purchasing bloc. Gen Z tends to be more diverse and multicultural than previous generations. A typical Gen Z person is highly interested in social issues and uses digital connectivity continually to gather new information and share opinions.

The latest generation (those born between 2011 and 2025) have been dubbed Generation Alpha. From infancy, Generation Alpha will have online access and digital devices that can readily access any knowledge that interests them. They'll have less need to actively search for information or products because AI software will identify their unmet needs and make suitable recommendations. The areas in which they need to think or act will be less than was the case for previous generations, so their thought patterns and behaviors may be radically different. In other words, they will become the generation of AI natives.

As values and behaviors of consumers change discontinuously in these ways, retailers will need to provide services beyond simply selling. Retailers will require a deeper understanding of consumer pain points and jobs to be done. How will they be able

to better understand consumers, offer goods and services that meet consumer needs, and build a successful customer engagement in a world where diversification of customers is progressing in multiple dimensions in addition to the different customer segments by generation?



Regaining control of data by consumers

Purchasing has traditionally been a simple transaction. The customer exchanges money for goods, with the vendor often retaining only enough records to balance their books. However, in the digital age trading becomes much more complex. Transactions are increasingly driven by personal data of individual consumers, such as purchase history, preferences, and creditworthiness, which give retailers an advantage.

Nowadays, huge digital platformers acquire large amounts of personal data from all over the world and use this data when doing business. Due to their scale these platformers tend to operate as a de facto monopoly. Various countries in Europe and elsewhere see this as a violation of antitrust laws and, to protect the rights of individuals, are tightening regulations by introducing measures such as the EU's General Data Protection Regulation (GDPR).

This creates the shift of control of personal data from companies to individuals, opening the door for the development of services that enable individuals to better manage their own information. Blockchain technology is gaining traction because of its ability to manage distributed data across multiple companies rather than having personal data managed by dedicated entities. While still a developing technology, when it reaches maturity blockchain may well become a game changer that drastically alters existing business models. In the future, when data belongs to individuals, companies will need to provide benefits to them as consumers in order to obtain their personal data.

Together with major companies and others, Fujitsu already uses blockchain technology to provide data to various operators to personalize their services, while leaving control of personal data in the hands of individual consumers. Using this, retail companies can develop a business that will give consumers access to a range of personalized services. This will enable retail companies, with the consent of consumers, to combine personal data on multiple individuals and engage in product planning and promotions in collaboration with companies from other industries – providing them with opportunities to attract new customers.

Trust is essential to the successful management. Major trust issues of continuing concern are: leaking of personal data, inappropriate management of personal data, and unauthorized

access to such data. Dissatisfaction is on the rise among customers whose trust has been betrayed. According to a global survey conducted by Fujitsu, 82% of respondents feel it is important to have full control of their personal data and 72% were worried about organizations exploiting their personal data without permission. Clearly, trusted administrators are needed to prevent leaks and unauthorized use of personal data. Fujitsu aims to realize trusted personal data management through the use of its various technologies.

How should we maintain transparent and responsible relationships with consumers? And what kind of initiatives should an organization take to earn the trust of consumers?





Diversifying relationships between people and machines

Robotic process automation, AI, and other technologies are now being used in a number of industries to automate tasks that were previously performed by humans. Huge e-commerce operators like Amazon continue to develop more sophisticated end-to-end automated operations, from the customer interface all the way to warehousing and logistics. Retailers are also part of this move to automation. They are applying digitalization and automation technologies, even in their physical stores, as evidenced by the emergence of supermarkets without cash registers.

But does this full automation help maximize customer value and improve the consumer experience? Let's consider this in more detail. Clearly, there are things that AI and machines can't do. These include tasks involving creativity, empathy, and art.

In developing useful and valuable ways of automation, the key is to design domains that elicit the best out of machine efficiency and human values. As the trend toward automation

continues, more and more opportunities and models for human-machine collaboration will emerge. Consider customer service at a clothing store. Here, AI can be used to extract and analyze multiple personalized styling suggestions based on customer data. The time thereby saved for the staff can be better spent assisting customers with value-added engagement, such as proposing styling options, establishing trustful relation, and enhancing client satisfaction. In the field of store design, as well, AI can generate ideas that humans might not have considered – providing hints for people to envision completely new store layouts.

As relationships between people and machines continue to diversify, requirements to employees in retail will change. Fewer people will be needed to handle stock inventory, product inspection and store cleaning. Apparel retailers, to promote their brands, will be seeking professional stylists and influencers, and people who excel in customer styling and communication. To keep pace with continual advances in digitalization and automation, the demand for professionals with AI and other digital skills will increase



strongly. Defining the roles and relationships between people and machines will determine the changing staffing requirements, recruitment processes, and personnel evaluation methods.

How can we inspire the creativity of our employees and encourage them to be empathetic with customers? How can we deploy AI and robots to empower store staff to enhance customer value?



Human centric ecosystems

In the era of mass production and mass consumption, every industry supplied mainly standardized products to a generic market. Now, the digital age unleashes possibilities for companies with solid trust-based customer relationships to provide personalized value. This can give each customer an experience specifically tailored to their needs. To achieve this, companies will reference purchase history and other individual customer data to analyze and understand their sense of values, hobbies, and

preferences. In addition, such companies can work cooperatively, to build cross-industry ecosystems that deliver values to the consumer by combining a comprehensive range of services.

Cross-industry ecosystems have begun to emerge in many industries, including financial service, mobility and healthcare. Retailers with a solid customer base will become key player in these new ecosystems. For example, a retail company as the nucleus of the ecosystem provides financial services to customers without credit cards, and an application that enables community-minded customers to use their accumulated shopping points to donate to social organizations and fair trade producers. The retailer could also provide health-awareness services at its stores, allowing customers to not only obtain wellbeing checkups after shopping but also have the most suitable groceries for their health situation delivered home on a regular basis. In short, such ecosystems can provide environments in which people are able to shop in comfort and lead more rewarding lives.

The development of such ecosystems means the competitive landscape in business will change dramatically and rivalry

Cross-industry ecosystem where companies co-create personalized value for their customers



between companies in the same industry will be replaced by competition between ecosystems and other ecosystems. In the United States and China, major retailers and IT vendors have already joined forces to provide platforms called Retail as a Service (RaaS) to support their ecosystem players. RaaS allows the retailer to use its own assets – including knowledge, know-how and accumulated data – to provide B-to-B services to sole traders and other small retailers and companies in the other industries. Users of RaaS in the ecosystem are immediately able to personalize and propose products that customers may need, as well as services that customers can purchase anytime, anywhere. They don't need to build their system.

It is a great opportunity for retailers, both as ecosystem providers and participants, to expand their businesses. Retailers not engaged in such a competitive arena risk losing their existing customers and the chance of attracting new ones.

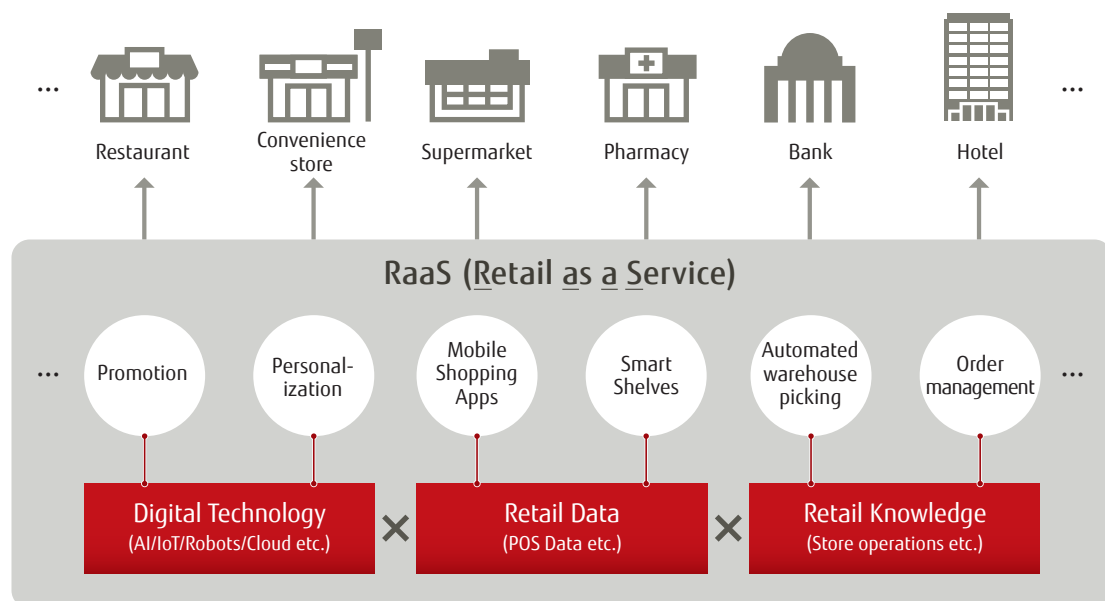
For retailers aiming to establish a business ecosystem, what do they need to do to co-create human centric values which

satisfy the individual need of their customers? Who are the best partners to collaborate with and what strategies should be adopted to grow the ecosystem?



Redefining the nature of consumption

The 20th century is seen as an era of mass production and mass consumption. Companies sought growth and increasing efficiency and many in society aspired to material wealth. While this era has brought wealth to people, it also led to many problems, including climate change, depletion of finite resources, destruction of natural ecosystems caused by the disposal of plastics, and food waste. According to the United Nations Food and Agriculture Organization nearly 800 million people suffer from hunger while 1.3 billion tons of food are thrown out across our planet every year. This food wastage is equivalent to about one-third of global food production. It is reported that in some developing countries, retailers force employees to work



in poor working condition. In response to these and other world challenges, the United Nations has set the Sustainable Development Goals (SDGs) with a target achievement year of 2030. Already, 66% of global business leaders consider the SDGs to be a business priority and incorporate them into their corporate strategy.

In recent years, some companies have also incorporated the concept of ethical consumption into their business objectives. Retail companies need to devise objectives and strategies that demonstrate their clear sense of social responsibility. Moreover, Gen Z and Millennials – the main purchasers of the future – are highly attuned to social issues and will avoid dealing with companies whose practices do not address these issues.

Companies are facing pressure to thoroughly rethink their strategies which focus more on sustainability and customer trust. For example, to minimize waste they will need mechanisms for matching supply and demand with a high degree of accuracy, as well as improving procedures to track customer satisfaction and respond to it promptly and appropriately. AI, blockchain, and

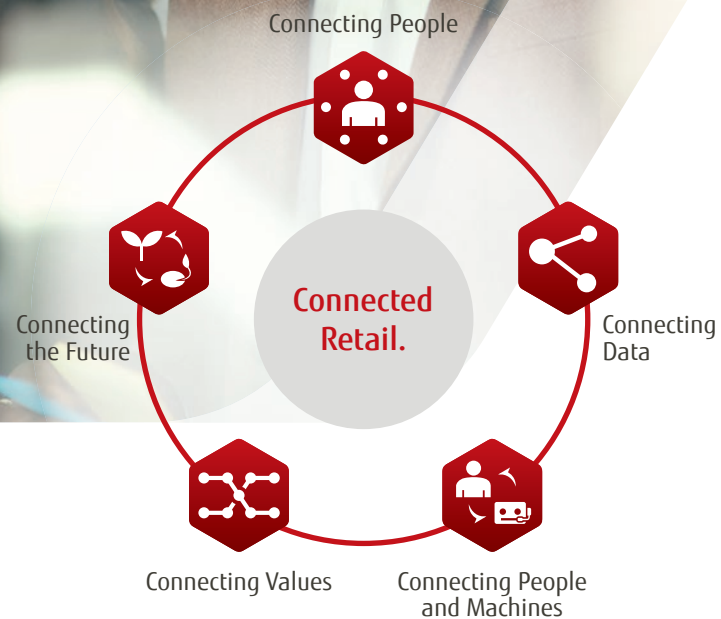
emerging digital technologies are providing new possibilities for rapid and reliable data collection and analysis, which will lead to improvements in end-to-end operational optimization and traceability in an ecosystem.

Meanwhile, a shift in emphasis from ownership to usership has flourished new business models, such as sharing and subscription services by digital technology. With the wider acceptance of usership will come a reduction in wasted food and clothing, a decline in unused electrical appliances and automobiles. The world paradigm will shift dramatically, away from mass production and mass consumption, eliminating the overall waste and inefficiency in society.

To manage the challenges we have considered, digital technologies and ecosystems are required. How should retailers reassess their operations, including the collaboration with their ecosystem partners, in order to build trusted businesses over the medium to long term? What type of business model should they adopt?



Fujitsu and the Future of Retail



Taken together, these five trends amount to a paradigm shift in retail. Specifically, we need to transition away from the conventional supplier centric model with mechanisms for providing value in one direction – from the supplier to the consumer. We must move to a human centric model where consumers can obtain any kind of value they desire, anytime and anywhere. To realize such human centric retail services, we

must transform the supplier centric sales model, where the sales process starts with the retailer, into a human centric purchasing model where the process starts with the customer. Under its Connected Retail vision, Fujitsu will transform retail business with customers. We will now cover Fujitsu's Connected Retail initiatives from five perspectives.



Connecting People

Traditionally, mass advertising was used to entice people to shop at physical stores. Buying behavior has now diversified in numerous ways. A consumer's purchasing decisions can be influenced by ads on the internet, by word of mouth, and by comparison sites. Some people use social media to help make decisions while others use physical stores as virtual showrooms, and then make their actual purchases online. With the rise of Millennials and Gen Z, purchasing behaviors are expected to diversify even further. It is easy to see why traditional retailers, whose sales offerings are determined by what their regular suppliers can provide, are unable to respond immediately to changing purchasing behaviors. Instead of designing touch points between retail companies and consumers from the supply viewpoint, it is necessary to redesign them from the consumer viewpoint.

For this redesign, we need to draw the customer journey, the consumer's purchasing behavior in their daily lives. Establishing new touch points within the customer journey can only be possible via digital transformation – the use of digital technology and data to bring about innovative services and business transformation. An example of this is our use case of an on-demand tailoring service for apparel companies. Providing a customer with a tailor-made suit would usually take about a month from order to delivery. However, digitalizing tailoring operations allows an apparel company to offer customers the same tailor-made suit in just one week. This on-demand service allows the apparel company to capture the sales opportunity.

Fujitsu is working to strengthen further the technologies, solutions, and human resources that support the business growth of retail customers through digital transformation. Together with its retail customers, Fujitsu will design and introduce new touch points with retail consumers for better engagement.



Connecting Data

Consumers must provide a company with their personal data to receive the value fit to their individual needs. However, online transactions do not allow users to see their business counterpart face to face, making it difficult to judge the credibility of the other party. With reports of fraud and instances of people falsifying personal credentials like work history and professional qualifications becoming more prevalent, ensuring the flow of high-quality, reliable identification becomes an urgent challenge.

In response to those challenges, Fujitsu Laboratories has developed IDYX (IDentitY eXchange), a digital identity exchange technology that makes it possible for companies and individual users involved in online transactions to confirm the identity of other parties in transactions. By expanding the application of blockchain technology to establish a distributed ID system, this IDYX enables to confirm the trustworthiness of the parties involved and to safely distribute personal information through the evaluations by users who have actually made transactions and the status of transactions made to date.

Fujitsu will continue to evolve IDYX to a digital platform service supporting digital business.



Connecting People and Machines

In retail outlets and restaurants, it is crucial to design shops and experiences there to keep customers regularly coming back again. A key factor is the ability to give customers new experiences with convenience and fun. At the same time, labor shortages in the retail industry are creating serious issues with increasing workloads and labor costs, highlighting the pressing need for more automation and laborsaving measures.

Fujitsu will help to achieve labor savings and enhanced

efficiency in retail operations. Here are some examples.

We have been conducting a trial that uses a robot to check if price tags are correct, POP stickers are not outdated and items are not out of stock. Previously these were visually inspected by staff before the store opened. This automation trial by a robot not only reduces the amount of time staff need to spend on routine tasks, but also boosts customer service quality, provides customers with timely information, improves ordering accuracy, reduces out-of-stock ratios, and offers a variety of other benefits to store management by utilizing information collected by the robot.

In the future, we aim to make this system further sophisticated and efficient by linking robots with key systems such as inventory control and ordering. In addition, Fujitsu's quantum-inspired Digital Annealer quickly solves large-scale combinatorial optimization problems such as optimization of inventory allocation and delivery plans. Fujitsu helps customers use these digital technology and machine to empower their employees.

Using IoT and data analytics technologies, we will work hand-in-hand with our customers to thoroughly visualize their end-to-end retail value chains. Then we can optimally reconfigure value chains by automating some processes and letting people operate other key processes. This approach certainly does not imply replacing people to machines. Rather, it enables people to concentrate more effectively on the tasks they should take care of and machines and digital technologies to empower and support people.



Connecting Values

Even if a retailer has an accurate grasp of customer needs, one company alone can fulfill only some of those requirements. To provide customers with an overarching service, the retailer must work with multiple players. This means interlinking various information of customers, previously dispersed across a range of providers, to gain a comprehensive understanding of the consumers' wants and needs. Recently, we have witnessed growing sales through online and smartphone apps as well as QR/barcode payments at stores. Data analysis of these transactions is enabling retailers to understand the whole purchasing histories of an individual customer across multiple sites and stores. However,

many consumers are concerned that they cannot track how their purchasing information is being used because such information is managed by retailers.

Fujitsu is developing a technology for handling consumer data in a trusted environment. Specifically, we applied blockchain technology to develop VPX (Virtual Private digital eXchange) technology in order to distribute safely a variety of data held by multiple companies and organizations within the existing IP network. This breakthrough enables us to dispense only necessary data to a trusted partner as required, while keeping data owned by each company or organization at hand and managing it in-house. We offer VPX as a data distribution platform to support ecosystems that transcend traditional company or industry boundaries.

Fujitsu conducts business with customers in various industries and sectors. In addition to retail, we work in collaboration with new partners in different industry areas, including government, local public sector, and financial institutions. By continuously providing value optimized to the current lifestyles of consumers, Fujitsu is supporting the development of a more rewarding society.



Connecting the Future

The world is facing a wide range of social challenges. These include issues related to the environment and climate change, food and education stemming from poverty, diversity and fairness, and mass consumption, which are cited in the United Nation's 17 Sustainable Development Goals (SDGs). We believe that the retail industry, which serves as a point of contact with end-users, must play an important role in helping to resolve these social issues.

Fujitsu engages in co-creation activities with customers to create a vision for future society and services, including finding solutions for social challenges. We open and operate the place for co-creation, FUJITSU Digital Transformation Center and have the technical capability to implement services framed during workshops and we can help customers transform ideas to the next level for evaluation. Fujitsu also has experience in developing systems, new business processes, and services in collaboration with multiple customers.

We are demonstrating leadership in solving social challenges. For example, Fujitsu promotes the reuse of plastic packaging materials for procured parts in cooperation with external recycling companies. We will make full use of digital technologies as a tool to address societal issues in the retail industry, including the shift from ownership to usership, optimal supply-demand matching, and assurance of product traceability.

Together with its customers, Fujitsu envisions the future of the retail industry with customer and transforms that vision into reality.



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