INTERNATIONAL LABOUR ORGANIZATION

Sectoral Activities Programme

Social and labour implications of the increased use of advanced retail technologies

**Report for discussion at the
Tripartite Meeting on the Social and Labour Implications
of the Increased Use of Advanced Retail Technologies**

Geneva, 2006

INTERNATIONAL LABOUR OFFICE GENEVA

Cover photographs: METRO Group

Preface

This report has been prepared by the International Labour Office as the basis for discussions at the Tripartite Meeting on Social and Labour Implications of the Increased Use of Advanced Retail Technologies. The Governing Body of the ILO decided at its 292nd Session (March 2005) that an international tripartite meeting for the commerce sector would be held in 2006. It was later decided that the Meeting would examine the role of new retail technologies in shaping the employment landscape in commerce. The focus would be on the introduction of radio frequency identification (RFID) technologies and their employment impact across the distribution chain in general and more specifically in retail. It subsequently decided (295th Session, March 2006) that the Meeting would be held from 18 to 20 September 2006 in Geneva, and be composed of all interested governments, 15 Employer representatives and 15 Worker representatives, selected after consultations with the respective groups of the Governing Body. The purpose of the Meeting is to: consider this report and, on that basis, adopt conclusions on ways to reconcile the interests of all stakeholders in the face of a changing employment landscape resulting from new technologies; to adopt a report of its discussions; and to propose a programme of follow-up activities to implement those recommendations. The Meeting may also adopt resolutions.

This Meeting is part of the ILO's Sectoral Activities Programme, as defined by the ILO programme and budget, the aim of which is to assist governments, and employers' and workers' organizations to develop their capacities to deal equitably and effectively with the social and labour problems of particular economic sectors. The programme also offers a means of alerting the ILO to specific sectoral social and labour issues. In addition to sectoral action programmes (launched in 2004), technical cooperation, advisory and research activities, the programme of tripartite meetings also contributes to ILO strategic objectives. Such meetings bring together a cross-section of Government, Employer and Worker representatives from countries that are prominent or have a strong interest in a given sector. In line with the ILO's strategic objectives, these meetings also aim to strengthen tripartism and promote social dialogue at the international level.

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Glossary of terms, acronyms and abbreviations

Auto-ID Center	A partnership founded in 1999 between a group of global companies and six of the world's leading research universities (the Massachusetts Institute of Technology in the United States, Cambridge University in the United Kingdom, the University of Adelaide in Australia, Keio University in Japan, the University of St. Gallen in Switzerland and Fudan University in China) to develop standards and assemble the building blocks for the creation of an "Internet of things." The Auto-ID Center has since split into Auto-ID Labs and EPCglobal, a joint venture between UCC and EAN to oversee the continued development of the Electronic Product Code (EPC).
Cash and carry	A form of trade in which goods are sold from a wholesale warehouse operated either on a self-service basis, or on the basis of samples for cash.
category killer	A product, service, brand, or company that has such a distinct sustainable competitive advantage that competing firms find it almost impossible to operate profitably in that category.
collaborative planning, forecasting and replenishment (CPFR)	A system to link the supply and demand processes from manufacturer to consumer, allowing trading partners to see the entire supply chain.
customer relationship management (CRM)	A business strategy built around the concept of being customer-centric.
cross-docking	A logistics practice whereby incoming materials are immediately shipped out, usually without warehousing.
European Article Numbering (EAN) International	Now called GS1, following its expansion in November 2002 when the UCC and the Electronic Commerce Council of Canada (ECCC) joined the EAN International as member organizations. The EAN International and the UCC co-manage the Global Standards Management Process (GSMP).
efficient consumer response (ECR)	A global movement in the consumer goods industry aimed at encouraging supply chain participants to work together to respond to consumer demand better, faster and at less cost.
electronic data interchange (EDI)	Networks, such as value added networks (VANs) or the Internet.
electronic funds transfer at point of sale (EFT-POS or EFTPOS)	A device by which sales transactions can be directly debited to the customer's bank account at the point of sale, through the use of a debit card (generally the same card as that used with automated teller machines (ATMs)).
Electronic Product Code (EPC)	The RFID version of the UPC bar code, to be used for specific product identification. It transcends UPC by not only identifying the product as an SKU, but also providing access to additional data (via the EPCglobal Network) about the origin and history of the specific item. It is also sometimes referred to as GTIN (Global Trade Item Number).

EPCglobal	An industry organization to support the EPC Network, developed by the Auto-ID Center of the Massachusetts Institute of Technology (MIT) as the global standard for immediate, automatic, and accurate identification of any item in the supply chain anywhere in the world.
Global positioning system (GPS)	A system of satellites, computers and receivers that is able to determine the latitude and longitude of a receiver on earth by calculating the time difference for signals from different satellites to reach the receiver.
hypermarket/supercentre/ superstore	A very large commercial establishment that is a combination of a department store and a supermarket.
Identification Friend or Foe (IFF)	A system originating in Second World War to enable secondary radars to identify friendly from enemy aircraft by assigning a unique identifier code to friendly aircraft transponders.
IT	Information technology
Labour Force Survey (LFS)	A population assessment based on a systematic random sample design which makes it representative of the whole country.
pallet	A portable platform for storing or moving cargo or freight.
radio frequency identification (RFID)	An alternative technology to bar coding, it uses devices attached to objects that transmit data to an RFID receiver. Advantages include data capacity, read/write capability and no line-of-sight requirements.
stock-keeping unit (SKU)	A number associated with a particular product, often represented by a bar code, used to track inventory.
Serial Shipping Container Code (SSCC)	An EANUCC-supplied identification number to assure worldwide uniqueness for serialized identification of shipping containers, sometimes also referred to as the *licence plate*. Once assigned, the number cannot be used for another container for a minimum of a year.
Uniform Code Council (UCC)	Formerly the Uniform Product Code Council, UCC administers the Universal Product Code (UPC) bar code and other retail standards.
Universal Product Code (UPC)	The Universal Product Code was the first bar code symbology widely adopted in the United States in 1973, when the grocery industry formally established UPC as the standard bar code symbology for product marking. International interest in UPC led to the adoption of the EAN code format, similar to UPC, in December 1976.

Introduction

Explaining the dynamics of employment from the perspective of technological and structural change is an ambitious goal. Many mainstream economists simply ignore the employment impact of innovation, while those addressing the issue appear blocked in a stalemate where (few) pessimists and (many) optimists oppose each other without any substantive empirical test of their theories. [1] Technological change may be defined broadly as "the process by which economies change over time in respect of the products they produce and the processes used to produce them". [2] The change may involve a variation of the output or of the application of knowledge and skills that results in a significant alteration in management techniques, work organization, raw materials and the relationship between capital, labour and the State. "The concept […] encapsulates not only machinery, materials and equipment, but also their economic and social organization: the processes of control by managements, workers and the state". [3]

As the Director-General of the International Labour Office, Mr. Juan Somavia, said in 1999:

> In bravely addressing the two great challenges of the next millennium – new technology and globalization – there are three crucial questions for which we do not yet have all the answers.
>
> ■ How can we orient and shape the new technological wave to enhance both economic and social development?
>
> ■ How can technology and globalization become key factors of increased equity and contribute to a new awareness of personal identity and human rights?
>
> ■ How can we generate new visions and cultures, which are capable of meeting these new challenges? [4]

Mr. Somavia stressed that "development at work and in society is … not just the result of uncontrollable forces such as globalization, intensified competition and technical change. It is, instead, primarily the result of political, economic and social choices." The subject matter of this report lies squarely at the centre of this message.

To understand the likelihood of any innovation's success, a proper appreciation of the environment in which it operates is necessary. The report therefore begins with an overview of the sector, highlighting the current state of affairs and trends, as well as significant developments in the industry's major markets and in countries emerging as important players in global commerce.

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[1] M. Vivarelli; M. Pianta (eds.): *The employment impact of innovation: Evidence and policy*, Routledge Studies in the Modern World Economy (London and New York, Routledge, 2000), p. 7.

[2] P. Stoneman: *The economic analysis of technological change* (Oxford, Oxford University Press, 1983), p. 3.

[3] G.J. Bamber; R.D. Lansbury (eds.): *New technology: International perspectives on human resources and industrial relations* (London, Unwin Hyman, 1989), p. 4.

[4] J. Somavia: "Exploring the high road to technology and globalization", based on a transcript on Video Intervention, Opening Ceremony, Workshop on "Emerging Electronic Global Distance Learning" at the University of Tampere, Finland (9-13 August 1999).

The interrelationships between technology and employment are complex and controversial, not only because of the potential trade-offs between technology-induced productivity increases and employment, but also given the role played by other important economic and social variables in this interaction. [5] In any case, however, an analysis of the effects of a new technology on employment has to look at both direct and indirect effects of such change on jobs. Direct effects would be job creation in the sector that produces the new technology, whereas indirect effects would occur in the user industries. Schumpeterian thought usefully distinguishes between product and process innovations. *Process innovation* is usually said to reduce employment, as it may reduce the quantity of factors of production needed – especially if it is of a labour-saving kind and if there is no increased demand to accommodate the rise in output per worker. *Product innovation*, on the other hand, is said to generate more employment, as extra labour is needed to produce new goods. [6] A product innovation can however also be a process innovation, if it can be used in other sectors (for example, computers), in which case jobs will be created in the producer sectors and possibly destroyed in the user sectors, if the demand does not keep pace with the increased production per worker, thanks to the successful application of a process innovation. This is indeed what Schumpeter called "creative destruction." [7]

Therefore, if an innovation is successful and permeates throughout a sector or the entire economy, it will ignite a process of structural transformation whereby some jobs are created and some are destroyed; some new job functions emerge and some others become redundant; and new ways of organizing work and designing the production process become necessary. It is for that reason that in analyzing the employment impact of new technologies based on RFID, the net effects must be considered not only at the enterprise or sectoral level but also at the level of the macroeconomy. The introduction of RFID-based technologies in the retailing environment certainly provides a basis for both process and product innovation, and its long-term effects on employment are expected to be significant, though difficult to predict now, at the technology's nascent stage.

Given the high cost of RFID implementation, it is quite clear that only the very largest retailers with the necessary financial resources will be able to deploy the technology. Estimates of the one-off initial infrastructure costs indicate, for example, that the set-up costs for a major retailer would range from US$340 to 380 million for a business with approximately eight distribution centres and a thousand or more stores. Moreover, this assumes that the variable costs related to the tagging of retail products would be borne by manufacturers, who also have a very strong interest in the deployment of RFID technology in their supply and distribution chains. As noted, below, market conditions are such that in many countries it is already becoming increasingly difficult for small and medium-sized enterprises in commerce to compete. It is not difficult to imagine, therefore, that leading retailers' sharply enhanced efficiency and cost-competitiveness from greater RFID adoption will accentuate these conditions dramatically, raising the pressure towards increased sectoral consolidation and rationalization, with concomitant effects on sectoral employment.

While the costs of RFID implementation are prohibitive for all but the largest retailers, the potential cost savings are immense. The projected annual cost savings

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[5] The ILO's *World Employment Report 2004-05*, entitled "Employment, productivity and poverty reduction", addressed this issue at length in its overview and Ch. 2.

[6] Vivarelli and Pianta, op. cit., p. 27.

[7] J. Schumpeter: *Capitalism, socialism and democracy* (New York, Harper, 1975) (originally published in 1942), pp. 82-85.

estimated from the technology for Wal-Mart, which is investing approximately US$3 billion over several years and is one of the leading proponents of RFID implementation, are indicative of the competitive advantages large retailers can expect. According to a computer science professor at Brigham Young University in the United States, Wal-Mart alone could save up to US$8.35 billion annually with RFID – more than the total revenue of half the companies in the Fortune 500. [8] These savings would be made up as follows: US$600 million through avoiding stock-outs; US$575 million by avoiding theft, error and vendor fraud; US$300 million through better tracking of 1 billion pallets and cases; and US$180 million through reduced inventory. However, labour savings dwarf the rest: a huge US$6.7 billion (80.7 per cent of the total) would be saved through eliminating the need to have people scan bar codes across the company's extensive supply chain and in its vast network of stores.

In addition, as emerging requirements and technological evolutions arise, companies will find they have to review their standard practices if they expect to gain full efficiencies from RFID implementation. This may require ensuring a high level of compatibility in the integration of RFID within distribution centres and store operations – how the physical layout is organized, how labour is deployed and even how the equipment itself is constructed. RFID advocates stress that the level of change required, itself, will prompt improved practices in retail operations that would otherwise not have occurred without enterprises' consideration of RFID deployment.

In Europe, the European Commission has welcomed the potential benefits of RFID technology for the continent's economic operators, expressing the view that the technology may be the forerunner of many increasingly "intelligent" objects that interact with each other and help humans in ever more sophisticated ways. The cumulative sales of RFID tags for 60 years until the beginning of 2006 amounted to 2.4 billion, with 600 million tags being sold in 2005 alone; the number delivered in 2016 could be over 450 times that of 2006. Were the main technical and economic challenges to be resolved in the near future (yield versus cost, frequency acceptance, required performance levels, etc.), the global RFID market could grow exponentially by 2016 to almost ten times the size projected for 2006. The deployment should make a major contribution to growth and jobs, with significantly improved product quality, fixed asset costs and stocks reduced by 5 per cent, sales improved by 3 per cent, labour costs in physical product movement reduced by 65 per cent, and generation of 45 per cent annual growth for RFID technology and applications providers. RFID implementation is expected to become a creator of quality high-tech jobs.

By competitive necessity, retail today is already a high technology-enabled environment. The pace of change encourages retailers to seek tools that might give them an advantage over their competitors, whether on the sales floor or behind the scenes. Frequently, faced with shrinking margins and dwindling profits, increasingly internationalized markets and more sophisticated and demanding customers, retailers believe they must constantly improve their ability to meet consumer needs; technology is considered indispensable in meeting these challenges. Retailers looking to distinguish themselves within a crowded, competitive market must increasingly harness technology to improve decision-making, provide more personalized service, streamline supply-chain operations and enhance business processes. Customers themselves demand more personalized attention, the right products at the right price, rewards for their loyalty, and an enjoyable and problem-free shopping experience. Retailers are ever more reliant on

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[8] AME Info: "How RFID can help optimise supply chain management", 21 Aug. 2005 at www.ameinfo.com.

technology in store back offices and in corporate headquarters to aggregate data on customers, products, sales trends, shipping logistics and marketing information.

Technology has become as ubiquitous in retailing as groceries themselves. Self-checkouts, kiosks and point-of-sale (POS) equipment, mobile computer stocktaking and management systems, electronic pricing networks, e-tailing solutions, electronic article surveillance, in-counter scanners, planograms, workforce management and sales force scheduling tools, secure management networks to speed up transactions, electronic labelling and global supply chain tools are among some of technological applications now common in many modern retailing operations.

Global retailers, without exception, need to be able to distribute huge quantities of merchandise in their extensive global store networks. They have harnessed advanced warehouse and logistics management systems to cope with the overwhelming challenges related to this task, whose central goal is to enhance operational productivity and capability. For such retailers, technology is essential to squeeze costs from the supply chain, optimize transport through large-scale capabilities, and create appropriate international logistical structures. As these businesses expand globally and scale up their operations, they find they must create processes to automate and manage replenishment and distribution, and integrate them into their warehouse management systems. To support the consequent complex structures, powerful management information systems are deployed to facilitate communication among the network of country operations, stores and headquarters, store employees and customers, customers and customer-service personnel, marketing professionals and store managements.

Optimization of supply chain management to satisfy customer requirements, as efficiently as possible, is now accepted as a critical competitive tool. For retailers, the process spans all movement of goods from point-of-origin to point-of-sale. To achieve maximum supply chain efficiencies, retailers have begun to rationalize and optimize their logistics, and to alter their market strategies and attitudes towards customers. Whereas, in the past, the main goal was the efficient control of stocks and their allocation along the supply chain, today the competitive factor is focused on customer satisfaction, so that the "supply chain" concept is increasingly being replaced by that of a "demand chain". In general, there is a shift from a stock-based logic, where the aim was the efficient management of storerooms, to a flow-based logic, where the goal is availability of the right kind of product, in the right quantity, and in the right place, according to demand.

The report prepared for the 2003 Tripartite Meeting on commerce [9] highlighted technology's role in the sector's growing consolidation. While the focus of technological innovation was then on the "back-of-store" in the logistics chain, there was also widespread introduction of new technologies and processes at all stages of the goods handling process from logistics to checkout. Particularly important as a factor behind technological and other innovations was the Efficient Consumer Response (ECR) initiative started in 1993 with the goal of enhancing supply chain cooperation to create value by satisfying consumer needs for product, convenience and price. It aimed to do so through: efficient store assortment to optimize inventories and store space at the consumer interface; effective stock replenishment based on efficiencies gained by using continuous replenishment programmes, electronic data interchange (EDI), cross-docking, computer-assisted ordering and new receiving techniques; effective promotion that maximized the total system efficiency of trade and consumer promotion; and efficient new product introduction aimed at maximizing the effectiveness of new product development and

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[9] ILO: *The employment effects of mergers and acquisitions in commerce* (Geneva, document TMMAC/2003).

introduction activities. The latter process has traditionally experienced high failure rates, thereby bringing extra costs into the system. The ECR helped the EDI, its most important enabling technologies and standards, gain wide industry acceptability.

Retail experts believe that accurate and timely information is critical to ensure continual improvement of consumer satisfaction, products and quality through ECR. To keep the costs low, it is preferred that this information and its communication are paperless. To accomplish these aspects, three central areas have been distinguished: category management, product replenishment and enabling technologies.

In category management, the objective is to maximize demand creation through the processes of product introduction, promotions and store assortment. In product replenishment, the focus is on ensuring the smoothest possible flow of products to the shelves to support joint category management with a physical supply chain that is flexible and responsive enough to changes in demand. Rapid and efficient product replenishment contributes to cost savings through minimizing the amount of inventory in the system while meeting required service levels. A critically important issue in this area is how trading partners work together to achieve these objectives. The ECR seeks to make a quantum leap in cost containment and responsiveness through well integrated planning which avoids activities that magnify variations in demand, which, in turn, stress the supply chain.

Standardization of information and communication can also save a great deal of time and money. Category management and product replenishment, and especially those of their aspects shared jointly by retailers and manufacturers, are confronted with a few barriers. It is in order to overcome these obstacles that RFID is being harnessed as an enabling technology to the retail supply chain and retail operations. The technology would reinforce and extend ECR benefits across the entire retailing industry.

Because of their ability to reduce demand for labour and other resources needed in the production of the same level of output, the introduction of new technologies is invariably accompanied by fear of job losses. While this may be true at the level of a single firm or even sector, most economists stress that technological change and productivity growth have historically been associated with expanding rather than contracting total employment and rising earnings. [10] There are various stages in this relationship: first, the introduction of a new technology should translate into real productivity growth, which requires effective learning for efficient use of the new technology (changes in the work organization, new skill requirements, etc.); second, productivity increases may or may not result in job losses, depending on the level of demand. If productivity increases are accompanied by concomitant demand increases, then there is no need to shed labour. In fact, if improved productivity stimulates a rise in demand which is higher than productivity growth, new jobs will be created.

In any case, since the diffusion and adoption of new technology typically take considerable time, the employment impacts themselves are likely to be felt much more gradually than those of other factors such as mergers and acquisitions.

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[10] For an evaluation of the longer-term impacts of productivity growth on employment, see ILO: *World Employment Report 2004-05*, op. cit., pp. 6-7 and Ch. 2.

1. Retail trade: Characteristics, trends and prospects

Retail trade comprises establishments engaged in the sale of merchandise, generally without transformation, and rendering services incidental to selling these goods. It is the final step in the process of distribution, and retailers are therefore organized to sell merchandise in small quantities to the general public. In the process, the industry plays an essential role in linking producers of goods and their consumers. It is similarly critical in the marketing process, transferring goods from producers to customers, while also acting as a conduit for customer information to manufacturers. Effective and reliable access to consumers is as vital for manufacturing firms as access to raw materials, and retail trade is essential for the satisfaction of households' consumption needs. Because of this bridging function, the value of retailing to the economy goes beyond its direct contribution to output: it is also an essential engine of growth for diverse sectors.

The industry is among the most important sources of employment worldwide. Small firms continue to dominate in numerical terms, but over the past 20 years the clear trend has been towards consolidation and rationalization, involving the growth of very large companies, with small firms increasingly pushed towards the periphery. With the extensive entry into new markets of large multinational retailers, this process is now global. Consolidation and concentration are evident in the statistics and other information presented here for the United States, the European Union, Japan and a number of other countries, where the average size of enterprises, shop size and the share of employment in the large companies are all rising.

The structure and functioning of the sector vary wildly among countries, depending on living standards, consumption and purchasing habits, as well as the effects of the regulatory framework on competition, firm size, shop opening hours, consumer protection, etc. In general, the more industrialized the country, the lower the number of retail businesses, owing to better-developed, large-scale distribution and a more intensive concentration process over time.

Even within countries, the industry is very diverse, with considerable differences among retailers, depending on firms' competitive strategies and the subsectors within which they operate: for instance, whether they are general merchandisers, speciality or discount stores. Although there is even greater division within subsectors, a look at the following categories gives some idea of the industry's diversity.

General merchandisers trade in such items as clothing, jewellery, household appliances or food. Composed of department stores, supercentres and warehouse club stores, general merchandise stores sell a large assortment of items. Department stores offer an extensive assortment of merchandise, and are generally organized on the basis of the items they sell, such as clothing/apparel, furniture, appliances, home furnishings, cosmetics, jewellery, paint and hardware, electronic goods, etc. Discount department stores have centrally located cashiers and typically fewer sales workers, relying more on self-service. Department stores that sell bulk items, such as appliances, usually provide delivery and installation services. Upscale department stores may offer tailoring for their clothing lines and more personalized service.

Grocery stores, also called supermarkets, sell an array of fresh and preserved foods, primarily for preparation and consumption at home. They also often sell prepared foods. Stores range in size from "supercentres", which may employ hundreds of workers, provide a variety of consumer services, and sell numerous food and non-food items, to traditional supermarkets to convenience stores with small staffs and limited selections. Traditional supermarkets face acute price competition from discounters and warehouse stores.

Warehouse clubs or stores and supercentres, the fastest-growing segment in the retail industry, sell an even wider array of products, in fixed quantities and at low prices. These stores typically include an assortment of food items, often sold in bulk, along with a wider range of household goods, clothing and services that may vary over time. Often, such stores require membership, offer very little service and usually require the customers themselves to take their own purchases home. Warehouse clubs and supercentres have expanded into market segments long dominated by department stores and supermarkets, eroding employment and sales in these other giants of retail trade; the increasing dominance of warehouse clubs and supercentres is expected to force yet more structural changes upon the industry. [1] Employment, establishment and total sales data indicate a substantial shift from more traditional retailers to supercentres. In the United States, a time series analysis of sales based on the Census Bureau's Annual Survey of Retail Sales shows that sales in supercentres rose by more than 350 per cent from 1992 to 2004, while those of traditional department stores and grocery stores dropped by 20 and 1 per cent, respectively. [2]

Compared with department stores, clothing and accessory stores sell a much narrower assortment of items. They are often staffed with knowledgeable salespersons who can help in the selection of sizes, styles and accessories. Many of these stores are located in shopping malls and have significantly fewer workers than department stores. [3]

Convenience stores are small shops that are generally accessible or local, often located alongside busy roads, or at railway or bus stations. They include petrol stations augmenting their income with retail outlets, or convenience stores adding petrol to the goods on offer. Size may be the main difference between a convenience store and a supermarket, although larger newer convenience stores have quite a broad range of items. With some exceptions, such as milk and soft drinks, which convenience stores traditionally sell in high volume and sometimes use as loss leaders, prices in such stores are typically higher than in supermarkets or mass merchandise stores. In some countries, at least, most convenience stores have longer opening hours. [4]

Despite the many differences in retail trade among countries, one constant cuts across markets: while small firms continue to dominate, over the last two decades the industry has undergone relentless consolidation and rationalization, leading to the growth of large companies and high levels of concentration. Increasing intensity of competition is reported from all countries. Large enterprises invest heavily in differentiating themselves from one another, and it is becoming tough for small and medium-sized enterprises to survive. In the United Kingdom, for instance, a report from a cross-party group of members of Parliament warned that consumers would ultimately be the biggest losers if the big supermarkets were allowed to continue to expand unchecked. The warning came as the country's consumer and competition watchdog, the Office of Fair Trading, was deciding on whether to refer the food retail industry to the Competition Commission for a full-scale investigation.

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[1] United States Department of Labor, Bureau of Labour Statstics (BLS): *Monthly Labor Review*, Feb. 2006, Vol. 129, No. 2 at http://www.bls.gov/opub/mlr/2006/02/art3full.pdf.

[2] ibid.

[3] BLS Career Guide to Industries at www.bls.gov/oco/cg/cgs022.htm#nature.

[4] See Wikipedia, at en.wikipedia.org.

For all retailers, however, even the very big ones, the operating landscape is evolving at a rapid pace everywhere, and companies face growing competition not only from local rivals, but also from other expansionary global retailers.

To cope with this development, retailers have had to introduce innovative strategies centred on the twofold goal of increasing market share and improving supply chain coordination. Companies are using various methods to increase sales and thus improve their market share, including mergers and acquisitions, the expansion of outlets, franchising contracts and alliances. Locational strategies are taking three main forms:

■ new superstores continue to be opened on the edge of towns, albeit less frequently than in the past because of a combination of market saturation and planning controls;

■ in countries where most retailing developments over the past two decades have been in out-of-town centres, there is a trend towards the establishment of small city centre convenience stores in an attempt to recapture customers who cannot or do not wish to travel to out-of-town stores;

■ foreign expansion, especially in countries that still have relatively underdeveloped markets, in Eastern Europe, Asia and Latin America.

A related facet of the growing intensity of competition is the increasing concentration of both sectoral turnover and employment. In most industrialized countries, the largest enterprises have a greater and growing share in total retail turnover now than they had in the past. Another consequence is the enormous economic power that goes with size and financial resources, reflected in the turnover and employment levels of the world's 50 biggest retailers, listed in table 1 (ranked by sales for either 2004 or 2005). This is highly relevant to the ability to afford the extremely costly RFID technology. The large and growing number of countries and territories in which many retailers now operate also underlines the industry's increasing globalization. Paradoxically, the similarity of many of these retailers' formats points to converging strategies, even as they invest substantial resources to differentiate themselves from their competitors.

Table 1.1.   The world's largest retailers, ranked by turnover

Company and home country	Number of countries of operation	Formats [1]	Retail sales (US$ million 2004-05)	Number [2] of employees (2004-05)
Wal-Mart Stores, Inc. (US)	10	Cash and carry/warehouse club, discount department store, hypermarket, supermarket	285 222	1 600 000
Carrefour S.A. (France)	35	Cash and carry/warehouse club, convenience/forecourt store, discount store, hypermarket, supermarket	89 568	430 000
The Home Depot, Inc. (US)	5	Home improvement	73 094	324 000
METRO AG (Germany)	29	Cash and carry/warehouse club, department store, electronics specialty, home improvement, hypermarket, other specialty, supermarket	69 781	261 000
Tesco plc (UK)	13	Convenience/forecourt store, hypermarket, other specialty, supermarket	62 505	367 000
Kroger (US)	1	Convenience/forecourt store, hypermarket, other specialty, supermarket	56 434	290 000

Company and home country	Number of countries of operation	Formats [1]	Retail sales (US$ million 2004-05)	Number [2] of employees (2004-05)
Costco Wholesale Corp. (US)	8	Cash and carry/warehouse club	47 146	60 500
Target Corp. (US)	1	Discount department store, hypermarket	45 682 (2004) 52 620 (2005)	292 000 (2004) 338 000 (2005)
Koninklijke Ahold NV (Netherlands)	8	Cash and carry/warehouse club, convenience/forecourt store, discount store, drug store/pharmacy, hypermarket, other specialty, supermarket	44 793	231 000
Aldi GmbH & Co. oHG (Germany)	12	Discount store, supermarket	42 906	65 000 [3]
Schwarz Unternehmens Treuhand KG (Lidl) (Germany)	19	Discount store, hypermarket	42 793	80 000
Rewe-Zentral AG (Germany)	14	Apparel/footwear specialty, Cash and carry/ warehouse club, convenience/forecourt store, discount store, drug store/pharmacy, electronics specialty, home improvement, hypermarket, other specialty, supermarket	42 782	187 000
ITM Développement International (Intermarché) (France)	9	Apparel/footwear specialty, convenience/forecourt store, discount store, home improvement, other specialty, supermarket	41 721	112 000
Albertsons (US)	1	Convenience/forecourt store, drug store/pharmacy, supermarket	39 897	240 000
Walgreen Co. (US)	2	Drug store/pharmacy	37 508	131 400
Groupe Auchan S.A. (France)	12	Department store, discount store, electronics specialty, home improvement, hypermarket, supermarket	37 373	155 013
Lowe's Cos. Inc. (US)	1	Home improvement	36 464	185 000
AEON Co. Ltd. (Japan)	11	Apparel/footwear specialty, convenience/forecourt store, department store, discount store, drug store/pharmacy, home improvement, hypermarket, other specialty, supermarket	36 345	194 978 (2005)
Safeway, Inc. (US)	3	Supermarket	35 823	201 000 (2005)
Sears, Roebuck & Co. (US)	3	Department store, non-store, other specialty	35 718	247 000
Centres Distributeurs E. Leclerc (France)	6	Convenience/forecourt store, hypermarket, supermarket	34 828	73 000
Edeka Zentrale AG & Co. KG (Germany)	5	Cash and carry/warehouse club, convenience/forecourt store, discount store, home improvement, hypermarket, other specialty, supermarket	32 125	220 000 (in Germany only)

Company and home country	Number of countries of operation	Formats [1]	Retail sales (US$ million 2004-05)	Number [2] of employees (2004-05)
Ito-Yokado Co. Ltd. (Japan)	4	Apparel/footwear specialty, convenience/forecourt store, department store, hypermarket, other specialty, supermarket	31 920	48 208 (2005)
CVS Corporation (US)	1	Drug store/pharmacy	30 594	80 000
Tengelmann Verwaltungs-und Beteiligungs GmbH (Germany)	16	Apparel/footwear specialty, Cash and carry/warehouse club, discount store, home improvement, hypermarket, other specialty, supermarket	28 991	184 046
Casino Guichard-Perrachon S.A. (France)	19	Cash and carry/warehouse club, convenience/forecourt store, department store, discount store, electronics specialty, hypermarket, supermarket	28 024	212 603
J Sainsbury plc (UK)	1	Convenience/forecourt store, department store, other specialty, supermarket	27 538	153 000
Best Buy Co., Inc. (US)	2	Electronics specialty	27 433	109 000
Coles Myer Ltd. (Australia)	2	Convenience/forecourt, department store, other specialty, supermarket	23 180	182 338 (2005)
Woolworths Ltd. (Australia)	2	Convenience/forecourt store, discount department store, electronics specialty, other specialty, supermarket	22 919	145 000
Wm. Morrison Supermarkets plc (UK)	1	Convenience/forecourt store, hypermarket, supermarket	22 601	95 341
Delhaize Group (Belgium)	9	Cash and carry/warehouse club, convenience/forecourt store, drug store/pharmacy, hypermarket, other specialty, supermarket	22 355	62 100
Kmart Holding Corp. (US)	5	Discount department store, hypermarket	19 701	133 000
Publix Supermarkets, Inc. (US)	1	Convenience/forecourt store, other specialty, supermarket	18 554	128 000 (2004) 136 000 (2005)
JC Penney Co., Inc. (US)	3	Department store, non-store	18 424	151 000 (2005)
Rite Aid Corp. (US)	1	Drug store/pharmacy	16 816	38 448
KarstadtQuelle AG (Germany)	23	Department store, non-store, other specialty	16 385	92 546
Gap Inc. (US)	6	Apparel/footwear specialty	16 267	152 000 (2005)
PPR Group (Pinault-Printemps-Redoute) (France)	29	Apparel/footwear specialty, department store, non-store, other specialty	15 743	95 000 (2004) 82 000 (2005)
Federated Department Stores Inc. (US)	3	Department store, non-store, other specialty	15 630	112 000 (2005)

Company and home country	Number of countries of operation	Formats [1]	Retail sales (US$ million 2004-05)	Number [2] of employees (2004-05)
Loblaw Cos. Ltd. (Canada)	1	Cash and carry/warehouse club, discount store, hypermarket, supermarket	15 487	130 000
El Corte Inglés, S.A. (Spain)	2	Apparel/footwear specialty, convenience/forecourt store, department store, electronics specialty, hypermarket, supermarket	15 462	87 610 (2005)
TJX Cos. Inc. (US)	4	Apparel/footwear specialty, other specialty	14 913	113 000
The IKEA Group (Sweden)	33	Other specialty	15 511	90 000 (2005)
The May Department Stores Co. (US) [4]	2	Apparel/footwear specialty, department store	14 441	132 000 (2005)
Marks & Spencer plc (UK)	27	Convenience/forecourt store, department store, other specialty	14 237	70 550
Kingfisher plc (UK)	9	Home improvement	14 061	70 811 (2005)
The Daiei, Inc. (Japan)	3	Apparel/footwear specialty, department store, discount store, hypermarket, supermarket	14 050	20 012
Coop Italia (Italy)	2	Discount store, hypermarket, supermarket	13 007	172 953
Migros-Genossen-schafts-Bund (Switzerland)	3	Apparel/footwear specialty, convenience/forecourt store, department store, electronics specialty, home improvement, hypermarket, other specialty, supermarket	12 371	81 000

[1] The terms "hypermarket", "supercentre" and "superstore" are interchangeable.

[2] The number of employees mostly reflects the figures provided by the company; it is not possible to ascertain in all cases whether they only cover full-time staff or include part-time workers.

[3] It is particularly difficult to establish Aldi's staffing levels as the company is unlisted and does not publicly release its employment figures.

[4] Acquired by Federal Department Stores in 2005.

Source: Adapted from Deloitte Touche Tohmatsu: *2006 Global Powers of Retailing* and other sources.

Other aspects provide an additional indicator of the power of these giants: between them the 50 companies alone employed about 9 million workers during 2004 and 2005 and earned well over US$1.8 trillion, approximately equalling the United Kingdom's 2005 gross domestic product (GDP), or just over 3 per cent of global output for that year. For 2004, *Wal-Mart Stores Inc*., the world's largest company by sales, and its 1.6 million workforce (400,000 of them outside the company's United States home base) earned US$285.2 billion from its retail business only. The "smallest" of the top 250 global retailers, *Charming Shoppes, Inc.* of the United States, rang up sales of US$2.33 billion in 2004.

It is important to note the impossibility of ascertaining whether all the employment figures in table 1 are for full-time or part-time workers, as such information is often jealously guarded (*Aldi* of Germany, for example, does not divulge its staffing figures, making it necessary to search extensively for indicative employment figures). Actual employment in the top 50 global retailers might therefore be much higher if the figures in table 1 exclude the high proportion of part-time staff, reflecting only full-time workers. Actual full-time employment might also be much lower if the figures reported for some companies include both full-time and part-time personnel.

2.   Retail trade: Regional overview

The following overview of the structure and trends in retailing for the United States, the European Union (EU), Japan and a selected number of other countries in different regions is intended to provide a context and a baseline to better understand the likely labour and social impacts of RFID technology. Because of the industry's dynamism and the paucity of comparable data (reflecting the disparate sources of the information), it is important to bear in mind that the following sections are aimed only at providing a general snapshot of the situation, trends and the contribution of the industry to overall economic output and employment within each country or region, rather than across countries in different regions at exactly the same time and on exactly the same points. Nevertheless, the importance of the retail trade is amply reflected not only by the immense size of the global retailing giants, but also the available statistics and other information presented below.

2.1.   United States

Data from the United States Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages show that retail trade accounted for a large part of the country's employment and business establishments. In the economy as a whole, the industry represented about 11.6 per cent of employment and 12.4 per cent of establishments. Estimates show that the annual average employment in retail trade during the 1995-2004 period ranged from 13,896,700 (1995) to 15,279,800 (2000) (see figure 2.1). Employment averaged 15,034,700 in 2004 and 15.3 million in 2005, the average figure for non-supervisory employees being about 13 million during the same period. Ten-year employment projections put retail employment growth behind that of the economy as a whole, increasing by 11 per cent versus 14.8 per cent. Greater retail automation is expected to be a contributory factor.

Figure 2.1.   Retail and wholesale employment, United States, 1995-2004 (millions)

Source: BLS.
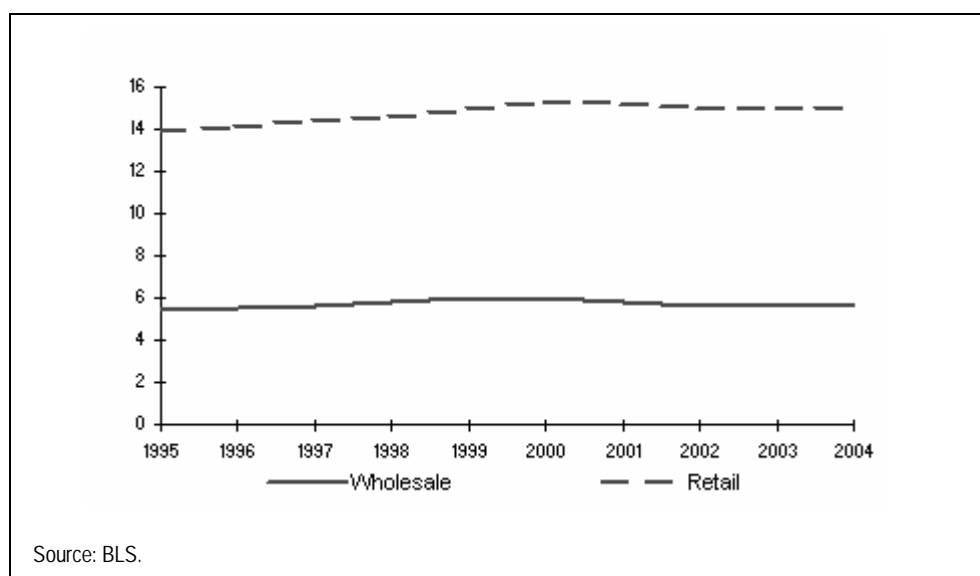
In terms of output, the United States retail trade generated approximately US$4.2 trillion in annual turnover for 2004 (to put this into context, the country's 2005 GDP was estimated at US$12.37 trillion). Single-store businesses accounted for over 95 per cent of all American retailers, but generated less than half of all retail store sales, demonstrating both the highly fragmented nature of the industry and the dominance of larger modern retail formats in sectoral turnover. Gross margin typically ran between 31

and 33 per cent of sales for the industry, but varied widely by format and subsector. The annual average weekly hours of non-supervisory workers in the sector was 30.7 in 2004, compared with 33.7 for all private industry. The average hourly earnings of non-supervisory workers in retail for 2004 were $12.08, substantially lower than the figure of $15.67 for the corresponding category of workers for private industry as a whole (figure 2.2). Wages and employment figures by occupation, available from the Occupational Employment Statistics programme, indicate that there were 3,937,540 retail salespersons, the most common occupation in the industry, and that their average annual wages were $22,720.

The United States Current Population Survey for 2004 indicates that the unemployment rate of persons most recently employed in wholesale and retail trade was 5.8 per cent, while the overall unemployment rate for private industry was 5.5 per cent. Data from the Mass Layoff Statistics programme show that in 2004 in retail trade, there were 344 extended mass lay off events and 143,670 separations.

According to data from the Productivity and Costs programme, labour productivity (defined as output per hour) grew by 5.1 per cent in retail trade from 2002 to 2003.

Figure 2.2.   Average hourly earnings in retail and wholesale trade
and private industry, United States, 1995-2004 (US$)

Source: BLS.
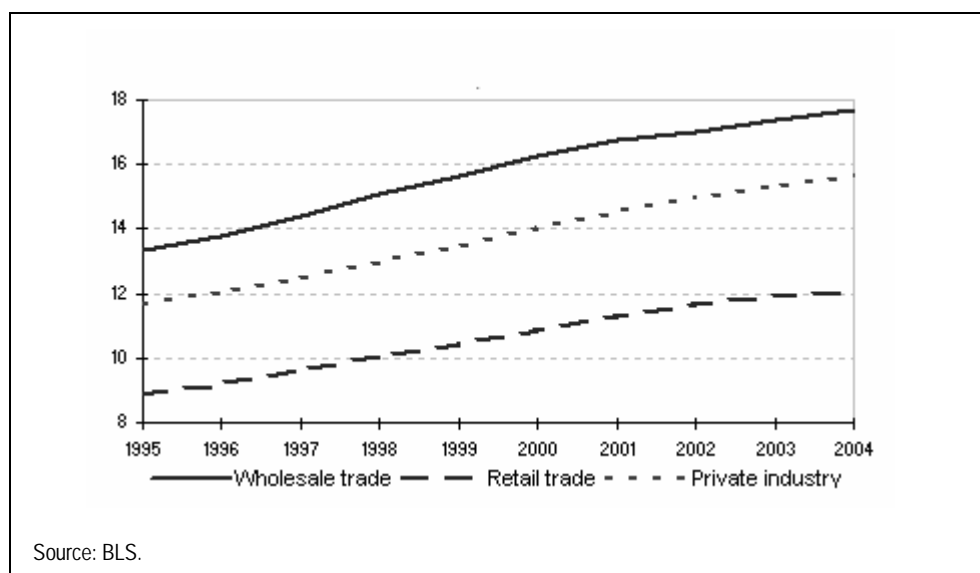
2.2.   Other American countries

By the end of 2003, the outlook for the retail industry in **Argentina** reflected positive recovery from the impact of the devastating 2002 devaluation of the peso from its ten-year one to one peg with the US dollar. Consumers had, in a matter of days, lost one-third of their purchasing power. Devaluation had brought higher peso prices, enticing producers to concentrate on the export market, increasing the relative sales of basic foods, reducing sales in higher-priced products, and shifting sales of foods and beverages from large-scale hypermarkets and supermarkets towards smaller-scale retailers with particular growth in hard discounters. The most important development in 2003 was the resurgence of credit, which had disappeared following the economic collapse. Many retailers have once again begun to offer multiple payment options for more expensive items, as well as the use of credit cards for standard purchases. The largest retailers, along with the largest banks, now offer steep discounts to consumers, if they use designated bank cards for their purchases.

Total retail turnover in **Canada** (excluding automobiles) amounted to Can$230 billion in 2003 (the exchange rate was approximately Can$1.13 to US$1 in April 2006). The number of retail outlets in Canada totalled over 58,000 in 2003, with a shift towards multiples relative to independents. Heavy consolidation among retail chain stores and department stores is, however, balanced by growth in independent retail businesses, and a corresponding increase in total retail selling space.

The Internet is also a fast-growing shopping channel, to the point where it has started to capture value from traditional brick-and-mortar outlets. Deep discounters have also seen rapid growth since their introduction through national franchising.

Although the majority of businesses are small or medium-sized, the biggest firms account for a large and growing share of turnover. There are clear signs pointing towards greater consolidation, with the top six retailers accounting for nearly one-third of total retail sales in 2002.

ILO statistics indicate that employment in Canadian commerce grew from 2.4 million to about 2.8 million between 1997 and 2004 (representing a corresponding rise in the sector's share of employment from 17.2 to 17.4 per cent). The industry's contribution to women's employment similarly rose from 16.6 to 16.8 per cent over the period.

Consolidation in the retail industry in **Chile** has resulted in an increasingly competitive market in which price wars have lowered margins significantly. The hypermarket format has become one of the fastest-growing channels as a result of some firms' aggressive investment in store expansion and increased product portfolios. The introduction of a number of new private label lines, focus on non-food merchandise outlets, and intensifying competition in department and specialty stores segments are some of the factors driving trends. Department stores also continue to rely heavily on their store card strength, popular with lower-to-middle income consumers for the purchase of large ticket items. New formats have proliferated, as evidenced by the aggressive growth in drugstores and the introduction of convenience and discount stores.

2.3. European Union

With some notable exceptions, the European retail industry displays characteristics roughly comparable to those of the United States. According to the Structural Business Statistics (SBS) data published by the Statistical Office of the European Communities (Eurostat), [1] about 3.3 million enterprises were active in retail trade in the EU-25 in 2002, generating a turnover of €1,887 billion. The industry provided jobs to 15.5 million people, slightly higher than the figure for the United States, representing 13.3 per cent of those employed in the EU's non-financial business economy. The €352 billion it generated in value added accounts for 7.4 per cent of total value added in 2002, reflecting the industry's relatively labour-intensive nature.

As might be expected, however, the significance of retail trade in EU Member States' economies varied from one country to another in terms of both employment and value added, with the share in employment consistently heavier than and very independent of the pattern in value added. Indeed, the employment rate was two to three times higher than that for value added in eight Member States, exceeding 16 per cent in four Member States, and reaching more than 17 per cent in Latvia and the United Kingdom.

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[1] The data in this section are drawn from Eurostat "Retail trade in the European Union", in *Statistics in Focus*, 8/2006.

Micro-enterprises with one to nine employees (such as small family-run shops, the local grocery, baker or shoe repair shop) had the largest share in retail trade employment (in 2001). They provided about 6.5 million jobs – 43 per cent of the industry's employment. Large enterprises (with 250 or more workers) had the second biggest share, with 5.3 million persons (35 per cent of the EU-25 total). Finally, small and medium-sized enterprises (ten to 249 workers) together employed close to 3.3 million persons, or 22 per cent, in 2001. The share of micro-enterprises in retail employment was particularly high in some Member States, especially in southern Europe. Large enterprises tended to be more dominant in their share of employment in north-western Europe, with the highest share of retail employment in 2002 in this class found in the United Kingdom (65 per cent) and the lowest in Malta, where no large enterprises existed. The importance of micro-enterprises in retail trade employment is again highlighted when compared with the services sector: it was notably higher than the 29 per cent average for services as a whole, where there were also comparatively small differences between countries. The importance of micro-enterprises is also confirmed by the number of retail stores by sales space. Among the few countries where data are available, the smallest sales units (measuring up to 119 m^2) were always the most numerous and, except in the United Kingdom (with around 40 per cent), accounted for the majority of total retail stores, with shares of around 80 per cent and above in five countries. Retail stores with a sales space of 120-999 m^2 made up the second largest category. Notably, although the largest retail stores – for example "mega stores" – with more than 5,000 m^2 sales space were generally rare, in the highly competitive United Kingdom market they were almost as numerous as those with 120-999 m^2 sales space.

A closer look at the main economic indicators showed the United Kingdom as the largest contributor to the EU-25 total in the sector for employment, value added and turnover, in each case accounting for around a fifth of the EU-25 totals; its retail trade contribution was €378.8 billion turnover (20.1 per cent of the EU-25 total), about 3.1 million persons employed (20 per cent of the EU-25 total), and €78.5 billion in value added (22.3 per cent of the EU-25). Next came Germany, with €65.5 billion in value added (18.6 per cent) and France, with €55.3 billion (15.7 per cent). For turnover, France and Germany came second and third with €318 billion and €317 billion, respectively (almost 17 per cent each). The German retail trade sector employed 2.5 million (15.9 per cent of the EU total), followed by Italy in third place with 1.7 million (11.1 per cent).

The high number of people employed part time or who were unpaid (because they were owner-operators) in retail trade means that the indicator of apparent labour productivity – based on simple head count – could not be relied on to provide accurate results. Instead, a more reliable measure is the ratio of wage-adjusted labour productivity (derived from value added divided by personnel costs, multiplied by the number of paid employees over the total persons employed). Based on this adjusted measure, in 2002, value added covered personnel costs by 132 per cent in the EU-25, about 15 percentage points below the services average.

In the five Member States with the highest employment in retail trade (collectively accounting for 68 per cent of the EU-25 total in 2002), the trend in employment was mixed but generally positive between 1999 and 2002, with growth especially high in Spain (9.9 per cent) and Italy (5.5 per cent). Also noteworthy is France's growth of 10.5 per cent between 1998 and 2001, which exceeded the growth rates for the same period in Italy (6.8 per cent) and the United Kingdom (6.4 per cent).

Retail trade clearly employs more women than any other service sector, underlining the importance of understanding the implications of the subject of this report for gender equity and public policy objectives. Women accounted for 60.2 per cent of retail employment in the EU-25, according to the 2004 EU Labour Force Survey (LFS), while the share in services as a whole was 40.1 per cent. More women than men were employed in most countries' retail trade, with the exceptions of Malta (34 per cent) and Greece

(48.6 per cent). The share of women employed in the retail trade sector reached a high of around 73 per cent in Estonia and Latvia.

The industry is also characterized by a relatively high proportion of part-time workers – 27.6 per cent of persons employed, compared with 17.7 per cent in the services sector as a whole. As with other aspects of retailing, however, there is a very varied picture behind these figures, ranging from the somewhat exceptional case of the Netherlands, with a part-time share of 65.1 per cent, to Greece's 4.3 per cent. Part-time employment reached 20 per cent and above in 11 of the Member States. When LFS gender and work status data are crossed, part-time work is found to be more frequent among women: 22.1 per cent of persons employed in retail were women working part-time, against just 5.4 per cent for men. This was more than in the services sector as a whole, where the respective shares were 12.4 and 5.2 per cent. By contrast, 38.1 per cent of persons employed in the retail trade were women working full time (services: 27.7 per cent), while 34.3 per cent were men in full-time employment (services: 54.6 per cent). The higher proportion of women in part-time employment in retail trade may of course be partly explained by the fact that there are more women than men employed in the industry overall.

2.4. Other European (non-EU) countries

The economic transformation of the Russian Federation is both led and highlighted by the retail sector. The industry has been the most promising sector of the country's economy over the last six years. Growth in its turnover surpassed the overall growth rate of GDP, and this trend is forecasted to continue for the foreseeable future. [2] The sector has benefited significantly from incomes growth, as well as from political stability and economic recovery.

The most recent trends in the Russian Federation are a reduction in unorganized retail trade, expansion in construction, including that of large-format commercial and entertainment complexes, and the development of consumer credit systems and alternative retail channels. Chain stores are being developed by both Russian and Western operators. Leading international operators, with considerable financial muscle, have appeared on the market, and their growing presence has in turn stimulated increased activity by domestic enterprises, with big domestic retailers expanding outside Moscow. The chains are concentrating on such roles as anchor stores in new retail complexes; development of franchising; purchase of existing retail multiples; and as independent operators.

However, the industry remains dominated by small and medium-sized traditional stores, open markets and kiosks, with low market concentration presenting both domestic and global retailers with promising growth and development potential. [3] The last ten years have been marked by several trends: a rapid rise and then decline in the number of small retailers; the emergence of national retail champions; foreign investment, and consolidation among the foreign and local retail investors; introduction and growth of new formats, category killers, shopping malls and hypermarkets; the arrival of private labelling (own brands) at both the low and premium-priced ends; and widespread implementation of information technology (IT) and other modern technologies at retail point of sale, in back office and in logistics.

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[2] P.B. Necarsulmer: "Russian retail sector experiencing powerful growth", in *BISNIS Bulletin*, Jan./Feb. 2005, at http://www.bisnis.doc.gov/BISNIS/BULLETIN/jan05bull2.htm.

[3] ibid.

ILO labour statistics show retail trade employment in the Russian Federation on a steadily rising trajectory: from slightly over 7 million in 1997 to over 10 million by 2004, increasing its share of overall employment from just under 12 per cent to close to 16 per cent. The industry's contribution to women's employment has similarly risen, from 14.7 per cent in 1997 to 18.7 per cent by 2004.

Retail trade in **Switzerland** is traditionally characterized by extensive legislative controls and a high degree of protection. [4] Domestic companies still dominate the market, but given the country's high level of affluence and price levels that are generally above European averages, foreign retailers have begun to move in. The fact that consumer expenditure, at around 60 per cent, comprises the largest portion of the Swiss GDP is an added incentive. The impact of global retailers has, however, been generally limited so far. Despite some changes to ease investment for foreign retailers, neither *Migros* nor *Coop* currently faces a serious challenge, not only owing to their omnipresence but also because of their extensively diverse non-business services. Their weight in terms of people employed also means that their lobbying power is considerable at both the national and local levels.

Switzerland's bilateral agreements with the EU, especially on duty exemption, are nonetheless expected to facilitate the operations of Swiss and EU retailers in both the EU and Switzerland. This development is generating both turmoil and revival in Swiss retail, offering opportunities for some but increasing fears for others, especially food retailers, of being pushed out of the market by cheaper imports and hard discounters. This is exacerbated by the fact that the unique selling proposition for Swiss goods is a reputation for high quality.

For foreign retailers, Switzerland, with just over 7 million inhabitants and three main languages and several regional dialects, brings special logistics, warehousing and administration problems and, as a result, most companies target one area only. Only a few large domestic and foreign firms can afford national coverage. Another obstacle is stringent building legislation: authorities are reluctant to approve new large-scale stores and obtaining building permission can take years. Local retailers expand slowly by acquiring individual companies one at a time, with a limited number of high-profile mergers and acquisitions.

The Swiss retail and wholesale industries employed 357,000 and 181,000 persons, respectively, in 2001. [5] For retail trade this represented a drop of 8.4 per cent from its 1991 employment level, but a rise of 4.5 per cent from 1998, when the industry employed 341,000 workers. Over the same period wholesale trade employment declined by 12.6 per cent from 1991 and 4.5 per cent from 1998. Switzerland also utilizes more part-time workers for the economy as a whole than many other European countries, especially among women. In 2003, for instance, 55.9 per cent of women workers in the country were in part-time employment, compared to 40.8 per cent for Germany, and only 7.5 per cent for Greece. The equivalent statistics for male workers for that year were: Switzerland: 10.7 per cent; Germany: 6.1 per cent and Greece: 2.2 per cent. As noted elsewhere, it is worth recalling that, in many countries, as a general rule, retail trade employs more part-time workers than any other sector.

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[4] The country snapshots in this and the following sections are largely drawn from the Euromonitor International web site, at www.euromonitor.com.

[5] Swiss Federal Statistical Office: *Statistical Data on Switzerland 2005*.

2.5. Japan

The Japanese commerce sector is a very important contributor to both overall economic output and employment. According to the *Japan Statistical Yearbook 2004*, there were 375,378 and 1,238,296 wholesale and retail trade establishments in the country in 2004, employing 3,805,000 and 7,767,000 persons, respectively. The total retail turnover for the year amounted to 133,285 billion yen, while that for wholesale was 405,646 billion yen (the dollar average exchange rate was US$1=105 yen in 2004). The share of retail trade establishments employing one or two persons in the overall number of establishments was around 46 per cent, while the comparable share for wholesale was 23 per cent. An overwhelming 86 per cent of retail establishments employed fewer than ten persons. The comparable share for wholesale was 74.4 per cent. The number of wholesale establishments, employment and total turnover were highest in 1991, when there were 475,983 establishments employing 4,773,000 persons, with 573,165 billion yen turnover. For retail trade, the number of establishments peaked in 1982, after which it started a continuing decline. Retail employment was highest in 1999, when there were 8,029,000 workers, and total annual turnover reached its highest point at 147,743 billion yen in 1997.

A striking feature of retail trade is that while employment levels have declined since peaking in 1997, the reverse trend is observed with regard to total sales floor space, which has risen consistently from 85,737,000 m^2 (in 1,673,667 establishments in 1979) to 144,190,000 (in 1,238,296 establishments by 2004); in other words, average shop size has more than doubled over the period, reflecting a shift towards the more modern hypermarket and supermarket formats.

ILO labour statistics indicate that commerce's share in overall employment in Japan for 2003 and 2004 was 19 and 18.8 per cent, respectively, while its contribution to total female employment for the same years was 22.2 and 22 per cent.

The Japanese retail market was primarily influenced between 1995 and 2005 by one of the country's longest periods of economic stagnation, which had a profound effect on consumer behaviour, government regulation and industry practices. With rising unemployment and low confidence, consumers became increasingly price-sensitive. Intense price discounting among major retailers led to price deflation, which cut profit margins, further aggravating the situation of smaller operators. Most large operators, while also experiencing considerable difficulties, were better able to weather the hard times by compensating for dwindling margins through improved operational efficiency and increased economies of scale – options that are less available to smaller retailers.

To stimulate the economy, the Japanese Government moved towards deregulation of the industry and greater opening to foreign investment. Among the most significant regulatory reforms was, perhaps, the repeal of the Large-Scale Retail Store (LSRS) Law of 1974, designed to protect small businesses by placing heavy restrictions on large retail outlets. In 2000, the LSRS Law was replaced by the Large-Scale Retail Store Location Law. Regulatory relaxation has stimulated the expansion of large retail chains, and encouraged the entry of a number of major foreign retailers. Another direct result of deregulation has been an increase in market concentration seen elsewhere in highly industrialized countries, with small retail chains and independents, finding it increasingly difficult to survive in the face of heavy competition from large chains. Meanwhile, recent years' high rural unemployment levels have led to growing urbanization, as rural workers seek better job opportunities in city areas, resulting in a shift from retailers' traditional geographic specialization to an increased focus on expanding urban store networks.

The Japanese consumer market has always been an early adaptor, with a population that is very receptive to technological innovation and quick to embrace both Internet

retailing and mobile commerce. RFID technology in retailing should therefore be particularly easy to implement in the country.

2.6. Other Asia and the Pacific countries

Over the last few years, retail trade in **Australia** has benefited greatly from stable consumer confidence. Prices remain an important element in purchasing decisions in most mass-market areas of retailing. However, the high level of consumer confidence is leading to other factors, such as product range, comfort and convenience becoming increasingly important competitive tools. In the grocery segment, in particular, fundamental changes are beginning to occur as the range of competitive tools at retailers' disposal expands to encompass cyberspace, as businesses increasingly find it necessary to embrace e-commerce. Other influential trends include greater prevalence of warehouse-style "category killer" stores and more franchised retail outlets. Growing attention is paid to developing customer loyalty to encourage higher repeat sales, leading to an increased emphasis on direct marketing. These trends are enhancing the competitiveness of the larger chains, as they are better able to afford the high investment costs required to build warehouse-style outlets or to adopt technological solutions, which is inexorably leading the industry towards greater consolidation and concentration. The Australian Bureau of Statistics reported nevertheless that, in 2003, there were still approximately 437 small and medium-sized retailers for every large retail business.

In **China**, the emergence of a middle class and the country's growing attractiveness for global retailers are much-discussed topics among industry observers. According to official sources, China's top 100 retailers accounted for about 8 per cent of the market for both 2002 and 2003, and they were under growing pressure to expand into chain and discount stores. Many foreign-owned firms are jumping into the market, often in fear of being left behind by the competition. By 2003, over 300 foreign retailers were already in China and were set to expand with the industry's deregulation. The influx involves not only retailers from high-income countries in Europe and North America, but also those of neighbouring Asian economies such as Hong Kong (China), Singapore and Malaysia. The country's accession to the World Trade Organization (WTO) in December 2001 has accelerated the entry of foreign retailers. In line with accession conditions, China issued in April 2004 the landmark Measures for the Administration of Foreign Investment in the Commercial Sector, which replaces a pilot regulation on foreign investment in commercial enterprises promulgated in 1999. The Measures – further liberalized in December 2004 – allow foreign investors to set up wholly foreign-owned enterprises (WFOEs) in retail, wholesale, and franchise and commission agency businesses with a vastly reduced capital threshold. The regulations represent a milestone for foreign retailers, wholesalers and traders who wish to enter the Chinese market. Key aspects of the new regulation include: the repeal of a mandatory requirement for foreign retailers to enter into joint ventures as the only vehicle for entry; abolition of geographical restrictions; a drastic reduction in minimum capital requirements; and a greatly simplified approval process.

Observers consider these reforms and the very high rates of economic growth to make China the next retail frontier. Government support, through efforts aimed at boosting economic growth through consumer spending, is one of the factors behind the rapid development of some retail subsectors. Others believe, however, that the increased entry of local and foreign retailers will, in the short term, likely exacerbate overcapacity, and that this, combined with the sheer size of the industry and its high fragmentation, will encourage mergers and acquisitions. The outcome is likely to be an extremely unpredictable competitive landscape, as consolidation will likely cause great fluctuations in retailers' relative competitive positions.

Specialist multiples are expected to grow at the fastest pace, either at the expense of smaller independents, or through increased mergers and acquisitions. In the more developed cities, convenience stores appear to be best positioned for dynamic growth, tempering the expected growth of large-scale retail formats such as hypermarkets. Unlike the trend in many other countries, the balance of power remains with wholesalers because of the fragmentation in the retail industry, and many suppliers increasingly carry out their own direct distribution to consumers. However, over time as their sales growth continues and they increase in size, retailers are expected to acquire greater negotiating power relative to their suppliers. Competition is expected to take on a slightly different dimension as specialist supply chain technologies, customer relationship management (CRM) software and best practices from global logistics companies, among others, are likely to be embraced by an increasing number of retailers. The Chinese Government is encouraging local firms to adopt such technology and knowledge, and it has signalled its willingness to provide funding for fledgling projects for interested companies.

As a whole, commerce employed approximately 49.7 million people in China in 2002, up from about 48 million in 1997. However, at only 6.7 per cent of all employment in 2002 (slightly down from 6.9 per cent in 1997), this represents one of the sector's lowest contributions anywhere to national employment. Statistics disaggregated by sex are unavailable.

India has sometimes been called a nation of shopkeepers because of the huge number of retail enterprises in the country, which totalled over 12 million in 2003, accounting for the largest share of employment, after agriculture. According to *The Economist*, retail trade's contribution to employment was between 6 and 7 per cent and its share 10 per cent of GDP. About 78 per cent of businesses are small family businesses utilising only household labour. Even among retail enterprises that employ hired workers, the bulk use fewer than three. In 2003, there were only 14 companies running department stores, two with hypermarkets and ten operating supermarket chains; the number operating supermarkets was higher at 385, but most of these had a single outlet.

In 2002, retail sales amounted to around Rs.7,400 billion (the exchange rate was approximately Rs.48.9 to US$1 in April 2006), growing at an annual average of 7 per cent from 1999. With the upturn in economic growth from 2003, retail turnover has risen by almost 10 per cent annually. In a developing country like India, a large chunk of consumer expenditure is on basic necessities, especially food products. It is not surprising therefore that food, beverages and tobacco accounted for as much as 71 per cent of total retail sales in 2002. Not surprisingly, given such a highly fragmented industry and the enormous size of the market, there is a very large variety of retailers in the food sector, in which traditional retailers, operating small single outlets mainly using family labour, predominate. In comparison, supermarkets account for a minuscule proportion of food sales, mainly because of the competitive strengths of traditional retailers, which include low operating costs and overheads, low margins, proximity to customers, long opening hours, and additional services to customers (such as home delivery). Nevertheless, supermarket sales are expanding at a much faster rate (30 per cent in 2003) because a growing segment of higher income Indians prefer to shop these for their convenience, higher hygiene standards and attractive ambience.

Cooperatives have been important in India's retailing trade for several decades, with about 35,000 outlets in 2002. However, since the 1990s, there has been a reduction in their support from the Government. Franchises have grown very rapidly over recent years, with over 5,000 outlets by 2002. The other major retailing organizational format is multiples, better known as "chain stores", which numbered about 1,800 in 2002. Compared to other retail formats, sales in chain stores recorded the highest rate of growth, averaging 24 per cent per year during the first three years of the millennium.

Most retail trade subsectors in the **Republic of Korea** have been consolidating in recent years as multiples squeeze out independent, individually owned stores that have hitherto dominated. Another trend favouring multiples are consumer tastes for the newest products and services, evolving too rapidly for most independents' ability to adjust to satisfactorily. The country's leading retailer is a subsidiary of the domestic conglomerate *LG Corp.*, which boasts various specialty operations. It also owns a sprawling network of food and grocery retailers, including department stores, while the leading "pure play" retailers are department store specialists *Shinsegae*, Internet retailer *Lotte Shopping* and *Samsung Tesco*, the discount superstore operator.

Industry experts see a positive medium-term outlook, with the economy poised to continue to benefit from a stable export base. Local retailers are also expected to strengthen their positions through further consolidation and to expand overseas. *Lotte Shopping*, *Shinsegae* and local clothing firm *E-Land* have joined *Tesco* in bidding for *Carrefour*'s outlets in the Republic of Korea, as the French multinational seeks to exit the market, where its warehouse-style stores have reportedly failed to win over consumers.

ILO labour statistics indicate that commerce employment has declined in the Republic of Korea from slightly over 3.9 million in 1997 to just over 3.8 million in 2004. The industry's share in overall employment similarly dropped during the same period from 18.5 to 16 per cent, as did its share in women's employment: from 20.2 to 19 per cent of total women's employment.

2.7. Africa and the Middle East

With some exceptions, such as Egypt, Morocco, Saudi Arabia and South Africa, few countries in Africa or in the Middle East have the modern retailing industries and formats for which RFID technology will be relevant in the short and medium terms. However, for those countries in which competition for market share is growing at a rapid pace among expanding global and large local companies, the advantages of advanced retail technology in capturing increased market share and an improved competitive posture could be decisive.

In **Egypt**, the industry has seen sharply rising sales due to a growing population, an influx of international chains, and a widening range of products on offer, rising incomes and an increasingly sophisticated and efficient advertising industry. The pace of privatization has increased since 2001, when the Government announced the sale of 65 companies, including some in retail, such as *Omar Effendi, Sednaoui and Hannaux*. Multinational penetration of local retailing included the arrival of such names as *Sainsbury's, Carrefour* and *Shoprite* in the food retail sector; and *Ethan Allen, Habitat, Nike, Adidas, RadioShack, Timberland* and *Oriflame* within the non-food sector. If patterns elsewhere are any guide, concentration of retailing trade can be expected in future.

South African urban centres enjoy a sophisticated retail infrastructure that, in many aspects, compares favourably with the best in the world. Elsewhere the face of retailing is changing, with growth of supermarkets and hypermarkets that now account for a major share of the industry's turnover, the growing development of large, especially designed shopping centres and mega malls. There has also been marked growth of out-of-town regional shopping centres, especially in the outskirts of large towns and cities, with the use of credit cards as well as retailers' own branded debit or account cards on the increase. The use of new technology, including laser-scanning electronic points-of-sale that contribute to more efficient stock control, pricing and analysis of customers' shopping lists and preferences is also on the increase, as is online Internet shopping. Another fast developing trend is the establishment of electronic funds transfer at point of sale (EFT-POS) systems to clear payments made by electronic, cashless shopping.

In **Saudi Arabia**, retail trade continues to benefit from high income growth. The country remains the largest market in the Middle East with a high proportion of young people and high levels of disposable income making it the region's fastest-growing consumer products market. Together with a booming economy, these factors mean that retail sales have consistently registered rapid growth over the last decade. The ongoing construction and residential building boom – a result of increased public and private spending – has boosted for the economy. The boom has also been reflected in the retail sector's performance with a high demand for furniture, electronics and interior furnishings. Multinational penetration is a strong characteristic of the industry, which has witnessed the influx of such multinationals as *Debenhams, Harvey Nichols* and *Saks Fifth Avenue*, to name but a few. The Kingdom is currently witnessing an expansion in shopping malls and centres.

3. Technology and supply chain management

Retail is a technology-heavy industry, where the strongest and most competitive are those who have successfully harnessed and exploited new technologies before their competitors. Retailers are increasingly integrating new technologies in their operations and innovating to cope with a highly competitive market. Technology has, for instance, driven significant trading advantages through smarter customer data (via loyalty cards), better supply chain management and the development of e-retailing and home shopping. It has been a key enabler for enterprises to expand their supply chains globally, while store technologies have also reduced errors and improved inventory control. Businesses, large and small, increasingly depend on cutting-edge technologies to check out customers, order products and manage inventories by stock-keeping units (SKU). They are upgrading their technical infrastructures and implementing multi-channel strategies. Technology provides the tools to automate business processes, to analyse performance and to manage relationships with customers and suppliers. More recently, the Internet has emerged as a vital enabler of retailing operations by facilitating the acquisition of real-time information and easing internal and external communication. The Internet also provides the backbone for remote applications, making it possible to outsource some operations. In addition, it is a means of communicating with business partners, driving costs from the supply chain.

Some experts suggest that the problem of supply chain management up to now has been the focus on the supplier instead of on the consumer, since failures in the supply chain tend to originate in bottlenecks at the consumer end, which causes ripple effects all the way back to the supplier. According to a 1996 Andersen Consulting survey, [1] on a typical afternoon in a supermarket in the United States, 8.2 per cent of the items are out of stock, and this number is nearly doubled for items that are advertised. The opportunity cost of such stockouts at that time in American supermarkets alone was estimated at $7-12 billion. The same study estimated that 33 per cent of out-of-stock items were located in the store, only not in the correct location.

This problem arises from the fact that before being stored on store shelves, items pass through several processes – the supply system, the order preparation process and the shipment and the receiving process. Once in the store, all products are initially stored in the backroom. Then the shelf stock is replenished from time to time during the selling season as retail shelf space is freed. During these processes, execution errors can compromise product shelf availability as a result of two root causes: (a) one part of products ordered is not received by the store; (b) all products ordered are received but one part is not available on the shelf because of internal store execution problems. In the second case, the store may apparently be out of stock in a product, when in fact the product may be available in the backroom or may have been placed on the wrong shelf.

Most global retailers have integrated advanced supply chain management technologies into their distribution chain operations to avoid these types of problem. Upstream, logistics automation facilitates warehouse and distribution centre operations, with broader tasks controlled through supply chain management systems and enterprise resource planning (ERP) systems. These automated systems comprise a variety of hardware and software components, including fixed machinery, such as automated cranes, conveyors or sorting systems; and mobile technology, such as handheld or truck-mounted radio data terminals which connect wirelessly to logistics automation software and provide

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[1] Andersen Consulting: "Where to look for incremental sales gains: The retail problem of out-of-stock merchandise" (1996), study prepared for the Coca-Cola Retailing Research Council.

instructions to operators moving throughout the warehouse. In-built bar code scanners fitted to the equipment allow identification of containers, while integration software provides overall control. A number of leading retailers have centralized their logistics activities, storing almost all produce at a few central locations and shipping it in just-in-time (JIT) fashion to individual stores, where it is put straight onto shelves rather than, as previously, in the backroom. In many cases, individual stores no longer need have any contact with suppliers. Stores send their orders to the warehouse by confirming or altering suggestions made by computerized warehousing systems.

While all these systems are critical to retail operations and have had very far-reaching social and labour impacts on the industry over recent years, this report focuses on the emerging radio frequency identification (RFID) technology. Called "the next generation bar code", RFID's non-line-of-sight and unique serialization properties promise to revolutionalize the supply chain and store operations, providing unprecedented levels of supply chain and shop-floor visibility and accountability. The expectation is that RFID-based capabilities will allow manufacturers, suppliers and retailers to collect, organize, distribute and store information on inventory, business processes and security controls much more efficiently than before, vastly enhancing supply chain management and shop-floor operations.

4. Radio frequency identification

RFID refers to systems that transmit the identity (as a unique serial number) of an object wirelessly, using radio waves. Its capacity goes beyond those of bar code labels, which, at the time, had triggered a revolution in product identification systems and stores' point-of-sale operations. While bar codes are cheap, they have low storage capacity, need line-of-sight scanning, and cannot be reprogrammed. RFID requires neither line-of-sight nor straight line alignment between tags and readers. Tags are also stouter than bar codes, can be affixed or embedded on product packaging or inside items, and can be used in difficult conditions.

RFID electronically identifies, tracks and stores information about groups of products, individual items or product components. It consists of three parts: tags (small chips programmed with information that can be located inside or on the surface of the product, item or packing material); readers (that interrogate or send signals to the tags and receive responses that can be stored within the reader for later transfer or instantaneously transferred); and a data system (which is typically networked with larger information management systems). The basic technology has been available since the 1940s, notably in aircraft Identification Friend or Foe (IFF) systems, and in inventory management since the 1970s. The exponential growth in information and communication technologies (ICTs), coupled with the expansion of global production and trade, has made RFID useful for managing and tracking large quantities of products, identifying them for security purposes and supply chain management, and shifting supply chain management from a historical to a real-time perspective. It is expected to transform operations management in the manufacturing, retail and service sectors.

The generalized use of RFID across the entire retailing chain – from the producer's factory gate to the shop-floor – promises to revolutionize the process by which products pass from manufacturer to retailer to consumer. Through increased accuracy, the ability to gather information at new points in the retail chain, and new collaborative ways of sharing information between retailers, manufacturers and/or wholesalers that go well beyond those developed under ECR, RFID could radically reduce the costs of bringing products to consumers.

With the tiny RFID chips replacing the laser-scanned bar codes, products can be identified automatically and simultaneously rather than requiring the individual scanning of every item. This provides retailers and their suppliers with access to an unparalleled quantity of accurate real-time product flow from factory to warehouse and on to shops.

While proponents stress the limitless potential of RFID, as with any transformative technology, businesses wishing to adopt it are confronted with an array of standards, hardware and software choices, the need for process redesign, and new modes of collaboration. Although supply chain management probably represents the most important current driver of the technology, RFID is already used more for security applications. As leading global retailers and their partners deploy it in their operations more extensively, the costs of RFID tags are expected to fall, and its use in inventory control is certain to increase: with increasing use, benefits and adoption will grow in a virtuous cycle.

Mandates by *Wal-Mart*, *Tesco*, *METRO* and other leading retailers requiring their top suppliers to use RFID tags on pallets and containers to track shipments are spurring its uptake. Pilot trials are under way in many countries and businesses. Under the auspices of the METRO Group Future Store Initiative, for example, companies have been testing several RFID-based applications, extending from manufacturing factory lines to shop shelves, using RFID tags on pallets, cases and some individual products; reported benefits range from real-time visibility of products on shelves to decreased time required to pick up

pallets with forklifts. The involvement of multiple manufacturing partners, different classes of products and applications at the factory, warehouse, distribution centre, stockroom and shelf already provide a sufficiently indicative view of RFID's impact on the infrastructure, processes and relationships, and the likely effects of its full deployment.

Studies by the Auto-ID Center of the Massachusetts Institute of Technology, [1] which oversaw the initial development of RFID for the retail distribution chain, already point to the following conclusions:

– Case-level tagging will bring the greatest number of benefits in the retail supply chain, but item-level tagging will bring about more benefits in operations that involve a large amount of unit-level handling or in sectors where inventory accuracy is critical. Pallet-level tagging has benefits for companies that receive and handle large portions of single SKU pallets.

– Direct labour reductions in the distribution centre will range from 5 to 40 per cent, depending on a company's current automation levels, technology and the number of times items must be handled as they pass through the supply chain.

– Safety-stock reductions made possible by cutting delivery lead times and lead time variability create the largest benefit in the transportation aspects of the supply chain. The greater the baseline lead time and lead time variability, the greater the potential savings. Depending on these baseline lead times, the reduction may range from one to four days of supply. [2]

In order to identify in detail RFID benefits in the retailer's distribution chain, a close examination of the processes involved in moving goods from the factory to the shops is required. Industry experts believe an RFID-enabled system will allow retailers and their suppliers to efficiently collect, manage, distribute and store information on inventory, business processes and security controls. Benefits to the various parties in the retail distribution chain include improved ability: of retailers to identify potential delays and shortages; of grocery stores to eliminate or reduce item spoilage; and of suppliers to track shipments more effectively; and better control of critical processes, enabling the verification of security and authentication of shipped items.

The technology offers several improvements over its predecessors – bar codes and magnetic stripe cards – as its central feature is the Electronic Product Code (EPC), viewed by many as the next-generation bar code or Universal Product Code (UPC). EPC and RFID standards are being developed by a consortium grouped under EPCglobal, comprising a number of leading retailers, consumer packaged goods manufacturers and major technology providers. The EPC can carry more data than the UPC and be reprogrammed with new information if necessary. Like the UPC, the EPC consists of a series of numbers that identify the manufacturer and product type, but also includes an extra set of digits to identify unique items (box 4.1).

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[1] Accenture: *Auto-ID on delivery: The value of auto-ID technology in the retail supply chain*, 1 Nov. 2002; IBM Business Consulting Services: *Focus on retail: Applying auto-ID to improve product availability at the retail shelf*; 1 June 2002; *Accenture: Auto-ID in the box: The value of auto-ID technology in retail stores,* 1 Feb. 2003.

[2] Accenture: *Auto-ID on delivery*, op. cit.

Box 4.1. Electronic Product Code
Header: Identifies the length, type, structure, version and generation of EPC
Manager number: Identifies the company or company entity
Object class: Similar to a stock-keeping unit (SKU)
Serial number: Specific instance of object class being tagged

<div style="text-align: center">

016.37000.23456.1000000000
Header. EPC manager object class. Serial number

</div>

Source: EPCglobal.

5. RFID and commerce

5.1. Introduction

To understand the process changes and the operational benefits that RFID would bring, it is first necessary to examine the flow of products from the factory to the store-floor. [1] In reality, every supply chain is unique and many permutations are possible in the way products move from production to the store-floor. In a "typical" chain, at the manufacturer's plant, pallets might be assembled directly after the production line, stored in the factory warehouse, moved directly to the manufacturer's distribution centres, or shipped to wholesalers or directly to retailers. In other scenarios, shops often receive deliveries from several retail distribution centres. They also take direct store deliveries from manufacturers. For ease of analysis, it is therefore necessary to simplify, and assume that most products are shipped directly from factories to a retail distribution centre and from there to a retail store.

Some of the potential benefits from using RFID can be determined by comparing the current steps with processes using RFID at the pallet and case levels, respectively, linking potential benefits to required supply chain process changes, distinguishing between case-level and pallet-level tracking in analysing the effects, and identifying the benefits in terms of:

- *automation,* where RFID provides a labour-cost or time saving;

- *new processes,* where RFID allows more efficient processes;

- *serialization,* where the introduction of new data makes it possible, for example, to know which shops received products that were recalled; and

- *collaboration,* where data are shared between manufacturer and retailer (i.e. enhancement of ECR and electronic data interchange processes).

At the initial stage of delivery stage, only full pallets are handled. To assemble a delivery, pallets are removed from the factory storage area and placed in the shipping area, where they are loaded on to trucks. On arrival at the retail distribution centre, trucks are unloaded, deliveries checked and pallets stored. Some pallets may be sent unchanged from the distribution centre to the stores, but the majority of pallets coming from the distribution centre are likely to be mixed. These mixed pallets are picked at the retail distribution centre. Pallets belonging to a given order are assembled in the shipping area, moved on to trucks and then to the retail store.

Store workers check the pallets, placing them in the backroom until they are moved on to the store-floor. Cases that cannot be placed on shelves are returned to the backroom and stored there until shelf space is available. Interchanged or additional products or those with quality problems may be detected in a delivery, either at the distribution centre or at the shop. This can lead to product returns to the distribution centre or manufacturer, which requires processing. In other instances, additional products delivered are simply thrown away, or products may be returned because of product recalls.

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[1] This and the following sections are based on METRO Group Future Store Initiative: *RFID: Uncovering the value – Applying RFID within the retail and consumer package goods value chain* (2004).

5.2. Processes and their potential benefits

The operation of any distribution chain involves several processes. The focus here, however, will be only on those steps that change with RFID tagging at the pallet and case levels; unaffected processes are ignored. Although, as already noted, item-level tagging would generally confer the greatest benefits – and have the most sectoral employment and social effects – the current cost of tags makes it uneconomical except for high-value products. As every supply chain is unique and involves different processes, the extent of benefits gained from RFID will similarly differ. The model discussed here provides, nonetheless, a sufficient basis to assess the impact on distribution/supply chains and on work organization within them. While the introduction of RFID technology in retailing would bring substantial upstream changes, including for manufacturers, for whom the benefits would be primarily related to pallet-level tagging, the focus here will be on distribution chain and store operations effects.

The majority of distribution centre RFID benefits arise from mixed pallet and case-handling changes. These benefits result from automating current manual processes, eliminating manual confirmation, checking and bar code scanning procedures. RFID would lead to optimization of current processes or to new processes. Most case-level benefits can be achieved without the need for serialized data. Because pallet bar codes, generally, already contain a unique identifier, such as a Serial Shipping Container Code (SSCC) number, for the processes considered here, a unique identifier for cases would only be needed for recall and returns processing. To better appreciate RFID benefits in the distribution chain, it is important to remember that retail distribution has two overriding objectives: to fill store orders accurately and completely; and to do it at the lowest possible cost. The most common considerations for retailers with regard to these goals are labour costs, inventory accuracy, order fill rate, shrinkage and inventory velocity.

While process change leading to cost reductions is the main source of benefits, not higher sales, it is important to remember, nonetheless, that case-level RFID can also increase sales by improving product availability and reducing out-of-stocks.

5.2.1. Benefits of pallet-level tagging

Distribution centre RFID advantages far outweigh those of store operations at the pallet level because of the greater number of procedures currently required for distribution centre pallet handling. Pallet-level tagging would facilitate distribution centre changes in shipment receipt; pallet staging and breaking; order assembly and truck loading while, for store operations, cost savings arise only from automating receiving processes.

Current distribution centre pallet-handling procedures, the new RFID-enabled processes and related retailer benefits are compared below.

Retail distribution centre

Currently, a forklift operator scans the pallet's bar code when a shipment arrives at the distribution centre's receiving area. The warehousing management system then assigns a storage place based on a number of established factors, with this information displayed on a terminal in the forklift cockpit. To confirm that the pallet has been stored correctly, the operator enters the checking number for the storage location. RFID tagging will automate this process, with an RFID reader fitted on the forklift. The forklift reader will also automatically determine the storage location, saving the labour involved in these two processes.

Retailers can also automatically identify and track the movement of tagged pallets wherever they might be in the distribution chain. In combination with a dispatch advice,

the distribution centre can automatically determine what should be on the pallet, although this possibility requires technological improvement to bring RFID read rates as close to 100 per cent as possible. In the meantime, signals can be used, where necessary, to confirm successful reads. Another precondition is collaboration between retailers and manufacturers to enable automatic association of the pallet identifier with the pallet's contents based on information contained in an electronic dispatch advice. Without this, the savings would be less. The need to continue to attach bar code labels at the distribution centre to provide information on picking location, week of arrival, etc., instead of using labels attached by manufacturers, would reduce the benefits even further. However, as not all manufacturers will be applying RFID and dispatch advices from the very start, the new and old processes will have to coexist for a while, resulting in additional costs.

Order assembly provides an additional source of labour saving. With the current procedures, once a pallet has been picked, it must be placed correctly in the shipping area. RFID would make it possible to automate the process, eliminating the time now spent manually scanning shipping area bar codes.

Truck loading is yet another area for potential savings. The current procedures require bar codes on shipping labels to be manually scanned to verify a delivery. This task could similarly be automated with RFID, freeing up more staff time.

Retail stores

Under current procedures, when pallets arrive at the store, they are normally identified manually and physically compared with the delivery note and the related order. With RFID, identifying the pallets can be automated, reducing the labour now required.

5.2.2. Benefits of case-level tagging

Unlike pallet-level tagging, where most benefits derive from process automation in the distribution centre, case-level tagging benefits are more evenly distributed across the retailing chain. For the distribution centre, savings are possible at the receiving stage; greater precision can be achieved in mixed pallet picking; and inventory control can be improved. Store operations also benefit from changes in receiving; mixed pallet handling; and shelf restocking. Both distribution centre and store operations benefit from improved product return or recall processing.

Case-level RFID tagging at different points in distribution centre and store operations is examined in greater detail below.

Retail distribution centre

When products arrive at the distribution centre, both their quality and quantity have to be verified. With case-level tagging, there would no longer be a need to check the number of cases on a pallet, and if electronic delivery notes were introduced, deliveries could also be automatically confirmed, saving some of the manual control effort.

Because case tagging also enables greater precision in identifying picked cases in mixed pallets, the need for manual confirmation of the number of picked cases would be eliminated, as would the additional accuracy checks currently required. Some distribution centres now conduct sample counting of pallets after the process is finished to assure picking accuracy.

By automating the identification and creation of receipts for returned or recalled cases, case-level tags would increase the efficiency of their processing, saving the time required with the current manual system. For product recalls – provided it has information

on the serial numbers of cases to be returned and to which stores these cases have been shipped – the distribution centre can determine which stores are affected, making it possible to issue better targeted information.

Much of the current inventory counting effort goes into checking the number of cases on pallets in the picking area. Automatic determination of the number of cases of a product on a pallet through case-level tagging would drastically reduce manual counting.

Retail store

In contrast to deliveries from their own company distribution centres, which are often not checked, store staff must verify all direct manufacturer deliveries on reception. Case-level RFID tags would reduce the need for manual checks. In addition, automating the checking process would facilitate detecting delivery errors that now remain undetected, helping to avoid payment for undelivered products.

Improved picking accuracy at distribution centres, especially of mixed pallets, also has significant benefits for store performance; higher accuracy means fewer missing products in a delivery, increased product availability and out-of-stock avoidance. Undetected delivery errors result in misalignment between inventory management system information and physical inventory. Some shops use computer systems to generate order recommendations automatically, and if these recommendations are based on inaccurate information, too many or too few products may be ordered, leading to excess inventory or out-of-stock situations. Both outcomes are highly undesirable in today's lean retailing environments. Products that have not been ordered may sometimes be delivered from a distribution centre: if the products are listed in the store, this leads to excess inventory and additional holding costs. However, the resulting marginal additional costs are probably less than when products are delivered but not listed. As administrative costs of returns are high, retailers often simply throw away such products.

Case-level tagging also facilitates the separation of store inventory between stockroom and store-floor, which helps reduce out-of-stock problems. Visibility of stockroom inventory allows staff to see that products they might have been unaware of were actually in the store; products might otherwise go out of stock on store shelves even when they were physically in the store. Case-level tagging also makes it possible to generate estimates of the numbers of products on shelves by combining information on cases moved on to the store-floor with sales data from the point-of-sale (POS) system – although this cannot be entirely accurate, as theft, damage, incorrect scans, etc., may lead to inaccurate inventory data. If shelf stock is low and there is still inventory in the stockroom, requests for shelf replenishment can be triggered automatically.

As with the distribution centre, case-level tags improve store-level product return/recall processing. Currently, when the store receives a request to return products, personnel have to start a time consuming search for those specific products, as it is not now possible to determine whether the cases might still be in the backroom or might already have been moved on to the shop-floor. Case-level tagging would help separate backroom and store inventory and reduce the expensive effort required in product location. Using case serial numbers, the distribution centre would be able to inform only those stores that had actually received the affected products, saving unaffected stores the time wasted in fruitless searches.

5.3. Differentiated impacts according to specific product and supply chain characteristics

Depending on whether RFID is applied at pallet or case level, the benefits will differ between supply chains and product categories. The product's physical properties, item-specific issues (such as theft, demand level, seasonal demand patterns and product promotions) and such attributes as limited shelf life and price will affect its RFID benefits.

Because supply chains differ in their level of efficiency, the level of benefits they are likely to garner from RFID will similarly differ, with higher gains for supply chains with existing problems: for instance, from improved product visibility. RFID can, for example, decrease errors in inventory data, reducing the volume of unsaleable products or high search costs that often make store operations unprofitable.

The number of processes required to handle goods in a given supply chain are equally relevant. Some retailers' supply chains involve, for example, distribution centres operated by manufacturers for cross-docking products produced at different locations. There are additional steps (such as receiving, storing and shipping in the cross-docking warehouse) that RFID can help to improve. In supply chains involving fewer steps from the factory to the store-floor, benefits would necessarily be lower.

Product-specific characteristics can be especially relevant for case-level tagging, but less so for pallet-level tagging, and may therefore determine the type of tag needed. Liquids and metal, for instance, currently make it hard to achieve acceptable read rates. Similarly, product-specific considerations may be crucial where the product is subject to a particularly high risk of theft. In such instances, retailers and their suppliers may feel they need RFID to detect and discourage shoplifting.

Using RFID to improve replenishment from the stockroom will affect availability of some products more than others, depending on whether they are usually found in the stockroom. Serialized case-level data can help monitor the stockroom availability of products with a long shelf life. Product price is also an important determinant in RFID adoption, especially at item-level tracking. For example, it would be very hard to justify RFID tags on items costing $1 or less. Product price is less significant at case and pallet levels, since most benefits are derived from handling automation, with savings dependent on the volume of units handled rather than their price.

5.4. Business transformation with RFID

Despite their significant advantages, RFID-based solutions pose immense and complex challenges for business transformation and technology infrastructure, which excludes their adoption by any but the leading retailers and their major suppliers. Many of the benefits require not only internal process changes but also new levels of collaboration between retailers and all their supply chain partners.

For manufacturers, collaboration with trading partners is the most important element of business transformation if they are to capitalize on RFID investments. Many examples of collaboration between manufacturers and retailers relate best practices under existing initiatives such as EDI, collaborative planning, forecasting and replenishment (CPFR) and the sharing of POS data. The main difference with RFID data is that collaboration would often occur in real time. If an RFID system alerts a distribution centre that pallets in a shipment are missing cases, a real-time solution is possible from the logistics provider. To maximize RFID gains, companies will need a profound cultural transformation to view collaboration as a way of doing business in real time.

Retailers, more than their suppliers, face a much more complex warehousing situation, receiving shipments from hundreds or thousands of vendors and assembling shipments to hundreds or thousands of stores at the end of long supply lines. RFID success requires retailers to fully grasp the implications of data-driven decision-making.

5.4.1. Distribution centres

For retailers, the overwhelming proportion of benefits from RFID-related process changes will be in distribution centre operations, unless tag costs can be reduced sufficiently for it to become financially viable to adopt them at scale. Even at 5 cents, the cost of tagging (and tracking) individual items still puts many of the in-store benefits of RFID out of reach of most retailers, except those dealing in high-priced products. In the short to medium term, the key question for retail distribution centres is whether tags are affixed at a pallet or case level.

To take advantage of the automation benefits of RFID at pallet level in retail distribution centres, retailers must simply replace bar code scanners with RFID readers. This would yield modest benefits from automating read processes in store operations. More substantial benefits are possible with case-level tagging, but this also requires a much heavier investment in new infrastructure, although the process implications, also involving corresponding reductions in labour inputs, are not as dramatic. RFID application to all cases in retail distribution centres would not only speed up the picking process while increasing accuracy, but also create multiple checkpoints for accuracy before the picked pallet exits the centre. The process remains fundamentally the same, except for the change in the physical workflow around moving cases to trolleys and pallets to trucks.

At both pallet and case-level RFID tagging, the process implies increased collaboration between the distribution centre and its logistics provider, where the retailer outsources this service. If retailers are using their own fleet for delivery, this process change can be minor. But retailers working with third-party logistics companies for shop delivery may need new procedures for information, timeliness and accuracy. Retailers unable to master collaborative relationships will find it very difficult to achieve sufficient returns on the substantial investment required to implement RFID-enabled processes until they develop best-practice relationships using data already available today.

5.4.2. Store receiving

Benefits from process change for shops with pallet-level tagging are minimal; the tag simply replaces the bar code that is scanned or visually accounted for with current goods receiving processes. Case-level tagging would, however, bring substantial store benefits through the ability to check pallet contents automatically, address any discrepancies, and immediately identify the location of goods needed to avoid stock-outs. Stockrooms would need to have a single portal through which goods enter and exit to provide personnel with a "snapshot" of the stock situation. The process implication is mostly in collaborative resolution of exceptions with the logistics provider, and the more immediate reporting of misdelivered or underdelivered shipments. The process change impact on store personnel is minimal.

One possible exception would be the use of hand-held RFID readers to locate cases within the stockroom itself. Although many goods are unloaded almost directly on to the shop-floor, others are stored in the stockroom until needed. Industry statistics show that, in a significant proportion of grocery shelf out-of-stock situations, the products are actually in the stockroom. A simple system by which sales data from the POS triggers a message to a hand-held reader informing the staff of the EPC number of a case that needs to be taken

from backroom stock and brought to the floor can reduce "in-stock out-of-stocks" with a modest investment in smart-shelf infrastructure.

5.4.3. Store floor

Virtually all potential store-floor process changes require a combination of item-level RFID-tagging with smart shelves that alert staff when replenishment is necessary. However, three major barriers stand in the way of this becoming generalized soon:

– *Tag costs.* While 5-cent tags are theoretically possible, low margins on most grocery and consumer packaged goods means that affixing even such tags would not be justified. High-theft items like razor blades, batteries, DVDs, etc., may be the exception, but RFID tags on a number of other consumer products would currently not be economically viable.

– *Infrastructure costs.* Fully equipping stores with smart shelves capable of reading each tag every few seconds is enormously expensive and would also generate huge volumes of data to sort. This is only viable for high-theft, high-cost items. Many analysts believe the combined infrastructure cost far outweighs any benefits of general item-level tagging for the foreseeable future.

– *Process change.* Replenishing shelves on an item-by-item basis, rather than a full case at a time, often fails to generate substantial business value and also requires extensive process changes. Rather than stocking shelves once or several times a day, workers would have to disrupt customer flow to stock the shelves, and backroom stock could no longer be counted in cases, but would have to be accounted for at item level.

5.4.4. Customers

While much media attention has been given to the implications of RFID for consumers, its use in the supply chain, where retailers can realize most benefits, does not touch the customer directly. Items shipped in RFID-tagged cases and pallets still arrive on the shelves with only bar codes on them. With retailers and manufacturers deploying RFID at the pallet and case levels only, consumers simply enjoy better product availability. Industry observers warn, nevertheless, that once item tagging begins, companies must recognize the real and perceived interaction between consumers and those tags, and ensure that the consumer privacy impact is minimized. Retailers currently trying out RFID deployment recognize the need to install signs ensuring that consumers are fully aware of both the tag and reader.

5.5. Technological transformation

Successful RFID adoption requires business-level process and structural changes, with an equally profound impact on the firm's technology infrastructure. The sheer volume of data that would be generated – much of it in new forms and gathered at new points – would strain the conceptual capacity of most of today's enterprise systems. Given the substantial investments in enterprise software and its customization, it would be impractical to assume that new architecture will quickly materialize to meet RFID's huge requirements to gather and use data at multiple points in the supply chain, or that any but the very large retailers and their trading partners will be able to deploy the technology soon.

Companies wishing to deploy RFID may choose to begin with a separate technology layer handling the primary tasks of gathering, filtering, and acting on RFID data received from multiple readers. The ability of the enterprise's technological infrastructure to support tag reading, correct data interpretation and conversion of those reads into messages that can be understood by other software systems will be critical.

Given these considerations, technology experts believe RFID introduction can be as simple as replacing bar code scanners with RFID scanners and gathering the same data with no change to an existing process. This would simply require the replacement of peripherals; the other hardware, applications and data structures need not change. At the other extreme, continually monitoring the location of every item in a warehouse using hundreds of linked readers and hundreds of thousands of tags would involve radical changes to existing infrastructures. Most companies will probably choose a middle path. Since RFID requires extending the enterprise architecture into multiple new dimensions (physical space, scalability of data management and multi-company collaboration), new designs will be needed, encompassing hardware, software and data structures that reside between the readers and both individual enterprise applications and the enterprise application integration levels.

Box 5.1. RFID technology requirements

Technology challenge posed by RFID	Solutions required
Multiple physical environments require new hardware	Secure wireless network ubiquity and standardized architecture throughout the enterprise
Harsh physical environments for technology (warehouses, distribution centres, backrooms)	Ruggedized hardware and attention to total-cost-of-ownership
New points of data gathering (portals, "smart shelves")	Scalable architecture that allows rapid expansion of technology in new physical environments
Massive influx of new data as cases are serialized or tags are scanned repeatedly	Distributed application architecture that allows data to be filtered close to the tag read
Data must be shared between multiple applications	Enterprise applications must be integrated and Web services enabled
Data must be shared between multiple companies	Solutions must be deployed on a common, open, standards-based architecture that allows seamless transfer between companies

Source: METRO Group Future Store Initiative: *RFID: Uncovering the value*, op. cit.

Most of today's RFID applications are built on the need for discrete single scans of pallet or case-level tags, but keeping track of individual items in real time is not far off, especially for goods with high theft rates or those with complex inventory mixes like DVDs or CDs. In such situations, RFID helps to ascertain what is on the shelf in real time. Bar codes allow the system to identify the last point where an object was scanned, and portal-based RFID readers registering a pallet's arrival simply replace the laser with a radio wave, but the fundamental data structure remains the same. Continuous communications between the overall RFID system and multiple readers reporting in real time on everything within range would simultaneously exploit more of the technology's inherent power and generate, exponentially, more data. While these "constant scan" applications are more complicated to develop, they would usher in truly revolutionary ways for retailers and their partners to monitor their supply chains from factory to store.

6.   Social and labour implications

Before assessing the social and labour implications of RFID introduction in retail trade, it may be necessary first to explain briefly the nature and principal characteristics of sectoral employment. The specific features of sector employment will have a dominant role in shaping the outcome of RFID introduction, and hence they must be properly taken into account in designing the appropriate policy options to address those implications.

6.1.   Retail trade employment characteristics

Like other industries, retail trade has two main sources of employment demand: expansion arising from the absolute growth of an industry, which occurs when new jobs are created, and replacement demand to fill the jobs of those leaving the industry through retirement, sickness or to work in other areas of the economy. The total net requirement is the sum of expansion and replacement demand, and indicates how employment levels are forecasted to change in the future. For retail trade, the demand for new labour is predominantly a result of replacement demand. In many countries, sales and customer service occupations are expected to be the main areas of projected employment growth. Other occupations likely to increase their employment shares and benefit from above-average growth include management and senior officials, professional and technical occupations and personal service occupations. Low-end occupations are, for the most part, expected to experience significant job losses.

Industry staff turnover, at around 40 per cent in many advanced economies, is on the whole extremely high, which is explained in part by the seasonal nature of consumption and other factors that fuel demand for temporary work. Another reason is considered to be the high number of students and other casual staff for whom retail employment is merely a stop-gap job. However, this does not fully account for such high turnover, which the sector's social partners fear could have a long-term cost impact on the development of their industry. High staff turnover also has considerable day-to-day productivity effects on businesses.

6.2.   An industry view of consumer benefits of RFID

Some provisional conclusions may already be drawn regarding RFID's social implications from the point of view of consumers. According to GS1 (formerly European Article Numbering (EAN) International), the industry consortium leading the effort to design and implement global standards and solutions to improve the efficiency and visibility of supply and demand chains globally and across sectors, it is important to keep in mind that the RFID-enabled EPC is all about providing consumers with greater availability of products they wish to buy at a better price.

The compelling reason underlying RFID supply chain introduction is to help retailers deliver what the customer wants. Other social benefits will include better food safety through enhanced ability to track and trace livestock, to access product information, and to fight counterfeit pharmaceutical products. The emphasis is on the significant supply chain and wider economy impacts of the technology; comparisons are made with the introduction of the bar code more than 25 years before, which had delivered annual savings to retailers, manufacturers and consumers of US$17 billion. Productivity in the retail sector in the EU is said to have suffered compared to the United States, for example, because European retailers had been late in adopting bar code technology. An innovative and prosperous retail sector has a multiplier effect on the broader economy as higher consumer spending spurs greater economic growth.

Although economists find it difficult to put a figure on the overall economic impact of RFID, as there are too many variables, GS1 cites the following European Commission figures:

- 1 per cent cost reduction due to product quality improvement;

- 2 per cent reduction in working capital tied-up in raw materials;

- 5 per cent reduction in fixed asset costs;

- 5 per cent reduction in stock costs;

- 3 per cent improvement in sales.

For its part, EuroCommerce, the Europe-wide employers' association representing the retail, wholesale and international trade sectors at the European Union, considers the greatest benefit of RFID technology to be increased competitiveness. RFID will allow companies to operate more efficiently, and that efficiency will, in turn, drive growth at the level of the company and the wider economy, which should eventually lead to greater job creation and higher levels of overall employment. It is important to point out, however, that this aggregate picture may not be so bright when one considers the possible shift of jobs between firms, sectors and locations throughout this process. New jobs may be created in other locations or sectors and for different skill requirements. A key factor is skill profile – if the existing workforce does not have the skills necessary to take advantage of the openings made possible by the deployment of RFID in the production and distribution processes, the employment consequences may turn out to be grim, unless active labour market policies are introduced to ease the transition.

6.3. Consumer and privacy-related concerns

A study commissioned by the University of Cambridge Auto-ID Centre covering France, Germany, Japan, the United Kingdom and the United States provides initial indications of public perceptions of the RFID technology, its promise and potential threats. [1] It reports that most consumers saw benefits from the technology accruing mostly to business, with negligible benefits to themselves. The biggest negative was that consumers felt they had no personal choice. The EPC network on which the RFID system is to run was considered different from other well received technologies, such as mobile phones or the Internet, because it was always on – a "silent" technology, perceived to be similar to nuclear power and genetically modified foods in that the potential negatives exist regardless of one's personal decision.

Other key concerns included privacy; personal security related to fear that somehow muggers could know what was in the shopper's shopping bag or that he or she was wearing a Rolex watch, or that the technology would improve to allow people to read through walls; health (especially in Europe, based on conflicting press reports of the time about the possible ill effects of mobile phones and their alleged link to brain tumours and the fact the RFID technology, like mobile telephony, uses radio waves). Increased unemployment and other negative labour effects were also seen as an important issue, especially in Germany and Japan, which were then in the midst of a recession. The study

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[1] H. Duce: *Executive briefing – Public policy: Understanding public opinion* (Cambridge, Auto-ID Centre, Institute for Manufacturing, University of Cambridge, 2003).

recommended, among other things, greater efforts to ascertain the impact of the technology's introduction on employment, privacy and health and safety.

As highlighted by industry-sponsored studies themselves, issues relating to consumer privacy, security and other social concerns need to be properly managed in conjunction with RFID implementation in retail trade.

Concerns were also raised by participants at a United States Federal Trade Commission workshop in June 2004 to explore the applications and implications for consumers of RFID technology. [2] The Electronic Privacy Information Center (EPIC), a public interest research centre in Washington, DC, noted for example that RFID represents a fundamental change in the information technology infrastructure with dramatic privacy implications. It significantly expands the range and function of global electronic databases of all kinds and, because the tag and the reading process can be virtually silent and invisible, RFID, if its use were left unregulated, would permit a wide range of private and public covert, database-linked surveillance, tracking and profiling applications whose operation would not be transparent and could remain unknown to those under observation. Consumers do not know the nature of the information that would be kept on them, or for how long it would be stored. The security of data, which when correlated with other databases offers a granular picture of the individual, was of high concern and as yet suspect. [3]

Privacy and consumer activists' proposals to respond to some of these concerns range from disabling the tags by crushing or puncturing them, boycotting products of companies which use the technology, to finding ways for after-sale blocking of tags' readability. Industry, for its part, has generally sought to meet consumer concerns with its own proactive solutions, most notably the EPCglobal standard requirement that tags be physically disabled at point of sale by the merchant – a solution that is fully in line with one of those proposed by consumer activists themselves.

6.4. Other social implications

The EU has expressed strong interest in harnessing RFID technology to enhance economic competitiveness in line with the goals of the Lisbon Agenda for positioning Europe as a global, competitive, dynamic and knowledge-driven economy. RFID is seen as having the potential to contribute to the protection of public health, safety and security and it is therefore essential to create a suitable framework for understanding and successfully implementing RFID throughout Europe. In his opening speech at the CeBIT trade fair [4] in Hanover, Germany, on 9 March 2006, Ms. Viviane Reding, European Commissioner for Information Society and Media, opined that RFID technology would evolve and reach unprecedented levels of functionality and memory storage and processing capabilities. She predicted that RFID would contribute to the breakdown of the boundary between cyberspace and real space, merging the worlds of data and things so that the virtual world of the Web would be rendered physical – what computer scientists have called "the Internet of things".

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[2] http:/www.ftc.gov/os/2005/03/050308rfidrpt.pdf.

[3] http:/www.epic.org/privacy/rfid/ftc-comts-070904.pdf.

[4] CeBIT (*Welt-Centrum für Büro-, Informations- und Kommunikationstechnik* in German or World Centre for Office, Information and Communications Technology), held in Hanover (Germany) annually, is considered the world's largest IT trade fair barometer developments in the sector.

6.5. General labour and employment impacts of RFID technology: Historical perspective

Evaluating the impact of a technological innovation before it has fully materialized requires overcoming two types of uncertainty: first, how fast and to what extent the technology will be taken up and how it will be used; and second, connecting technology-related causes with their potential economic and social effects.[5] This is especially difficult as information and communications technologies "generally 'emerge' after years of continuing incremental improvements in their performance, cost, and usability that increase demand for them and lead to their widespread adoption".[6] Assessment of a new technology, especially one at such an early stage of introduction as RFID, can therefore only be very tentative and qualitative rather than quantitative. The exercise is rendered particularly complicated by the fact that the technology is usually only one among many concurrent factors affecting the social and employment environments. In such circumstances it is often very difficult to separate the specific causes and their particular effects.

The power of technology lies not only in its potential to improve on old processes, but also in its creation of new ways of working. RFID facilitates the automation of many processes across the entire supply chain, from factory to store shelf, with considerable labour savings. It is impossible to estimate, however, let alone quantify, the likely overall effects of RFID on employment in the retail trade industry. The technology is still at the pilot stage and the extent of its eventual deployment in the industry cannot yet be precisely gauged.

As a general rule the manner in which technology affects employment usually depends on whether it stimulates the creation of new types of jobs, the nature of those new jobs, the extent to which they replace existing jobs, and the effect on rival firms in that industry as well as in other industries or countries. Another factor that always makes it hard to estimate the likely impact of any technology on employment – and therefore its social and labour effects – is that consumers rarely behave as expected.

As noted above, it is not yet possible to draw any concrete conclusions regarding employment implications, especially in the retail industry, given the nascent stage of RFID technological innovation. One can only attempt to extrapolate from previous experience with the introduction of other new technologies to draw some very preliminary and broad conclusions on probable effects for retail employment. It would be even more hazardous to attempt any predictions regarding the economy-wide employment effects.

Since the industrial revolution, workers have frequently opposed the introduction of new technology out of fear of their labour substitution attributes. The effect of technological change on employment continues to be debated, especially in many advanced economies, which are experiencing concurrently high and persistent rates of unemployment and fast technological change.[7] The relationship has traditionally been the

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[5] L.M. Hilty: "Pervasive computing – A case for the precautionary principle?", draft position paper for the MIT – Oxford Internet Institute (OII) Joint Workshop on New Approaches to Research on the Social Implications of Emerging Technologies, 15-16 April 2005.

[6] W.S. Baer: "Social implications of emerging technologies", draft position paper for the MIT – OII Joint Workshop on New Approaches to Research on the Social Implications of Emerging Technologies, 15-16 April 2005.

[7] R. Simonetti; K. Taylor; M. Vivarelli: "Modelling the employment impact of innovation: Do compensation mechanisms work?", Ch. 3 in M. Vivarelli; M. Pianta (eds.): *Employment impact of*

subject of many contributions in economics. [8] While controversial and the subject of intense debate over the last two centuries, this relationship appears today straightforward at least from the macroeconomic perspective. Either the introduction of new technologies leads to more efficient production processes, reducing costs by saving on labour, capital, materials, energy, or any other factor of production, or it leads more directly to the development of new products that generate new demand. In either case, more welfare is created: first, through more efficient production combinations that liberate scarce resources; second, by satisfying new wants.

The majority of experts concur that technology both stimulates and dampens employment, and different countries can experience contrasting outcomes. For example, the relationship between IT investment, productivity and employment has been experienced quite differently in the United States and in Europe. If productivity increases are accompanied by demand increases, employment will be protected. If demand growth exceeds productivity growth, new jobs will be generated. However, where productivity increases are unaccompanied by demand increases, reductions in staff may range from slight to dramatic when work is restructured.

Taking the United States as an example, it is agreed, for instance, that one of the main reasons productivity has grown faster in commerce than in the service sector at large since the early 1970s is that wholesalers and large retail chains invested heavily in IT. Since 1960, IT investment per worker in the United States increased more quickly in wholesaling and retailing than in any other major sector. Investments in IT have also comprised a large share of total equipment spending in wholesale/retail than in other major sectors, except communications. The introduction of scanning technology and the UPC in the 1970s brought noticeable changes in work organization and dramatic benefits for consumers at the checkout line. Equally important was the fact that these technologies helped to transform the ordering process, enabling electronic data interchange (EDI) of orders to wholesalers and manufacturers. Concurrently, the emergence of industry-supported mechanisms for sharing scanner data provided all supply chain actors with timely access to accurate and highly detailed data on product movement, making it possible to schedule production and manage inventories more efficiently. [9]

Notwithstanding a degree of consensus linking technological change and positive employment outcomes, identifying and measuring aspects of this complex relationship is not easy, as the existence of many feedback effects operate in the economy. [10] Many economists stress, in particular, that the economic shocks resulting from the introduction of new technologies are usually compensated for by various mechanisms that tend to ensure full employment. They note that while employment levels might indeed decline at the sector level, the impacts throughout the economy are much more difficult to assess, but positive. In addition, they highlight other important effects (compensation and feedback

innovation: Evidence and policy, Routledge Studies in the Modern World Economy (London and New York, Routledge, 2000), p. 26.

[8] See, for example, ILO: *World Employment Report 2001: Life at work in the information economy* (Geneva, 2001).

[9] ILO: *Human resource implications of globalization and restructuring in commerce*, Report for discussion at the Tripartite Meeting on the Human Resource Implications of Globalization and Restructuring in Commerce, Geneva, 1999, document TMC/1999, p. 52.

[10] The consensus is not completely straightforward, as the relationship appears positive in the medium to long run, but may well be negative in the short run, depending on how quickly technological change translates into productivity growth and how quickly this growth is absorbed by the market.

mechanisms) that have historically enabled society to achieve greater prosperity without sacrificing employment. For example, by reducing costs and thereby lowering the price of particular goods and services in a competitive market, technological change frequently leads to increases in output demand; greater output demand results in increased production, which requires more labour, offsetting the employment impacts of reductions in the labour required per unit of output stemming from technological change. Even when the demand for goods or services whose production or processing has been transformed does not increase significantly when its price is lowered, benefits are still said to accrue because consumers can use the savings from these price reductions to buy other goods and services, expanding aggregate employment, although the jobs created in this case would be elsewhere, and not in the same firm, sector or location. The role of technological change as an essential component of a dynamic, expanding economy is emphasized to support the view that it does not produce significant increases in total economy-wide unemployment, although individuals and firms in specific industries may face painful and costly adjustments. Rather than producing mass unemployment, technological change is considered a precondition for improved living standards, wages and employment levels if appropriate public and private policies are adopted to support the adjustment processes that accompany new technologies.

No discernible reason exists as yet to expect a change in this pattern with the introduction of RFID technology in retail trade. As in the past, however, it must be assumed that employment in industries directly affected, especially retail trade, will see a decline, at least initially, and some workers will certainly be displaced. As with previous technological innovations, it is possible that RFID adoption and diffusion could be gradual, with employment impacts taking considerable time to be felt, depending on the absorptive capacity of retail and supply chain enterprises. The extent of such impacts will be affected by their interaction with the concurrent processes of sectoral restructuring, globalization, consolidation, and concentration, highlighted above.

In the United States, a study by the Department of Commerce [11] generally buttresses the preceding analysis, using as an example the correlation between productivity growth and increases in business investment in computer and communications technologies. It similarly notes the difficulty of teasing out the effects of a specific (and nascent) set of RFID-enabled activities on broad economic indicators, such as output or productivity growth. Like computers, RFID technologies may have their largest impact only after businesses have the opportunity to learn about the technology and rethink their process design using the information and capabilities made possible by RFID.

6.6. RFID technology and the jobs of tomorrow

It is currently impossible to find any authoritative studies on the employment effects, direct or indirect, of introducing RFID technology in retail trade. An extensive search of the Internet highlights only one research firm predicting the loss of 4 million jobs in the United States from the technology's deployment, [12] though it is not clear whether any economy-wide compensatory employment effects had been taken into account. The German retailer METRO Group has also acknowledged that the deployment of RFID

[11] Department of Commerce: *Radio frequency identification: Opportunities and challenges in implementation* (Washington, DC, Apr. 2005).

[12] A. Gonsalves: "Study: RFID saves money, displaces workers", in *EE Times* Online, at http://www.eetimes.com.

across the company's operations will "render thousands of jobs superfluous".[13] The company stressed, however, that while the effects might sound devastating from a labour perspective, the displaced workers could be shifted to customer service positions, benefiting both them and the company.

Recent technological developments had already transformed the main job role of the cashier, the most common job category in the sector. Push-button tills have given way to scanning of items and, more recently, handheld devices and "intelligent" labelling have allowed some retailers to consider replacing the traditional cashier-assisted checkout formats with self-checkout. While some technical problems remain, increased transaction growth can be expected with the new system over the next five years.

The United States Bureau of Labor Statistics predicts that employment in such retail industry functions as shipping, receiving, and traffic clerks is expected to grow more slowly than the average for all occupations through 2014 as a result of automation, as all but the smallest firms move to reduce labour costs. Large warehouses will be increasingly automated, with computerized conveyor systems, robots, computer-directed trucks, and automatic data storage and retrieval systems. Automation, coupled with the growing use of hand-held scanners and personal computers in shipping and receiving departments, is expected to raise productivity in shipping, receiving, and traffic clerking functions, affecting the work of staff in those jobs. In time, RFID technology will allow entire shopping carts to be instantaneously scanned, fully automating the checkout process and eliminating or radically transforming the cashier function. However, cost constraints mean that such automation is initially likely only at the largest supermarkets. Many other tasks, including stocking shelves or helping customers find a product, cannot be performed effectively by machines and will continue to require sufficient numbers of store staff. In addition, despite retail store "lean staffing" efforts, many customers continue to prefer personal service, and retailers find they have to increase its provision to enhance store loyalty.

Given the close similarity in retail store functions around the world, the above technological effects in the United States can be extrapolated to some extent to other advanced economies, appropriate account being taken of local conditions, traditions and legal requirements.

New retail technology, including RFID, is also expected to expand the potential of new forms of work organization for major retailers, with the overall impact being efficiency savings. For this to happen, employers and their staff will need to accept and become familiar with the need for corresponding changes. Among other consequences, retailers will want to constantly find ways to optimize staffing levels, building on the flexible working practices already widely used in the sector. IT-based applications will be applied to staff schedules to calibrate them with evolving consumer preferences, and technology will be harnessed more widely in internal communication, continuous training and in the effective planning of space utilization.

While current retail store operations focus mainly on checkout transactions, RFID-enabled applications are likely to open up greater options on how customer transactions might be completed, including that of minimal contact where the transaction at the end of the shopping trip is reduced to a credit or debit card swipe. Other retailers may, however, forgo the cost saving possible from such unassisted shopping, seeking, instead, the greater opportunity to be derived from using the final transaction process to reinforce the relationship with the customer. Customers may also prefer more personalized service,

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[13] "METRO plans large-scale use of RFID systems", in *Heise* Online, at http://www.heise.de.

including information on available products and advice on options regarding some of them. A likely impact for such retailers would be the need to ensure that their personnel have a high level of knowledge about the products sold, and train and promote those with the requisite basic communication skills and customer service orientation.

Another consequence of the expanded use of retail technology applications may be the need for retail workers to be more IT-literate. This opens up further opportunities for training, improved career prospects and enhanced skills portability.

6.7. Employment relations

The very ability of RFID technology to track and trace, that is so invaluable in managing products across the entire retail distribution chain, has also raised employment relations concerns. A number of trade unions have drawn attention to the less beneficial aspects of RFID workplace applications, including their use in tracking personnel movements and more ubiquitous worker surveillance. Unions point to such practices as embedding RFID chips in employees' uniforms as unacceptable invasions of individual privacy.

One labour analyst has highlighted the fact that their use in chip-embedded staff ID badges currently represents the most widespread workplace application. Although these badges are ostensibly designed solely to control access to premises, there is evidence that RFID data, once collected, can be used in some companies in other ways, including for disciplinary purposes. [14] A 2005 RAND Corporation study of six medium to large companies in the United States found that some employers were using the data to enforce rules governing employee conduct. None of the firms, however, had told their staff that data collected with access cards were being used for more than simply controlling entry locks. [15]

The extent of employers' right to undertake RFID-enabled surveillance of their workforce remains largely unclear, given that the technology is still nascent and little case law on the issue has been established. One commerce trade union from the United Kingdom, the GMB, has called on the European Commission to outlaw the use of RFID in conjunction with global positioning systems (GPS) to track workers in the workplace, as this violates the data protection and personnel privacy provisions of European law and regulations.

For RFID advocates, however, public concern with the technology is reminiscent of the short-lived anxiety when bar codes were first introduced. EPCglobal has signalled its readiness to engage stakeholders on such concerns through its public policy workgroup.

6.8. Technology and workforce adjustment

In a world of rapid change, including that accompanying the relentless introduction of new technologies, jobs and occupations become redundant far more quickly than ever before. Restructuring to adjust to increased competition, accelerating technological change and changing patterns of consumer demand increasingly require that advanced countries

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[14] A. Bibby: "Invasion of the privacy snatchers", at http://www.andrewbibby.com/misc/rfid.html.

[15] RAND Corporation: *RAND infrastructure, safety and environment research brief: Privacy in the workplace – Case studies on the use of radio frequency identification in access cards* (2005).

transform their economies from a focus on low-skill processes to those requiring technology-driven high-skill production with high value added.

Especially in commerce, a substantial proportion of workers displaced by these developments will, as a general rule, lack the basic skills necessary to find new jobs and will, in turn, remain unemployed much longer than those with the requisite skills. Active labour market policies geared towards promoting opportunity and employability through the provision of skills, and steps to promote workforce flexibility are urgently needed. Such policies should encompass assistance for those who lose jobs as a result of technological adjustment to find new jobs, including new positions made possible by the technological innovation itself. Governments, together with the social partners, need to develop and implement such policies as a matter of urgency if the new RFID applications are to be successfully implemented. The focus should be on designing education and skills policies and programmes that encourage investment in education and lifelong learning to equip people, including those in the retail industry, with the necessary tools to adapt to change and to new labour market requirements. [16]

6.9. Gender-specific considerations in RFID technology

As noted elsewhere in this report, commerce as a whole and retail trade in particular generally employ more women than any other sector in advanced economy countries. Indeed, on average, the proportion of women in commerce employment is frequently higher than for the economy as a whole. While the sector provides the flexibility, many women seek to balance work with family responsibilities, as well as often being the only industry not requiring higher level skills, women in retail employment also tend to be concentrated in low-skilled, part-time or temporary work that may be most affected by sectoral adjustment from the introduction of RFID technology.

The ILO places particular emphasis on the promotion of gender equality, with gender as a crosscutting theme in the Organization's work. A special effort has been made to promote the ratification and application of ILO standards addressing gender equality, more specifically the Equal Remuneration Convention, 1951 (No. 100), and the Discrimination (Employment and Occupation) Convention, 1958 (No. 111). A resolution adopted at the 92nd Session (2004) of the International Labour Conference reaffirms ILO interest in promoting gender equity, calling upon all governments and social partners to actively contribute to the elimination of all forms of discrimination in the labour market and to promote gender equality between men and women, as well as dismantling barriers which prevent women from obtaining economic autonomy through their labour market participation on an equal footing with men. [17]

The introduction of labour-saving technologies has traditionally affected women in commerce more than their male colleagues, particularly as the consequent work reorganization usually impacts on work functions with a high proportion of female employees. Paradoxically, lifelong learning programmes can also inadvertently increase inequality where opportunities are available only to those in a company's full-time jobs or

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[16] For a more detailed review of a variety of active labour market policies in both developed and developing countries, with some guidelines for their effective use, see P. Auer, Ü. Efendioğlu and J. Leschke: *Active labour market policies around the world: Coping with the consequences of globalization* (Geneva, ILO, 2004).

[17] Resolution concerning the promotion of gender equality, pay equity and maternity protection.

where fewer opportunities are extended to job areas where women are concentrated. While gender segregation as seen in the retail trade can also promote women's access to employment, it may equally inhibit their access to better job opportunities as it confines them to low quality employment. There is clearly a need for affirmative action initiatives so that women workers in retail can share in reskilling opportunities that might be designed to support company or industry-level programmes to adjust to the introduction of RFID technology. Fortunately, the social partners in commerce, as well as most public authorities, are increasingly conscious of the need to improve the career prospects of women at all levels of the industry, whether in low-skilled, part-time jobs or in supervisory positions, especially given the industry's dependency on women workers to ensure the flexibility required in lean retailing systems.

A general weakness in available official statistics is that they do not enable a more precise appreciation of the dynamics relating to the status in which women are employed in retail. Further investigation to clarify such a dynamic and its possible interaction with RFID deployment in the industry would be helpful. It would seek to highlight any gender-based retail trade sectoral labour segmentation, and identify any barriers to women entering or moving up the career path. Such an understanding would provide a much stronger base for developing policy recommendations on how technology might best be harnessed to promote gender equity in the industry.

6.10. RFID and occupational safety and health

As already noted elsewhere in this report, the industry consortium promoting the use of RFID in the retail distribution chain has itself commissioned a study that highlights, among other things, consumer health concerns related to the use of RFID technology. The ILO is not currently aware of any authoritative studies indicating occupational safety and health hazards related to the use of RFID and similar technologies in retail or any other industry.

However, another study prepared for the European Commission on the risk to health of the general public from the use of security and similar devices employing pulsed and continuous electromagnetic fields may be worth noting. [18] Although it focuses on the risks to the general public, it can reasonably be assumed that such risks would apply equally, if not even more, to workers exposed to them for even longer periods at their places of work. The study notes that electronic article surveillance (EAS), RFID and metal detector systems operate over a wide range of frequencies, using continuous wave or different pulse modalities. While individual systems now generally use single frequencies or narrow bands of frequencies, future applications may exploit combinations of different frequency bands used simultaneously. EAS systems are also likely to become ubiquitous in retail stores and, together with low-cost tagging of goods, will become standard pieces of equipment at store points of sale and checkouts.

After reviewing available epidemiological studies, the report points out that, because of lack of data, no clear-cut conclusions can be drawn, especially at the low frequencies involved. By contrast, it cites several dozen incident reports suggesting that certain types of electrically powered active medical devices, worn by people who are ambulatory and may pass through security systems, can be disrupted by these systems' emissions. There were also several hundred records of interference of medical devices with security systems. The reported cases of electromagnetic interference with certain critical medical devices

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[18] International Commission on Non-Ionizing Radiation Protection: *Possible health risks to the general public from the use of security and similar devices* (2002).

remained a concern. Collection of exposure data on RFID systems is recommended, so that when such technical information becomes available during the development of a new product or application, a health hazard assessment could be undertaken to identify likely problems in complying with exposure guidelines. Awareness of the magnitude of the likely exposure of people as a result of the envisaged use of a system needs to be an integral part of the technology's development process.

7. Social dialogue

7.1. Introduction

Tripartism and social dialogue is one of the founding principles of the ILO, and strengthening it is one of the Organization's four strategic objectives. Social dialogue at the national level is considered an important component of good governance in many countries. Tripartite social dialogue in economic and social policy-making has a fundamental role to play in furthering democracy, social justice and a productive and competitive economy. The association of all three parties concerned in the design and implementation of economic and social policies facilitates consensus building with a balance between the demands of economic development and social cohesion. It also provides the best possible scenario for the effective and sustainable implementation of the policies concerned, minimizing the risk of industrial and social conflict. [1]

However, the viability and effectiveness of social dialogue are contingent upon a social, economic and political climate conducive to this process and upon the existence of independent and strong social partners willing to cooperate. The basic enabling conditions for social dialogue include, at a minimum, freedom of association and the right to bargain collectively, as stipulated in the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87), and the Right to Organise and Collective Bargaining Convention, 1949 (No. 98). Freedom of association is a multifaceted concept, which includes:

■ the right of workers and employers to form and join organizations of their own choosing, and to do so without prior authorization;

■ the free functioning of those organizations;

■ the right to elect representatives in full freedom;

■ the right of organizations to organize their internal administration;

■ the right of organizations freely to organize their activities and to formulate their programmes;

■ the right to strike;

■ the right to form federations and confederations and affiliate to international organizations of workers and employers;

■ protection against anti-union discrimination;

■ protection against acts of interference; and

■ the right to bargain collectively.

Where full respect for freedom of association is absent, the social dialogue process will lack legitimacy, and is hence unsustainable. If, for example, workers and employers

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[1] This and some of the following paragraphs are excerpted from J. Ishikawa: *Key features of national social dialogue: A social dialogue resource book* (Geneva, ILO, 2003).

are not able to choose their organizations freely, the organizations involved in the social dialogue process cannot truly be representative; or if there is inadequate protection against anti-union discrimination, frank and transparent consultations or negotiations will not be possible. The legitimacy of the social partners is critical to effective social dialogue. Employers' and workers' organizations need to be representative and reflect the interests of their members. Decision-making should also be transparent. Patterns of representation in social dialogue processes, i.e. whether they are tripartite or bipartite, depend on the issues that need to be addressed. Issues relating to wider economic and social policy, labour and industrial relations may be covered by tripartite or bipartite dialogue (the former bringing together representatives of government, employers and workers, and the latter involving only employers' and workers' representatives).

Change, whether it arises from the introduction of new technologies or from other factors, is always a source of great uncertainty, tension and potential conflict, and the profound transformation likely to be brought about by the introduction of RFID in retailing can be expected to be far-reaching indeed. These changes are certain to have serious consequences for the rules and practices which regulate relations between employers and workers, including collective bargaining and, more generally, social dialogue, which has a long history in the sector. There are two reasons for the optimistic view that the social partners will be able to effectively utilize social dialogue-based design solutions to any employment problems arising from the introduction of RFID: the long period required for the technology's introduction and, paradoxically, the high staff turnover in the industry.

More than in any other sector, the commerce social partners recognize that there is a direct link between customer and employee satisfaction: a happy employee usually makes for a happier customer, and customer service is indeed a fundamental differentiator across the industry. Broken customer service promises are unlikely to be tolerated by consumers.

There is, thus, convergence in the social partners' views on the importance of social dialogue for the management of technological change in ways that safeguard harmonious labour-management relations by ensuring a proper balance between enterprise and worker interests and outcomes that are acceptable to both.

Social dialogue on technology-related change in commerce has a long history in the ILO. The conclusions of the tripartite meeting held to review productivity and employment in commerce and offices recognized, for instance, that structural and technological change, among other factors, heightened the need for training and retraining to meet the needs of both employees and management. [2] They also noted that increased competition and the accelerating pace of change resulting from globalization and structural and technological change made productivity improvement a necessity rather than a choice; and that the health of enterprises, economic growth, and job security and employment creation could not be sustained without ongoing productivity gains. The conclusions, adopted unanimously, remain relevant to the debate regarding the social and labour implications of RFID. They recommended, among other things, that productivity improvements be pursued through information, employee involvement, consultation where required, and collective bargaining with workers' organizations where they exist, better management practices, the use of appropriate new technology, effective investment in human resource development and relevant structured training.

Another more recent ILO meeting on commerce addressed similar issues, including: the need to promote a positive approach to skills and training; maintaining of harmonious

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[2] ILO: *Final report*, Tripartite Meeting on Productivity and Employment in Commerce and Offices, Geneva, 19-25 October 1994, document GB.262/STM/5.

labour-management relations and enterprise competitiveness in the context of technological change; the timing of information and consultations between the social partners on such change; the primary role of social dialogue in this process; and the role of the public authorities in ensuring harmonious industrial relations in the process of technological and structural change. [3] Participants noted that the application of advanced technologies both in the distribution chain and the store networks helped retailers to increase their productivity and improve the quality of consumer services, making retailing more competitive and, at the same time, better able to offer good jobs and career opportunities to a large number of workers with different levels of education, training and qualifications. The conclusions of the seminar enjoined governments, and employers' and workers' organizations to use social dialogue to ensure workers' employability through skills enhancement, lifelong learning and active labour market policies to support adjustment to the introduction of the new technologies. They called, among other things, for retraining to be accessible to all and properly aligned to labour market requirements.

With regard to technology's effects on labour-management relations and enterprise competitiveness, there was unanimous agreement that the social partners had a common interest in ensuring the success of their company, including in the context of structural change. In the absence of meaningful consultation or transparent dialogue, problems could arise, as employee anxiety and insecurity could seriously erode labour-management relations.

7.2. The trade union view

Commerce sector trade unions are generally receptive to the introduction of RFID applications in the industry. The global union federation in the commerce sector, Union Network International (UNI), considers that technology can be useful. The whole distribution chain is on the threshold of a big technological leap with the use of RFID; the increased automation and efficiency it promises is of major concern, as it is certain to cost many jobs. Technology could, however, add to enterprise and sector competitiveness and profitability, providing a basis for unions to push for improvements in wages and conditions.

Workers and their unions are interested in serious social dialogue with companies at the forefront of RFID technology introduction to discuss and agree on transparent and controlled transitions, avoidance of lay-offs, deskilling and de-qualification, and to ensure that the productivity and economic benefits of the technology are not dumped solely into price competition.

UNI reports preliminary discussions on RFID with initial positive responses from employers. Unions believe it is in the mutual interest of the social partners to avoid anxiety about the social and employment effects of RFID deployment on commerce workers, and this can only be achieved through social dialogue and agreement between employers and unions.

7.3. The industry view

Most retailers and other industry groups accept that it is essential to create a suitable framework that serves to understand and successfully implement RFID, because no

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[3] Conclusions of the ILO Regional Seminar on Social Dialogue on Structural and Technological Change in Asian Retailing, Bangkok, November-December 2005.

technology can be implemented effectively without social acceptance in general and that of its users in particular. The executive overseeing the METRO Group Future Store Initiative points out that full replacement of the bar code with the newer technology will not be completed for at least 15 more years. [4] This provides public authorities and the social partners with sufficient time to examine all the ramifications of the technology and to agree and design measures to ensure that its benefits far outweigh any possible negative impacts.

Box 7.1. The METRO Group Future Store Initiative and social dialogue on RFID

The *METRO Group*, which now utilizes RFID technology at 22 locations and has 39 partners in the consumer goods industry attaching RFID transponders to pallets destined for the retailer, is among the technology's pioneers in the retailing industry. It reports considerable acceleration of incoming and outgoing goods processes through use of the technology.

The company emphasizes its efforts to prepare its workforce for RFID implementation, involving individual employees and Works Council members from affected stores, outlets and warehouses. All employees from the retail brands and cross-divisional companies concerned with the technology's implementation had undergone comprehensive training, and personnel were kept abreast of RFID developments via the company Intranet and the staff newspaper. In addition to informing its Works Councils prior to RFID implementation, the company maintains an ongoing dialogue with German trade unions on the issue, giving them guided tours of the future store or making presentations on changes in workplace conditions. Such activities have included members of the German service union ver.di and UNI-Europa. Because RFID introduction alters demands on employees, with the elimination of routine warehousing tasks, staff resources can be shifted to higher value added tasks, including customer advisory services. Staff support measures for the transition include training and career development.

Source: METRO Group Future Store Initiative.

7.4.   A social dialogue agenda for RFID in retail trade

The current period of turbulent markets, deregulation and the extensive introduction of new retail technologies has added to the need for training and reskilling. Businesses increasingly accept training and consultation as part of their social dialogue strategies, aware that today's turbulent business environments require a workforce that is adaptive, flexible and responsive. They also recognize the need for mechanisms to achieve the consensus and commitment that shape shared corporate goals.

In this context, the issues for discussion in the sectoral social dialogue on the introduction of RFID in retail could include: enterprise needs for RFID technology and its employment effects; measures to address job impacts; skills and training for employability; maintaining harmonious labour-management relations; and worker privacy concerns.

While the majority of economists, as we have seen, tend to believe that the long-run benefits of technological innovation generally outweigh their potential costs, the perception that technological change reduces employment at the enterprise, sectoral or locational levels can – justifiably – raise resistance from workers likely to be affected. It is therefore good practice to:

■   initiate an extensive dialogue with workers on the nature of change and its expected implications long before such change is implemented;

■   examine with workers the retraining and re-education strategies that could be adopted to minimize job loss; and

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[4] J. Blau: "RFID on all goods 15 years off, says retail giant", in *InfoWorld*, at www.infoworld.com.

■ where training cannot be provided, ensure that mechanisms are in place to avoid income loss as far as possible.

Retraining plays a critical role in gaining workers' acceptance of the introduction of new technologies. This often entails moving from manual to more numerical or verbal tasks – competencies that can be acquired by most personnel. Documented practice in banking [5] and manufacturing [6] demonstrates that with extensive social dialogue and appropriate training, enterprises and workers can achieve win-win outcomes with improved productivity, increased customer satisfaction and enhanced working conditions. Such retraining, frequently, has little to do with computer literacy as such, but more with verbal and numerical skills.

Public authorities at the national, regional or local level can provide extremely useful support by making training facilities available and assisting enterprises in the deployment of staff. Joint efforts by employers' and workers' organizations, public authorities and social security and training institutions would simplify the introduction of RFID technology before it happens. It would also be very useful to prepare a reclassification schedule identifying new competency requirements and, together with interested parties, developing the necessary job profiles and training needs.

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[5] D.H. Autor; F. Levy; R.J. Murnane: *Upstairs, downstairs: Computer-skill complementarity and computer-labor substitution on two floors of a large bank*, NEBER Working Paper No. 7890 (Sep. 2000).

[6] R.M. Fernandez: "Skill-based technological change and wage inequality: Evidence from a plant retooling", in *American Journal of Sociology*, Vol. 107, No. 2, Sep. 2001.

Suggested points for discussion

The following list of points is suggested as a framework for discussion. Participants are, of course, free to amend the list as they deem appropriate.

1. Which factors are central in driving technological and structural change in the retail industry? How are these processes affecting the levels and quality of employment, including their impact on gender, forms of employment and working conditions? Given the context of unceasing change, what are the core opportunities and challenges for human resource management?

2. What elements must be integrated in a Decent Work Agenda for an evolving retail sector?

3. How could active labour market policies combining sufficient enterprise flexibility and worker security or employability be utilized to facilitate the introduction of radio frequency identification (RFID) technology in retail trade for the benefit of both workers and employers?

4. On what basis can workers and their organizations work together with management to support new technological innovations in retail trade? What mutual commitments are possible?

5. What forms of industrial relations can best contribute to long-term productivity enhancement within retailing firms? What role can social dialogue play in safeguarding harmonious labour-management relations with RFID deployment and ubiquitous computing systems; and what should its structure and core agenda be?

6. What role should governments, employers' and workers' and their organizations play to ensure continuous training and ongoing skill acquisition in the context of fundamental restructuring and the introduction of advanced retail technologies?

7. What future activities should the ILO undertake concerning advanced retail technologies and their impact on social and labour issues?