1.   Introduction: surf's up

Surfers and logistics professionals have much in common. Both want to catch the next 'great wave'. Surfers watch the sea surface for the next great wave that has the capacity to erode the shoreline and disturb the seabed. Logisticians track and trace social and business trends, and technological advancements that may turn into the next great wave with potential to erode prevailing bedrock business strategies. Often surfers and logisticians are frustrated when the expected wave peters out long before it gathers the requisite energy and momentum to be classified as 'great'.

Since the 1950s four 'great' waves have coursed through logistics: physical distribution management, business logistics, supply chain management and global logistics. Scanning the business horizon suggests that a fifth great wave — Consumer Logistics — is already gathering sufficient momentum, strength and magnitude that will turn the business world upside down and carry a reconfigured logistics system through this decade and maybe beyond. This observation raises the issue of how the forces contributing towards building this new great wave amass their strength.

Three marked forces are recognized as contributing to the onset of the fifth great wave of Consumer Logistics. First, there is the changed pattern of consumption in the digital era with the lowering of search costs and faster price discovery; second, there is the movement beyond the self-service economy to expand the role of consumers in their relations with business; and third, there is the coalescence of both business and consumers, and consumers with consumers that gives rise to Consumer Logistics. Each of these forces is examined in turn to identify the associated disruptive digital business trends underpinning Consumer Logistics that have arisen in the progressive switch from a corporate-centric to a crowd-centric economic system (Davis, 2016). Their combined impact suggests that the time is ripe for a study that explores past logistics waves and changes in logistics practices flowing from the disruptive digital trends.

CONSUMING IN THE DIGITAL ERA

Digitization is rewriting the scripts for consumerism. The 'plug and play' nature of the digital artefact has revolutionized interactions not only between people but also between people and physical objects. Businesses have capitalized upon the prowess of digital technologies to promote goods and services to consumers, and improve operational performance. Also consumers have leveraged the effectiveness of digitization to search for goods, compare prices, check out substitute brands and models, and locate bargains. What has resulted is a new generation of shrewd consumers who have been empowered to extract value for money. Strangely, the cost of transportation, or the price for delivering the product, is no longer a major concern in the purchasing journey.

Consider an advertisement from eBay shown in Figure 1.1. The price of a pair of men's sport shoes is advertised in Australia for A$7.19. The postage is A$14.99, more than twice the price of the shoes. A random survey of 50 persons, from ages 18 to 40, reveals that 19 of them (mostly below 30 years of age) said they would certainly buy the shoes from the vendor, if they were in need of a pair, and would not 'worry about' the delivery charges being more than twice the price of the shoes. Their reason: '*Those shoes are good. You cannot get to buy them at that price anywhere in Australia*'. Were the respondents not aware that they would, in fact, be paying over A$22 to own the pair of shoes, not to mention they would also have to bear the cost of the return freight charges (see small print circled), should they need to return the shoes?

Of course, should the purchasers return the pair of shoes for reasons acceptable by law, as outlined in Figure 1.2, they will not get a refund for the delivery charges of A$14.99. Yet, the 19 respondents, who thought positively of the purchase deal, were not the least concerned. A common answer: '*that is part of the online purchase package*'.
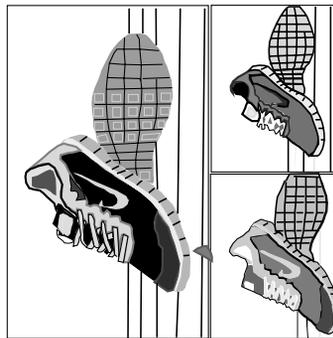
The same 50 respondents were asked whether they ever consider that the price of their purchase has included the cost of transportation when they buy a pair of shoes at a retail shoe outlet. The majority of the answers were a resounding '*no*'. The explanation from two respondents went to the extent of saying '*the retail price at the shop is strictly that of the shoes; transport is an expected part of the service*'. These two respondents countered with a question: '*Isn't it the responsibility of retailers to bring the shoes to their shops to sell to customers?*' They added that '*prices at the shops already have a huge mark-up. That should cover the transport costs.*'

This vignette illustrates that, from the perspective of some young consumers at least, logistics is an expected service in traditional bricks-and-mortar retailing. Transport and handling costs should not form part of

Source: Shot captured on 17 October 2015, 10.30pm Australian Eastern Time.

Figure 1.1   eBay advertisement (part reproduction of a screen shot)

3

Description | Postage and payments

Report Item

Seller assumes all responsibility for this listing

Postage and handling

Item location:北京China

Posting to worldwide

Quantity 1   Change country Australia

Postcode [   ] [Get rates]

Postage and handling	To	Service	Delivery
AU $14.95	Australia	Item must be returned within	Estimated between Tue 3 Nov and Mon 16 Nov

Estimated delivery dates include seller's handling time, origin ZIP Code, destination ZIP Code and time of acceptance and will depend on shipping service selected and receipt of demand payment. Delivery times may vary, especially during peak periods.

Domestic handling time

Will usually post within 1 business day of receiving cleared payment

Return policy

Item must be returned within	Postcode	Refund will be given as
30 days after the buyer receives it		Money Back

The buyer is responsible for return postage costs

Refunds by law in Australia, consumers have a legal right to obtain a refund from a business for goods purchased if the goods are faulty, not fit for purpose, or don't match description. More information at returns

Payment details

Payment method   Preferred/Accepted

PayPal   Accepted

[BANK ACCOUNT] [○○] [VISA]

Figure 1.2   Postage and payment terms of an eBay advertisement

the purchase price; it should be a hidden service cost. In online retailing, made possible by the advent of the Internet and enhanced by mobile technology, logistics is recognized as an essential cost element with a rightful place in a transaction. In fact, a prospective purchaser of the advertised shoes could end up paying almost A$30 for having completed the online purchase but found the shoes 'not suitable' after delivery and had to return the merchandise for a refund within the 30-day time limit. In this scenario, the prospective purchaser would have ended up spending A$30 for having completed an online purchase and yet did not own the pair of shoes. Such an out-of-pocket experience would not have happened in the conventional bricks-and-mortar transaction. Of course, that scenario is not likely, as one of the respondents quipped: '*the shoes are so cheap; you wouldn't want to spend another A$15 returning them even though they may be unsuitable. You can sell them through eBay!*'

Though the proportion of respondents willing to pay more than double the price of the shoes for transport charges is in the minority, the recognition of transport charges as a separate cost component in online purchasing is a significant departure from the popular contention that the price of the shoes paid for in conventional bricks-and-mortar retailing would have included the transport cost from the manufacturer to the retailer.

The vignette described here is not an isolated incident of the increasing craze for online bargains. This preference for online shopping has been on the increase in recent years. Worldwide, online sales grew 16.5 per cent between 2012 and 2015, from US$1,058 trillion to US$1,700 trillion (Statista, 2016a). In the United States e-commerce sales as a percentage of total retail sales soared from 4.1 per cent in the first quarter of 2010 to 10 per cent in the second quarter of 2016 (Statista, 2016b). In Australia, the share of online sales went from 4.9 per cent of traditional retail spending (A$10.5 billion) in 2011 to 6.9 per cent (A$16.6 billion) by January 2015 (NAB, 2012, 2015).

With the change in perception towards the payment of transport cost in e-commerce, the continual rise of online and mobile retailing is heralding a new dawn in freight transport logistics. More significantly, perhaps, some consumers are accepting the idea that the cost of transport could be higher than the cost of the item purchased. As one of the respondents rationalized: '*In online shopping, we know exactly what we are paying for. All cost items are transparent. We can compare and pay for the cost of transport if we know the goods we are buying is value for money.*' Logistics has come alive. Place, as an element in the famous 4Ps in marketing, has taken centre stage ahead of Product, Price and Promotion.

Consumption in the digital age has separated the price of the product from that of its associated logistics service (Figure 1.3). Logistics as a service has gained recognition. Consumers view logistics costs as a distinct
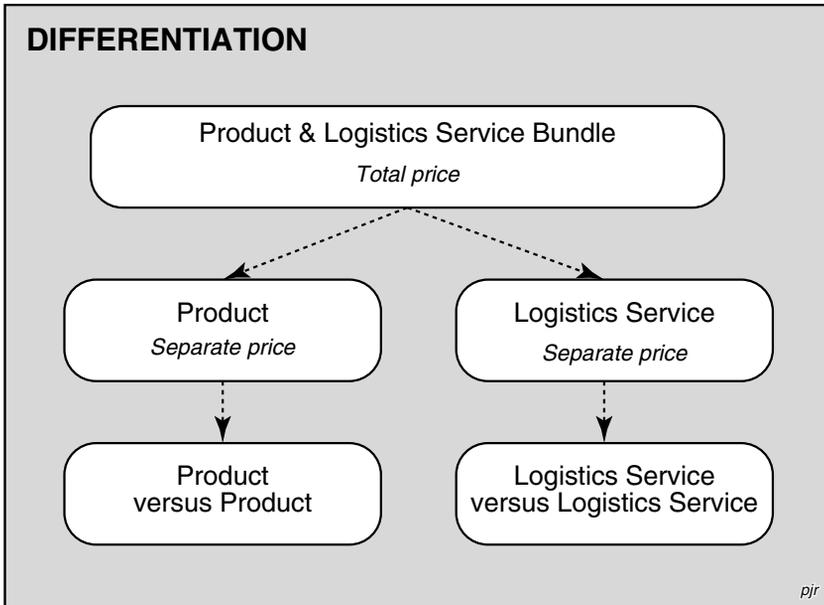
DIFFERENTIATION

Product & Logistics Service Bundle
Total price

Product
Separate price

Logistics Service
Separate price

Product
versus Product

Logistics Service
versus Logistics Service

pjr

*Figure 1.3   Differentiation between production and logistics service
components*

cost component in the purchase equation. More significantly, they have
come to accept that the logistics cost could be greater than the cost of the
product, suggesting that logistics does command a value, which could be
above that of the product.

RISING ABOVE THE SELF-SERVICE ECONOMY

Digitization is also redefining the relationships between businesses and
consumers. With the capability of creating near-perfect transparency,
digital technologies have empowered consumers to compare prices, product
quality and service provisions globally with no more than a few clicks or
finger swipes. Equally, digital technologies have also lessened the burden of
businesses by enabling them to enlist the (often free) services of consum-
ers to perform part of the conventional business services themselves, thus
accentuating the significance of the self-service economy. Online retailing,
online banking, self-airline check-in, and e-government are but some of
the many business activities that have taken on an expanded self-service
dimension with the rising popularity of e-commerce. In fact, digital tech-

nologies have enabled companies to create not only self-service options but also customer-to-customer service possibilities through social networking, exemplified by online feedback and experiential comments on social media, at each phase of the customer purchase journey.

In France, for instance, Jacques Bughin (2014) has reported that Free, a start-up company relying only on websites, blogs, and social media to publicize its offerings, was enjoying 80 per cent 'brand conversion'; this is against an industry average of 44 per cent for website visitors who take action beyond a casual view of content. The Free Company nurtured opinion-leaders or 'alpha fans', using them to interact with the rest of the customer base online via blogs, social networks, and other channels. The support it managed to amass through its alpha fans has created a large and active digital community of 'brand fans' and advocates, creating a positive buzz that spread like wildfire across the digital world. Despite its token expenditure on traditional marketing, the Free Company succeeded in achieving unexpectedly high levels of customer satisfaction by building digital-communication platforms where customers routinely assist each other. Mobile Vikings, another digital company in the telecommunications sector, also applied the same strategy — blogs and social media — and achieved a brand conversion rate of 70 per cent in an industry chalking up an average of 52 per cent in the Benelux countries.

Outside the telecommunications industry, Jacques Bughin (2014) also cited the *Financial Times* and *The New York Times* as having capitalized on digital interactions among readers to advantage, creating public awareness of their digital products. Despite declining print circulation and advertising revenues, both newspapers have managed to boost their digital subscription revenues considerably.

Examples of how firms leverage on consumers to market their products and services abound. Even small local restaurants have joined the bandwagon, capitalizing on the close-knit communities of social media to promote their names and brands. Third-party websites, which aggregate information across vendors to offer consumers a comparative view of prices and service offerings in one location, are also using consumers to provide feedback on vendors, raising their e-commerce value in the process.

Thanks to digital technologies, businesses have further extended the idea of involving consumers at large to help with tasks typically done by either their employees or contractors — a process termed 'crowdsourcing'; that is, outsourcing to an online community or a crowd through an open call (Howe, 2006). Crowdsourcing, in this sense, is not only a cheaper form of getting a job done quicker, but also an effective means of ensuring higher quality outputs. For instance, *Business Week* reported that L'Oréal, a cosmetics firm, challenged viewers of Current TV, a cable television producer that relies on its audience to contribute to most of its programme

content, to develop an advertising message for a new brand of eye shadow (Hempel, 2006). The winner obtained a prize of US$1,000, compared to an estimated US$164,200 in fees that the firm might have paid for such a service. L'Oréal, of course, is not alone in this game of crowdsourcing. Increasingly firms have been turning to consumers to generate creative ideas at a fraction of the normal business cost. The long, and mounting, list of crowdsourcing projects depicted in Wikipedia (2016) is testimony to the growing popularity of such a practice among businesses.

As a concept, crowdsourcing is not new. Back in the 1960s and 1970s firms had already used competitions to entice consumers to create memorable slogans that best describe their products or services. While the winner or winners would get a hefty money prize, the firm would use the selected slogan for future advertisements or promotional campaigns. Likewise, manufacturers have, for decades, resorted to soliciting new product ideas and refinement of existing models from end-users (Von Hippel, 1988, 2006; Whitla, 2009). Suppliers have also tasked their salespersons with soliciting feedback from customers to inform subsequent product development processes.

The current proliferation of crowdsourcing as a business practice was made possible by the democratization of the Internet and the development of Web 2.0 technologies. The advent of Web 2.0 technologies has empowered Internet users to move from passive content viewing to an interactive experience where they can share their creations on free distribution channels, collaborate and engage in discussions with other users (Whitla, 2009; Belahsen, 2015). Due to their significant influence, Internet users have affected businesses and other social phenomena through their content uploading and sharing of information.
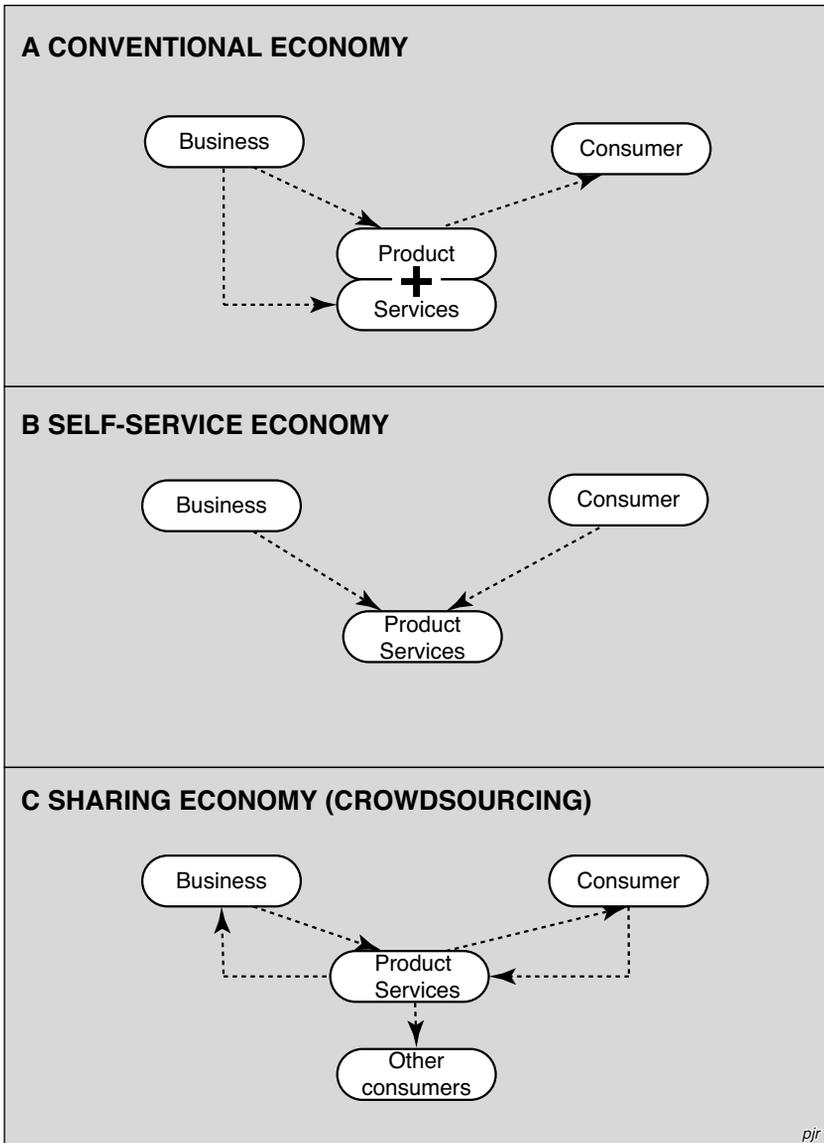
As early as 2006 *Time* magazine named 'YOU', the crowd or community of Internet users, as the person(s) of the year for 2006. Then in January 2007, *Advertising Age* also nominated 'the Consumer' as its 'Agency of the Year' (Creamer, 2007). Although the Editor's rationale was that consumers have become 'the most effective creators and distributors of commercial content', there was little attempt to address their variability (Bloom, 2007). To what extent were the consumers able-bodied, technologically savvy, with access to technology, poor, rural or remote, educated, well informed, cashed up, acquisitive, desiring instant gratification, or trustworthy, especially in sharing value with others? Was the new technology better able to cater for diversity of consumers and their changing needs in any location?

These cultural, demographic and psychological attributes of consumers came to the fore once crowdsourcing moved from its initial use in computing-related activities, such as writing several lines of software code or debugging a program, online crowdsourcing, or persuading the public to provide content. Crowdsourcing has been applied to a wide variety of

tasks, including submitting real-time eyewitness videos to television chan-
nels, and uploading how-to videos onto YouTube to educate the public.
In the context of logistics and supply chain management, the concept of
crowdsourcing has, however, not been exploited as extensively as in market-
ing, advertising or the news media. Uber Technologies Inc., an on-demand
taxi service that allows consumers to request private drivers through smart-
phones and Android devices, has also unleashed a dedicated, on-demand
courier service, UberRUSH, based on the crowdsourcing concept similar
to that deployed by its big brother Uber Taxi. Businesses, big and small, as
well as consumers can call on the services of UberRUSH, to pick up and
deliver urgent items. Just like the case of Uber Taxi, the public can sign up
to obtain a pick-up and delivery service or become couriers themselves.
With the explosive growth of digital technologies, it may not be too long
before the concept of crowdsourcing makes deep inroads into warehous-
ing, freight distribution and other supply chain operations.

Digitization has brought the consumers-at-large into the pick-up and
delivery equation in last-mile deliveries. It is changing the configuration of
conventional supply chain operations, dismantling the dominance of the
consumer-to-business (C2B) model for bricks-and-mortar shopping and
the business-to-consumer (B2C) plus consumer-to-consumer (C2C) model
for e-commerce. With the aid of digitization, UberRUSH and its competi-
tors have used the concept of crowdsourcing to develop a sharing economy.
A person registered with UberRUSH (i.e. the UberRUSH courier) would
pick up the item from the supplier and deliver it to the customer (C2B2C).
The terms of the last-mile delivery equation have thus been extended to
become (C2B) + (B2C) + (C2C) + (C2B2C). The conventional product-
service bundles provided by businesses have been split: businesses only
provide the product while the consumers undertake either a self-pick-up or
shared delivery service in the last-mile supply chain (Figure 1.4).

Operationally, the rise of the sharing economy has taken away the control
over the last-mile delivery from logistics service providers. Technologically,
this wave of change has been underpinned by the shift from Web 2.0 that
connects people to Web 3.0 (Internet of Things) that connects information
by interpreting the activity's context (DHL, 2014). Not only has this shift
expanded the power of consumers to interact with web contacts, but it has
also allowed the exchange of information between physical objects without
human intervention. The fundamental issue is not how these changes will
affect logistics operations but how logistics service providers and consum-
ers can collaborate to take advantage of the Internet of Things to enhance
supply chain operations, especially last-mile deliveries. As businesses coa-
lesce with consumers, and consumers with consumers, this gives rise to
Consumer Logistics, the prime focus of this study.

A CONVENTIONAL ECONOMY

Business   Consumer

Product
+
Services

B SELF-SERVICE ECONOMY

Business   Consumer

Product
Services

C SHARING ECONOMY (CROWDSOURCING)

Business   Consumer

Product
Services

Other
consumers

pjr

Note: Crowdsourcing and the coalescence of business and consumer activities are the key
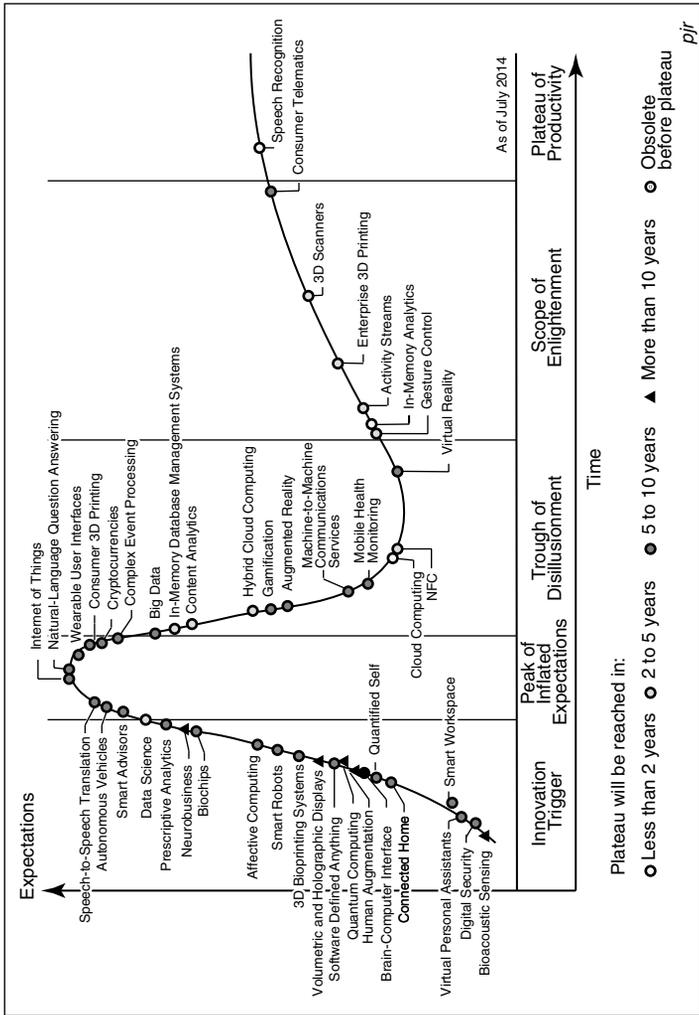attributes of the sharing economy.

*Figure 1.4   Stages in the shift from the conventional economy through the
self-service economy to a sharing economy*

THE WAVE OF CHANGE

The disruptive impacts digital technology has had on supply chain and logistics management are yet to be fully appreciated (Figure 1.5). In 2014 Gartner Inc., an American information technology, research and advisory company, judged the most-hyped technology from some 2,000 candidates to be the Internet of Things (IoT) — the name given by the International Telecommunications Union (ITU, 2005) to the next generation Internet brought about by 'the networked connection of physical objects' (DHL, 2015a: 3). It is no surprise that Gartner, Inc. (2014a) picked the Internet of Things and its metamorphosis into the Internet of Everything (IoE) or Web 3.0 as the next technology frontrunner. With Web 3.0, physical objects or 'things' at large will be able to collect and exchange data without human intervention, offering mobile, virtual, and instantaneous connectivity. The Internet of Things, therefore, promises more evolutionary changes, opening more horizons of possibilities. Everything, big and small, in our lives will become 'smart'. That might sound a little far-fetched, but the Internet of Things is already here. *Forbes* brought together '17 of the most mind-boggling Internet of Things numbers and stats that prove that the phenomenon is here and here to stay' (Marr, 2015: 1). Among them, the list indicates that 'by 2020, a quarter of a billion vehicles will be connected to the Internet, giving us completely new possibilities for in-vehicle services and automated driving'. Further, machine-to-machine (M2M) connections are slated to increase by more than fivefold from 5 billion in 2015 to 27 billion by 2024.
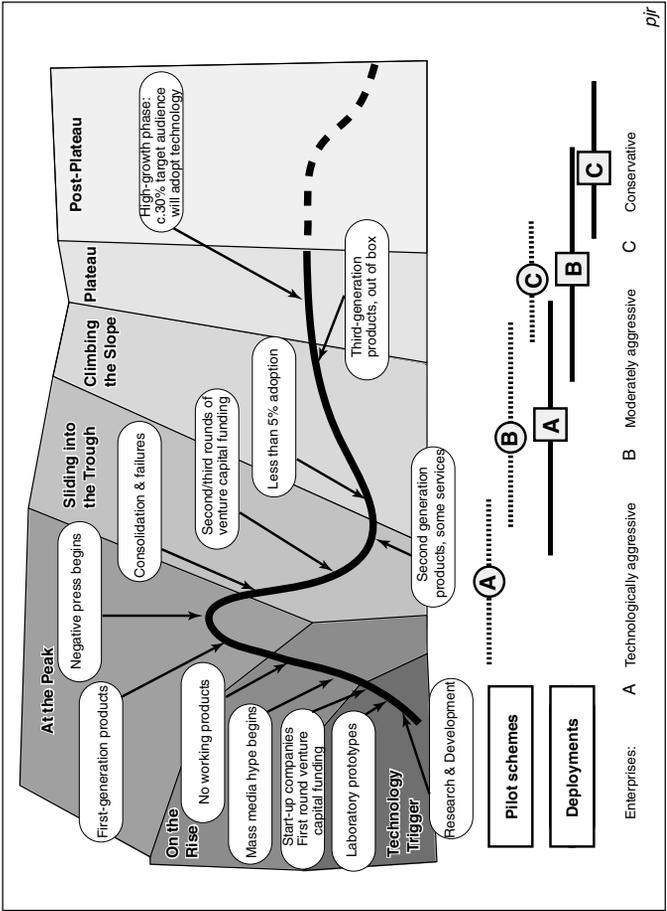
Gartner associate, Jackie Fenn (2014), contended that a typical technology has a 30-year Hype Cycle, beginning with the introduction of a prototype that provides the initial technological trigger (Figure 1.6). Should the innovation gain increasing visibility, it will reach 'the peak of inflated expectations', when its ability to resolve critical issues will be touted by the media. Negative press coverage from first-generation products will precipitate the product's slide into the 'trough of disillusionment'. A slower recovery based upon a second-generation or subsequent product development will see the technology begin to mature and climb the 'slope of enlightenment'. Finally the product will reach the 'plateau of productivity' where at least 30 per cent of the technology's audience has adopted it or is planning to do so (McLellan, 2014).

Big Data, which covers datasets too complex for traditional data processing applications to handle, was about to enter the 'trough of disillusionment'. Cloud Computing, which uses a network of remote servers to store, manage and process data rather than on a local server or personal computer, was seen to be near the bottom of the trough. Enterprise 3D

Source: © Gartner, Inc., 2014.

Figure 1.5   Gartner's Hype Cycle, 2014

Post-Plateau

High-growth phase: c.30% target audience will adopt technology

Plateau

Climbing the Slope

Sliding into the Trough

Consolidation & failures

Second/third rounds of venture capital funding

Less than 5% adoption

Third-generation products, out of box

At the Peak

Negative press begins

First-generation products

On the Rise

No working products

Mass media hype begins

Start-up companies First round venture capital funding

Laboratory prototypes

Technology Trigger

Research & Development

Second generation products, some services

pjr

Pilot schemes

Deployments

Enterprises: A   Technologically aggressive   B   Moderately aggressive   C   Conservative

A   Technologically aggressive   B   Moderately aggressive   C   Conservative

Note: The diagram also shows the timelines for pilot schemes (circles) and deployments (squares).

Source: Adapted from Fenn, 2014, © Gartner, Inc.

Figure 1.6   Typical market events occurring during different phases of Gartner's Hype Cycle

Printing, first patented by Charles Hull in 1984 to build simple polymer objects, was considered to have reached the 'scope of enlightenment'.

Not all of the emerging 'hot' technologies canvassed since the cycle's inception in 1995 have succeeded in reaching the 'plateau of productivity'. Some are incorporated in other categories or divided into sub-categories. Others can be stuck in a particular phase, or become obsolete before completing the cycle due to poor performance, weak consumer acceptance, inadequate process infrastructure or meagre returns on investment. Also technological progress never follows an even path but exhibits sudden jumps between two phases of little perceptible change (Le Hong and Fenn, 2015). Identifying the technologies that are likely to persist and propel the next great wave of change in logistics needs further investigation.

Further insights on some of the more disruptive technologies in terms of their potential impact, and relevance, for logistics practices in the coming years can be gleaned from the work of Wolfgang Kersten and others (2014), the McKinsey Global Institute (Manyika et al., 2013a; Dörner and Edelman, 2015) and DHL's *Logistics Trend Radar 2016* (DHL, 2016).

Wolfgang Kersten and others (2014) have identified 16 long-term (mega) trends likely to impinge upon the global logistics system, of which seven are considered as technological drivers (Table 1.1). They placed 'new technologies' on top of the list, incorporating both the Global Positioning System (GPS) and Radio Frequency Identification (RFID) together with

Table 1.1   Megatrends and technological drivers affecting the logistics industry

| Megatrends	Technological drivers
1. Globalization/networked economy	10. New technologies (including GPS, RFID and IT)
2. Customer expectations/ individualization	11. Electric and alternative energy-vehicles
3. Cost pressure	12. 3D Printing
4. Container traffic	13. RFID – Radio Frequency Identification
5. Demographic change/aging society	14. IT-Integration
6. Talent shortfall	15. Transparency in supply chains
7. Sustainability	16. E-business/Online Shopping
8. Reverse logistics	
9. Compliance	

Source: Based on Kersten et al., 2014: 16–22.

the integration of information technology (IT). Some of these items were also repeated among the next six technological drivers likely to impact upon logistics. They included: electric vehicles and alternative energy vehicles; 3D Printing; Radio Frequency Identification focused on logistics and supply-chain management; the integration of information technology; transparency in supply chains; and e-business using the application of information and communications technology to support activities within a business, including online retailing.

The McKinsey Global Institute also put forward 12 potential technologies likely to have a massive impact upon the business or social landscape by 2025 and disrupt the status quo (Manyika et al., 2013b). This study ranked the Mobile Internet in first position, followed, in order, by the automation of knowledge work, the Internet of Things, cloud technology, advanced robotics, autonomous and near-autonomous vehicles, next-generation genomics, energy storage, 3D Printing, advanced materials, advanced oil and gas energy recovery, and renewable energy.

DHL's *Logistics Trend Radar 2016* also gauged social, business and technology trends in terms of their disruptive potential, impact, and relevance within or beyond a five-year timeline (DHL, 2016). The trend radar, shown in Figure 1.7, identifies nine social and business trends, and six technological trends of relevance within the next five years. Five social and business trends, and another six technological trends are considered of relevance in more than five years.

Among trends attributable to advancement in digital technologies, Omnichannel Retailing, the Internet of Things and 3D Printing stand out as having the most eminent, and already visible, impact on logistics practices. Omnichannel Retailing grew out of the Mobile Internet and Cloud Computing. 3D Printing, or additive manufacturing, has been hailed as the third industrial revolution. Already Omnichannel Retailing has altered the supply chain configuration of many branded products from a conventional linear structure to a network system by offering consumers a seamless shopping experience across online and offline channels (DHL, 2015b). The Internet of Things has its roots in Radio Frequency Identification (Evans, 2011), a technology that has become an integral part of high-performing logistics operations. 3D Printing makes it possible to produce three-dimensional solid objects economically in small quantities, more flexibly and with very low labour input by printing layers of material based on two-dimensional digital blueprints. With the potential for moving jobs back from emerging economies to developed countries, 3D Printing threatens to reverse the growing demand for global logistics, altering the patterns of international trade (*The Economist*, 2012a; Markillie, 2012).

Social & Business Trends | Technology Trends
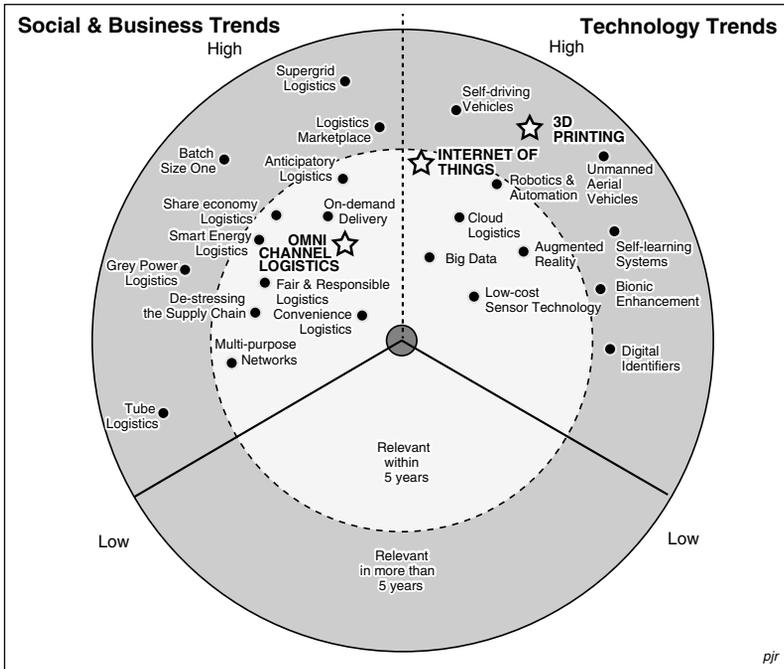
Note: The radar shows the positioning of social and business trends, and technology trends. A star marks the positions of Omnichannel Logistics, the Internet of Things and 3D Printing. Note the positioning of Big Data and Cloud Logistics among the technology trends, and the sensitivity of the logistics service provider to the variable nature of the consumer exemplified by grey power logistics.

Source: Based on © Deutsche Post DHL Group, 2016.

Figure 1.7   DHL's Logistics Trend Radar, 2016

Collectively the three selected disruptive trends provide the underpinnings of the next great wave in logistics (Figure 1.8). This new wave is consumer-centric. Omnichannel Retailing provides consumers with an array of delivery choices; the Internet of Things supplies them with data to make informed decisions; and 3D Printing allows them to print their own products anywhere, including at home. By empowering consumers to take control of their purchase journey, from product research to price search to stipulating location for product delivery or collection, not to mention their ability to print their own goods at home, consumers are now forming their supply chains individually. This is the dawn of the fifth wave — the coming of 'Consumer Logistics'.
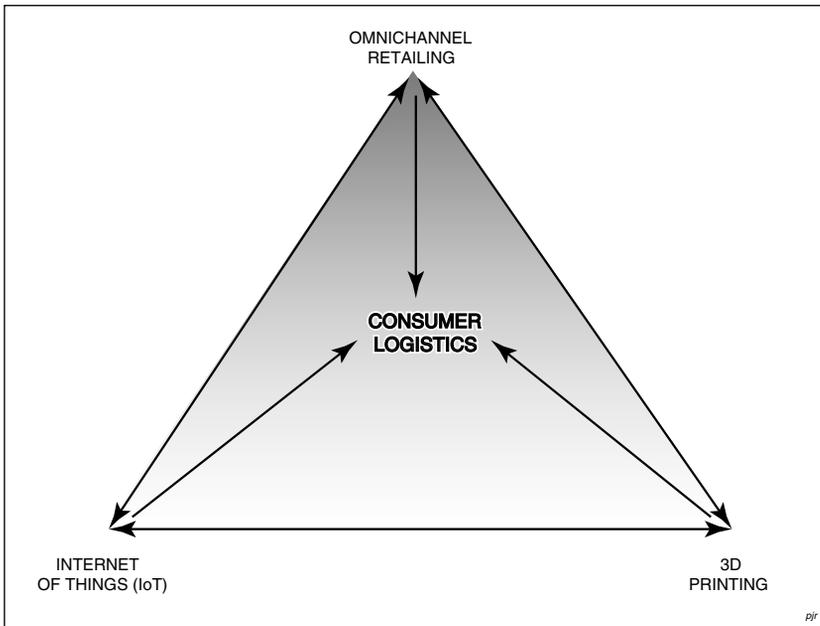
Figure 1.8   The three key elements contributing to the development of Consumer Logistics: Omnichannel Retailing, the Internet of Things and 3D Printing

TIME FOR A BOOK ON 'CONSUMER LOGISTICS'

These disruptive digital trends are already coursing through the global logistics landscape. As the wave of Consumer Logistics gathers momentum, strength and magnitude, it is likely to become as relentless and cumulative as its ocean counterpart. Not only will the great wave turn the business world upside-down but it will also propel a reconfigured logistics system through the next decade. The time is thus ripe for a book that focuses upon the drivers, operations, implications and transformations created by the great wave of Consumer Logistics.

The structure of this book is embedded in the study's overarching framework that continues the close analogy of logistics with surfing (Figure 1.9). Similarities to the ocean's pressure, breaking wave, swash and backwash, and the effects of these activities upon the seabed can be readily identified within the great waves that have surged through logistics and revolutionized business practices. The remaining task is to show how each of the
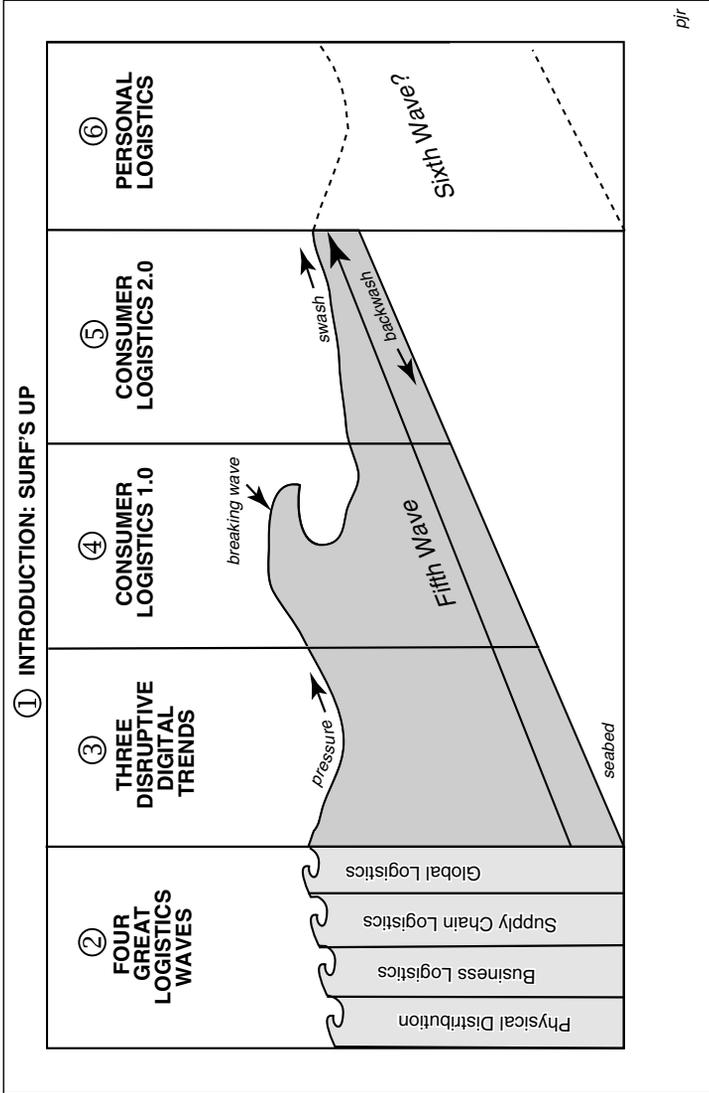
Note: The numbers refer to the individual chapters.

Figure 1.9 *The book's structure*

elements within the framework contributes to the study's overall structure by focusing upon the key messages and implications of each chapter.

Chapter 1 has already outlined this book's outer framework by highlighting that logistics has emerged as a distinct cost component in the consumer purchase equation and the cost of delivery could be greater than the cost of the product. It also points out that digitization has redefined the relationships between businesses and consumers. Coupled with the breakneck pace of advancement in digital technologies, the chapter asserts that a new great logistics wave — Consumer Logistics — has emerged on the horizon. Two issues are raised: what is this new wave? And what have been the previous great waves that have surged through the logistics landscape?

Chapter 2 revisits previous great logistics waves, recounting their evolution and distinctive characteristics. Through a historical overview of how logistics has evolved since the 1950s, this chapter reveals the nature of these receding waves. A descriptive review identifies the distinctive characteristics of each of the four great waves of physical distribution management, business logistics, supply chain management and global logistics to show how one great wave receded and another surged, and how the transformation took place. This is undertaken by tracking the shift in focus from a firm's logistics department through logistics within the firm and the firm's entire supply chain network to encompassing the firm's activities that stretch across national borders. Comprehending these past waves provides a springboard for extrapolating how global logistics might be reconfigured by the emerging fifth wave, raising the question: what is driving this next wave? This issue is addressed over the next four chapters (Figure 1.10).

Chapter 3 discusses the most logistically disruptive technological trends that will support the fifth great wave in logistics, their key drivers — Omnichannel Retailing, the Internet of Things and 3D Printing — and their distinctive characteristics. Each digital trend is successively appraised to gauge its likely effect upon social life, business and the world economy before assessing how each will affect both production and consumption, and the global logistics system and multinational supply chains at the local, regional and global level. Omnichannel Retailing emphasizes the importance of the 'speed of now' in transitioning from a multichannel retailing environment. The Internet of Things is broadened to include Cloud Technology and Big Data Analytics to stretch consideration to the Internet of Everything. Also a distinction is made between Consumer and Manufacturing (Additive) 3D Printing. While corroborative evidence is provided to show businesses have been busy initiating or contemplating new moves to deal with each of the three disruptive digital trends, researchers have yet to corral all three disruptive trends within a single study. Consequently, the trends and forces driving Consumer Logistics
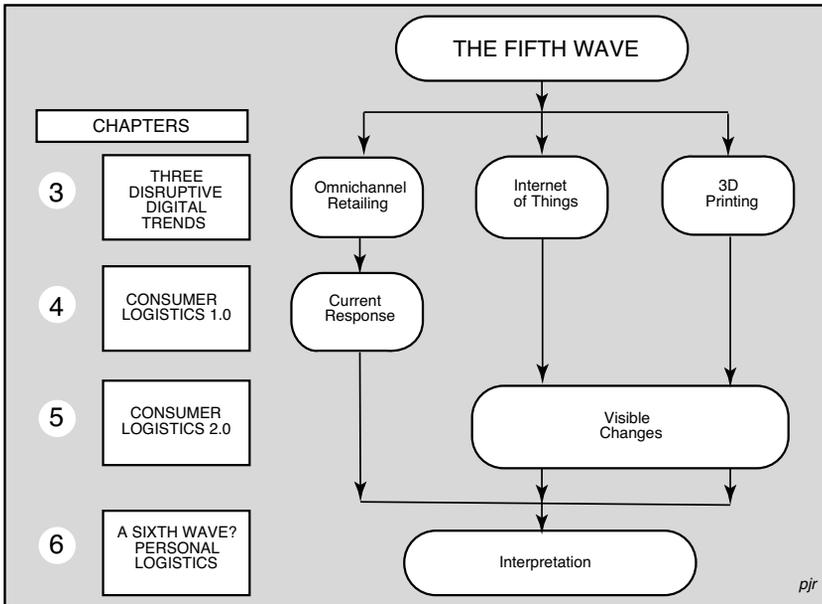
Consumer logistics

Figure 1.10   Discussion of the fifth logistics wave

are detailed, the concept defined, its distinctive features outlined and evidence provided of its onset. In discussing how Omnichannel Retailing, the Internet of Things and 3D Printing interact, overlap and support each other to move and amplify the next wave of Consumer Logistics, the analysis is split into two sections: (1) Consumer Logistics 1.0, which has gained prominence following the rise of Omnichannel Retailing and the response of logistics service providers; and (2) Consumer Logistics 2.0, which is based upon how the visible changes brought about by the Internet of Things and 3D Printing have affected and could be influencing logistics and supply chain operations.

Chapter 4 — the book's 'engine room' — tracks the rise of Consumer Logistics 1.0 brought about by digitization, concentrating upon the business and social trend of Omnichannel Retailing. This task involves following the shift from the business-to-consumer (B2C) through business-to-business-to-consumer (B2B2C) to the proliferation of an array of extensions and permutations of business–consumer interactions (e.g. B2B2C2B, B2C2C2C and B2C2B2C2B). As this process is rooted in the self-service economy, there is a need to reinstate its culture and technology exemplified in vending machines, the supermarket and the sushi train, before tracing its recent amplification in airline check-in and bag drop, and parcel

collection from postboxes. Drawing upon and illustrating the notion of 'consumer ubiquity', and exploring business and consumer partnerships, particularly those reflecting the possibilities offered by Uber Technologies Inc., enable progress from a self-service economy to a sharing economy to be mapped. Extrapolating from the experience of Uber, greater consumer involvement in freight logistics raises both regulatory and institutional issues, and questions about risk and reliability, quality control and social acceptance. Nevertheless, the prospect of capitalizing upon the contributions that consumers-at-large could make to last-mile deliveries through 'uberization' is being considered by major logistics service providers as a means of responding to the 'speed of now' brought about by the rise of Omnichannel Retailing. As these contributions by consumers-at-large also allow the entry of both start-ups by asset-light virtual companies and retail operators into the options game connecting the *right consumer* at the *right place* and the *right time*, the competitive edge of the logistics service providers could be reduced. In turn, these developments to accommodate Omnichannel Retailing could remake the High Street and change the faces of supermarkets and convenience stores. Although the proposition that Consumer Logistics 1.0 will have a greater impact than the global logistics wave might appear implausible at first sight, the sheer numbers of consumers that 'check, click and collect' could ensure this development.

Chapter 5 discusses how the fifth wave might evolve into Consumer Logistics 2.0. This process involves progressing from the sole focus upon Omnichannel Retailing to incorporating the fast-moving technological trends of the Internet of Things and 3D Printing into the calculus to show the penetrating effect of these innovations on logistics operations. These ingredients are combined into a conceptual framework that demonstrates how Consumer Logistics 2.0 works and revolutionizes logistics operations. The conceptual framework reveals how multinational supply chains may be splintered into local, sub-regional and regional chains, before discussing the special functions of both innovative and non-innovative production, and the roles of mobile technology and logistics service providers. The key characteristics of Consumer Logistics are distilled from this analysis to highlight the paramount importance of technological availability in anticipating changes in consumer demand. Their combined impact is discussed by contrasting a series of Global Logistics versus Consumer Logistics 2.0 regimes: logistics service providers versus logistics service facilitators; city logistics versus logistics cities; economic regions versus smart cities; low-cost production centres versus home-based production; and the global hub-and-spoke system versus the network hierarchy. These contrasts highlight the need for research to continually monitor and evaluate the progress of the fifth logistics wave.

Chapter 6 recognizes that Chapters 3, 4 and 5 have examined the fifth great logistics wave's composition, trajectory, implications and transformation to highlight the distinctiveness of Consumer Logistics 1.0 and 2.0 from the earlier logistics waves. The examination has demonstrated how the fifth great logistics wave has been predicated upon an ability to harness the power of the consumer. This contribution to logistics practice needs to be matched by an input questioning: what do the current and forthcoming visible changes mean from a theoretical perspective? The input centres on how suppliers could push products to consumers with the aid of Big Data Analytics, which enable businesses to synchronize product delivery based on an anticipated purchasing pattern of individual consumers, creating what has been referred to as 'automatic shopping'. In this light, logistics operations can act as a change agent on consumer behaviour, bringing forth the contention that logistics is no longer a derived demand but also a driver of demand. This involves making a case for the social shaping of logistics and discussing how technologies, logistics and social behaviour coalesce by drawing upon the tenets of structuration theory (Giddens, 1984). As technology and social behaviour converge to redefine business structures, this book recognizes the possibility that the fifth great logistics wave of Consumer Logistics could soon be overridden. Should the 'consumerization' of logistics and the supply chain turn into the 'personalization' of logistics and the supply chain, the rise of a sixth wave, buoyed by the advent of 'automatic shopping', would be a real possibility, raising the prospect of retailers regaining control over the last mile of supply chain deliveries from consumers.