

**SWP 20/98 CUSTOMER SUPPORT DISTRIBUTION
CHANNELS:
FIVE EXPLORATORY CASE STUDIES**

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CUSTOMER SUPPORT DISTRIBUTION CHANNELS: FIVE EXPLORATORY CASE STUDIES

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ABSTRACT

Customer support, such as equipment maintenance and repair, is an essential element in the successful marketing of a wide range of products, from computer systems to domestic appliances. Consequently, companies need to establish and maintain appropriate channels for high-quality customer support; either as part of their own operations or through third parties. This paper describes research investigating five manufacturing businesses and the distribution channels they use to ensure that their customers receive the necessary support to enable them to obtain maximum value from their products. The results illustrate the key role that customer support plays in various industries and identifies the respective advantages and limitations of different distribution channels. The results have implications for managers in all industries where customer support is important, as it provides insights on how different channels affect the quality and efficiency of customer support.

INTRODUCTION

Customers for many types of manufactured products, ranging from high-technology computer systems to domestic appliances, require customer support i.e. assistance to help them obtain maximum value from their purchases. Consequently, manufacturers need to ensure that appropriate customer support is available for their products including:- installation; documentation; maintenance and repair services (generally termed *service*); user training; telephone support; and equipment upgrading. An important aspect of customer support is the distribution channel; including whether companies have their own customer support organisations, or whether their products are supported by third parties [Armistead and Clark, 1992].

Customer support, which is also referred to as *product support* or *after-sales service*, is important for manufacturers because it:

- Can be a major source of revenue [Berg and Loeb, 1990][Goffin, 1998][Hull and Cox, 1994], although it often receives too little management attention [Knecht et al, 1993]
- Is essential for achieving customer satisfaction—as identified by a number of researchers [Lele and Sheth, 1987][Lele and Sheth, 1988][Davidow, 1986][Teresko, 1994][Cespedes, 1995][Armistead and Clark, 1992][Athaide, Meyers, and Wilemon, 1996].
- Can provide a competitive advantage [Armistead and Clark, 1992][Goffin, 1998][Davidow, 1986][Hull and Cox, 1994]. This is true in most high-tech industries [Lawless, and Fisher, 1990][Meldrum, 1995][Goffin, 1994] but also in low-tech sectors [Moriarty, and Kosnik, 1989]

- Plays a role in increasing the success rate of new products [Cooper and Kleinschmidt, 1993];

Despite its importance, support is a neglected area on which too little has been published [Hull and Cox, 1994]. However, “increasingly, after-sales customer service is... being recognised as an important research priority” [Loomba, 1996]. This article reviews the previous literature and describes case study research in five different companies which had two main objectives:

- To investigate the nature of customer support in different industries and its importance in achieving customer satisfaction
- To examine the distribution channels used for customer support.

The results show that customer support is important in each of the five markets investigated—telecommunications, automobiles, vending machines, aircraft and domestic appliances. They also illustrate that different types of distribution channel used for customer support. The research has implications for managers in any industry where support plays a significant role. Due to the importance of the area, further investigations are necessary and suitable approaches are recommended.

SEVEN ELEMENTS OF CUSTOMER SUPPORT

From the literature, seven main elements of after-sales support can be identified over the working lifetime of products. These are: installation; user training; documentation; maintenance and repair; on-line support; warranty; and upgrades. The main characteristics of these elements are:-

- *Installation.* For many products, the first element of product support following the sale is installation. For more complex products (e.g. computer systems), or where safety issues are involved (e.g. medical devices) this is usually performed by personnel from the manufacturing company, or their representatives. Increasingly, where product design allows it, customers themselves will install their purchases and manufacturers face the challenge of making this easy for, often, non-technically minded customers. A good example of the importance of easy installation is that IBM realised in 1990 that their personal computer (PC) customers placed a strong emphasis on being able to unpack their purchases and have them running quickly. This led to products with pre-installed software and which consequently could be unpacked, assembled, switched-on and in use within five minutes [Haug, 1990]. Ease-of-installation can also be an important consideration in sectors such as networking products [Taylor, 1995], or computer systems [Cespedes, 1995].
- *User Training.* The complexity of some types of equipment necessitates that manufacturers provide good training for users. For example, hospital staff need to be well-trained in the use of critical care devices [Cespedes, 1995][Goffin, 1998] and the successful implementation of process innovations, such as new manufacturing equipment, depends on extensive training being given over a long period [Athaide et al, 1996]. Many computer-based products include functions which help users learn to use them more efficiently; these can range from simple *Help* functions, to full training packages as offered by manufacturers such as IBM [Bauer et al, 1992]. However, training costs can still be very high—business users have to invest significant amounts of money in training their employees in efficient use of personal computers [Taylor, 1995]. For simpler products, training is not necessary and details of product operation are usually given in user documentation.

- *Documentation.* Most products have some form of documentation and in industries such as medical electronics it plays a key role [Goffin and Price, 1996]. Typical forms of documentation cover equipment operation; installation; and maintenance and repair [ibid]. Good documentation can lead to lower support costs and increased productivity [Miskie, 1989], however, the documentation for many products is poorly written and too hard to understand [ibid] [Anonymous, 1997]. New technology is being applied to documentation and, for example, CD-ROMs are making car servicing more efficient [Fisher et al, 1991].
- *Maintenance and Repair.* Historically, maintenance and repair has been an important element of product support which has required companies to invest significant resources. For example, an estimated 500,000 car mechanics are employed in the USA [Mandel, 1995]. If equipment fails, fast and efficient repair is essential in many markets because “down-time costs run typically at anywhere from 100 to 10,000 times the price of spare parts or service” [Knecht et al, 1993]. In markets where product failure has strong implications—for example computer systems for financial institutions—companies need to offer either equipment which is very reliable (or even *never fails*), or a *rapid response* to expedite repairs [Lele and Karmarkar, 1983]. One way to achieve a fast response is to provide customers with *loaner* equipment in the event of breakdowns, where this is feasible [Loomba, 1996]. Another strategy for maintenance and repair is to design *disposable* products; the approach used by some companies for watches, torches and other products. Where repair costs do not exceed a significant percentage of product replacement costs, having *repairable* products is the best strategy for companies [Lele and Karmarkar, 1983]. For repairable products, it makes sense for companies to develop good *diagnostics*—efficient means to test for problems and identify the causes [Karmarkar, and Kubat, 1987]. In order to repair faulty equipment, companies need to have efficient management of *spares*, the parts which will be used as replacements. Some companies have focused strongly on this area, to gain an advantage over their competitors [Lele and Sheth, 1987]. However, where products are becoming cheaper and more reliable, as is the case with PCs, service is becoming less viable [Mandel, 1995].

Maintenance, also referred to as *preventive maintenance*, is undertaken to clean, refurbish or replace parts of equipment which otherwise would be liable to fail. Mechanical parts, for example, normally require regular maintenance as in the case of cars. In the computer sector, where fewer mechanical parts are involved, *remote support* technology enables computers to be “updated... diagnosed and repaired” by linking them to manufacturers’ support centres via telephone lines [Bauer et al, 1992]. Similar approaches are being used by the US earth-moving company Caterpillar to monitor equipment remotely and enable maintenance to be performed before faults occur [Fites, 1996].

- *On-Line Support.* Telephone advice on products is a major element of customer support in many industries. Product experts give on-line consulting to customers to help them use products more efficiently or, sometimes to trace the cause of faults (*troubleshooting*). Whenever problems can be solved over the telephone, costs are much lower than an engineer having to visit the customer site. On-line support is particularly strongly utilised for software products (*software support*) [Armistead and Clark, 1992]. For example companies such as Microsoft have invested significant resources in telephone centres [Dubashi, 1992] and support costs are typically 6% of revenues in the software industry [Blaisdel, 1990]. Many software

products can now be remotely configured, so that they more exactly match customer requirements—for example, Microsoft's Windows 95 product has this capability [Taylor, 1995].

- *Warranty.* Manufacturers of most products offer warranty and, in some markets such as automobiles, manufacturers may try to gain a competitive advantage by offering longer warranty periods. Warranty reduces the financial risk of owning products and therefore it is an important element of customer support [Loomba, 1996] [Lele and Sheth, 1987]. Over the lifetime of a product, support costs may be greater than the initial purchase price. In the computer sector these costs are referred to as *cost-of-ownership* and “the costs of buying and operating computer hardware for the office are rather like an iceberg - most of them are hidden” [Taylor, 1995]. Consequently, as products become more complex and support costs increase, customers are demanding more economical and effective support [Loomba, 1996]. To reduce the risk of expensive repairs, many manufacturers offer customers the possibility to purchase *extended warranty*. However in the domestic appliance sector, manufacturers have been accused of charging excessively for this cover [Lodge, 1998].
- *Upgrades.* Offering customers the chance to enhance the performance of existing products can be an important aspect of support [Cespedes, 1995] [Davidow, 1986]. It is a particularly common practice by computer manufacturers because upgrades increase the working lifetimes of products and can be a significant source of revenue. Original equipment manufacturers have a competitive advantage in this business because they normally have records of where equipment has been sold [Knecht et al, 1993].

Over the last fifteen years a change in the scope of support and in the recognition of its importance can be identified from the literature. In the early 1980s, when many products had high failure rates, the most important aspect of support was fast and reliable repair [Lele and Karmarker, 1983]. However, due to the influence of new technologies, which have led to more reliable but often more complex products (with many software-based functions), the scope of support has broadened and now includes a greater emphasis on elements such as user training and on-line support [Goffin, 1998]. This change in scope is reflected in the greater use of the term *customer support*, as opposed to *customer service* which was the more commonly used term in the past [Clark, 1988]. As the importance of customer support has become more widely recognised, companies are now taking a more professional approach to it than they did in the past [Knecht et al, 1993].

Distribution Channels

Manufacturing companies may have their own—direct—organisation for customer support, or they may use alternatives. As “the demand for service support... has steadily increased in recent years”, the distribution channel used has become more important [Loomba, 1996]. A review of the trade and popular management press confirmed the importance of good distribution channels (see for example [Blumberg, 1989][Blumberg, 1994][Cagan, 1994][Fites, 1996][Gasparovic, 1989] or [Renn, 1990]). Despite this importance, there has only been sparse attention to this area from researchers and Table I shows that only four pieces of previous research have collected empirical data on customer support distribution channels.

Little et al [1988] surveyed a sample of high-technology companies' practices in spare parts management. Although the importance of the organisation used for customer support is acknowledged, Little et al did not consider the influence of different distribution channels and concentrated solely on spare parts movement.

Armistead and Clark's book [1992] is based on the results of survey research and discusses customer support distribution channels. It identifies that more complex products necessitate the use of highly-skilled customer support engineers and that manufacturers may wish to exert a high degree of "in-house" control over customer support. For example, it is an advantage for manufacturers to control customer support directly for critical new products, so that they can react quickly in the event of problems and avoid customer dissatisfaction. Later in the product life cycle, the use of third parties may be preferable, in order to reduce costs. Armistead and Clark also identify a number of limitations of particular distribution channels for support, for example the high costs of a direct channel of highly-skilled engineers and the comparative lack of control resulting from indirect channels.

Table I: Previous Empirical research on Customer Support Distribution Channels (Chronological order)

	Article	Publication	Industry(s)	Methodology	Key Points
1.	Little et al, 1988	Journal article	High-technology sectors	Survey of UK companies' spare parts distribution programmes	<ul style="list-style-type: none"> • The goal of field service is to maximise the availability of spare parts and engineer utilisation, whilst minimising costs. • The movement of spares is an important aspect of field service.
2.	Armistead and Clark, 1992	Book	Electronics, computing, automotive and mechanical products	Book is based on surveys of UK manufacturers	<ul style="list-style-type: none"> • Two critical factors in the choice of distribution channel for customer support are the complexity of products and the degree of "in-house" control required by manufacturers.
3.	Hull and Cox, 1994	Journal article	Electronics and computing	In-depth case studies. Purposive sample of six "leading" US companies.	<ul style="list-style-type: none"> • Strong focus on customer support by all case companies • Customer support provided directly by all case companies. • Information and spare parts management play key roles in customer support organisations.
4.	Loomba, 1996	Journal article	Computing	Case studies on purposive sample of two different US computer firms	<ul style="list-style-type: none"> • The choice of the support distribution channel is strongly associated with the product sales channel. • Three research proposals are developed (see text)

Hull and Cox [1994] made case studies of six US electronics and computing companies, concluding that "overall, the six companies are dedicated to customer service". All companies in this study had their own, direct, customer support organisation. However, the placement of this organisation within the company hierarchy varied, in some cases it was part of marketing, in others a separate

organisation. As all companies in the sample used the direct channel, Hull and Cox's study provides no information on the role of other channels for customer support, although it does provide six examples of where the direct channel has been successfully used (and demonstrates the importance of good information and parts management in the direct channel).

In a study focusing solely on support distribution channels, Loomba [1996] states that there are five main channels:-

- Direct support from the factory
- A direct after-sales network
- Channel intermediaries
- Authorised, independent third parties
- Some combination of the above possibilities

Using case study technique at two US computer companies, Loomba shows that the choice of customer support distribution channel is closely linked to the sales channel. The limitation of this study is that it only investigated two companies, both of which are in the computer industry. However, Loomba still derives three research propositions from his limited data:

P1: Manufacturers which operate in centralised (decentralised) product distribution environments, will opt for centralised (decentralised) after-sales service support channel structures. Conversely, manufacturers, that operate in centralised (decentralised) after-sales service channel environments, will opt for centralised (decentralised) product distribution channel structures.

P2: Manufacturers operating in "high substitutability" environments (as in the case of "commodity" products) will choose decentralised (indirect) channel structures for distributing products and providing after-sales service support.

P3: Manufacturers operating in "low substitutability" environments (as in the case of "specialty" products) will choose centralised (direct) channel structures for distributing products and providing after-sales service support.

Obviously, these propositions need testing in sectors other than the computer industry.

The review of the literature shows that previous research on customer support is very limited and has focused on high-technology sectors such as computing and electronics. The recognition that other sectors need to be studied was the motivation for the current study.

THE RESEARCH

The current study investigated the distribution channels used for customer support by companies in five different industries. To conduct this exploratory research, case study methodology was chosen as an appropriate approach and the research was designed in three main stages:

- 1) *Preliminary contact.* Companies were contacted by letter and their agreement to participate in the research obtained. At this point telephone calls were made to the customer support managers to understand the distribution channels used and identify the most suitable informants at each company.
- 2) *Case study visits.* One-day visits were made to the companies to conduct semi-structured interviews with the customer support manager and other informants, such as marketing and quality managers. During these visits the researcher also had the opportunity to see companies' products; either on a factory tour or a visit to a company's product showroom.

- 3) *Data analysis and post-visit contact.* After each visit, data collation and reduction was conducted and, following the completion of all five visits, cross-case analysis was performed. There was also a high degree of involvement of the participating companies during this stage, in checking the data and discussing the results with the researcher.

Case Study Visits

The main data collection was performed during visits to the companies. These were made over a period of seven months in 1997-98. During each visit, semi-structured interviews were held with a range of informants. Holding on-site interviews at companies with personnel from various departments—typically customer support, marketing, quality, and development—allowed a comprehensive picture of the role of customer support within the company to be obtained.

The interviews at each company were based on a questionnaire designed to collect information related to each of the following research questions:

- 1) What are the characteristics of typical products?
- 2) What is the role and importance of customer support in the market?
- 3) What are the key elements of customer support?
- 4) Which distribution channel(s) is (are) used for customer support and what are its advantages and limitations?

The 11 page questionnaire was based on the instruments developed by researchers who have previously investigated customer support; primarily the work of Knecht et al [1993]; Loomba [1996]; Goffin [1990]; and Hull and Cox [1994]. (The questionnaire also covered a number of additional issues which have been reported elsewhere [Goffin and New, 1998].)

Interviews were recorded (and later transcribed) and at the same time detailed notes were taken. Interview transcripts were prepared and footnotes added to explain any specific terms used by the respondents. In addition to direct discussions, a number of telephone interviews were held with personnel who were not available during the on-site visits but interviewees had recommended the researcher to contact.

A number of company documents were also inspected during the visits. These included company brochures and annual reports (for background information); product brochures (to understand product features and to see whether customer support was used as a marketing tool); financial statements (to investigate support revenues); and organisation charts (to see where customer support fitted in the overall company organisation). Companies were willing to give the researcher copies of most of these documents but, in the case of financial statements and (sometimes) organisation charts, they only allowed inspection. After each visit a detailed case file was prepared containing the transcripts, interview notes and copies of documents.

Sample

Five industries were selected as an exploratory sample for the research. As the computer industry has been the focus of most previous research (see Table I), it was decided to investigate customer support in a range of other industry sectors. Telecommunications, the car industry, vending machines, aircraft and domestic appliances were chosen—a purposive choice of industries. The choice was driven by the need to cover a variety of case study contexts and therefore a deliberately wide range of sectors (including both consumer and business-to-business products) and technologies (from electronics to mechanical devices) was covered. Once the industries

had been chosen, “leading” companies were identified—companies having a significant market share in their industry. All of the sample companies have operations in Europe.

As a motivation to participate in the research, companies were promised, anonymity and an informal “benchmarking report”, contrasting their approach to customer support to that of the other companies. This offer was well-received and only one company declined to co-operate with the research (forcing the selection of another company). The companies were also invited to a one-day workshop where the results of the research were presented and each company had a chance to discuss customer support issues with the other participating companies.

Data Analysis

Case analysis involved three main stages.

- Each case was reviewed separately and the data analysed to give a complete picture of the company’s approach to evaluating support at the design stage. To check the internal validity of the data, triangulation was used; between different respondents and between respondents’ comments and documentation.
- Data reduction was performed and 2-3 page case descriptions were written on each company. A number of main headings were used including: *Product Characteristics*; *Key Elements of Customer Support*; *Importance of Customer Support*; and *Support Delivery Channel*. The descriptions were then submitted to informants for two reasons. Firstly, informants checked that the case descriptions did not contain obvious clues to their company’s identity or information that was likely to compromise their business. (One company asked for the job title of one informant to be changed in the description because it was very specific to their company and commonly known within their industry. Another company asked for their disguised name to be slightly modified. For one company, at the researcher’s suggestion, certain market details were modified which ensure anonymity without detracting from the aims of the research.) Secondly, informants checked the detail given in the case description—and a number of small corrections were made.
- Following this, cross-case comparisons were made, to determine where similarities and differences existed and to identify a number of “best practices” [Yin, 1994]. As the results of the cross-case analysis were presented to participating companies during the workshop mentioned above, this allowed the conclusions on support distribution channels to be discussed with the informants.

RESULTS: FIVE CASE STUDIES

The data from each company will be described separately, before a cross-case analysis is given. As the companies were promised anonymity, they will be referred to as *TelecommA*, *AutoB*, *VendorC*, *AircoD* and *DomesticE*. Table II (page 21) summarises company backgrounds and key findings. Data from each case has been collated under the same four headings, to make comparisons easier.

Case 1: TelecommA

TelecommA is a leading European company in the field of telecommunications equipment which designs, integrates and supports complex systems used in logistics applications, such as radio contact and control of fleets of vehicles.

- *Product Characteristics*. Each system sold has a unique configuration of devices such as PCs, sensing and radio equipment, with specialised software monitoring and controlling the resulting network. Systems are sold for approximately \$1M and

customers—normally large companies or organisations—use them for up to 20 years before replacement.

- *Key Elements of Customer Support.* Systems are complex and are installed by TelecommA engineers with a typical installation taking 9 working days. Users require training and this takes one day following installation. Once the equipment is in use, TelecommA “spend very little time on training, we do try to pass that on to the customer. We might train the trainers, if anything. We often try to do that during installation” [TelecommA—Development Manager]. All systems are sold with a 12 months hardware warranty and 3 months software warranty, which is standard in this industry. Hardware is very reliable and failure rates are typically only 1%. System documentation is produced by R&D engineers and has, in the past, mainly been written for internal use. However, some customers are now requesting comprehensive documentation for their own use in first-line maintenance. Upgrades, which enhance system capability, are a significant business for TelecommA and systems typically have a major upgrade every 2 years.
- *Importance of Customer Support.* Support is “becoming more and more important, particularly to... non-technical owners of systems” [Development Manager]. because customers cannot afford their systems to be out of order. Therefore, TelecommA offer a quick response in the event of problems. From a business perspective, support is important because of its influence on customer satisfaction. However, it also generates about 4 percent of revenues (at margins of typically 60 percent).
- *Support Delivery Channel.* TelecommA have no formal field support organisation. Therefore, installation, hardware and software maintenance, and upgrades are organised by the Operations Manager utilising R&D engineers. It is acknowledged that this can lead to resources being stretched: “it’s a balancing act” [Operations Manager] but existing customers have, if need be, the priority over development work. As a consequence, TelecommA think they have “built up a reputation [for good support] very quickly by going in and only sending people who were able to fix the problems” [Quality Manager], compared to competitors who have a dedicated field organisation but are less effective at system problem-solving.

TelecommA are now looking to improve their customer support offering and gain a competitive advantage from it because currently “we don’t sell our support well enough” [Operations Manager].

Case 2: AutoB

This company is a major international car manufacturer. They design, market, manufacture and (indirectly) service cars and their products are produced in very high volumes.

- *Product Characteristics.* Typical vehicles cost \$15,000 and are sold both to private users and also fleets; a major segment of the business. Car design is changing fast and typical models now include a large amount of new technology in engine management, airbag control, etc. A passenger car has a 10-12 year working lifetime, during which it will have a number of owners.
- *Key Elements of Customer Support.* In the automotive industry product support is generally referred to as service and the most important elements are warranty; maintenance and repair including parts; documentation (workshop and owner manuals); and training. Warranty is normally 12 months, although competitive pressure is changing this to 3 years in some countries. Due to the number of

different mechanical parts, cars require a significant amount of maintenance and repair and this increases cost-of-ownership. Stocking and distributing spare parts is a major part of the business for AutoB and other car companies. Although accessories—such as mud-flaps and roof racks—may be sold after the initial sale, currently the automotive industry does not have an upgrade business as such.

- *Importance of Customer Support.* Car cost-of-ownership is a key factor, particularly for fleet sales. Fleet managers are very much aware of the running costs, as these are published in the trade journals. Therefore “reducing cost-of-ownership sells cars” [Advanced Service Manager]. Internally support is viewed as an important area; parts generate about 15% of revenues and 24% of profits.
- *Support Delivery Channel.* AutoB have a large organisation responsible for managing spare parts, as it is a major part of their business. Actual maintenance for all of their products is however provided through an accredited chain of dealers all of whom must provide sales, service and parts management. To ensure that customers receive a good quality service, dealers’ technicians must attend AutoB’s maintenance and repair training courses—there are three levels of training and dealers must have a minimum number of staff trained to each level. AutoB “publish labour times and the dealers are required to work to those” [Advanced Service Manager]. As the service delivery channel is not directly under the control of AutoB, they experience difficulty in obtaining comprehensive and accurate data on reliability and repairs over the typical working lifetime of a car.

AutoB believe that they must further reduce the cost-of-ownership of their products and are looking closely at their competitors’ work in this area.

Case 3: VendorC

This company designs, manufactures, sells and supports complex vending machines. Vending companies buy large numbers of machines to provide self-service sales of a wide range of goods, some of high value.

- *Product Characteristics.* Modern vending machines—often referred to as *Vending Terminals*—are a complex mix of mechanical, electronic, security and display technologies and a top range model can cost in the region of \$15,000. The product working lifetime is about 10 years. Due to the relatively large number of mechanical components in vending machines and their high levels of usage, regular maintenance and repair is required. Vendor terminals can now be linked via modems to a central computer, which remotely monitors performance, sales activity and stock levels in chains of vending machines.
- *Key Elements of Customer Support.* VendorC offer a *total installation service* and “manage all aspects of installation, from site surveying, architectural design and planning, to building, wiring and fitting” [Quality Manager]. Warranties are 90 days—standard in this industry. Timely maintenance and repair is very important as equipment downtime leads to lost sales. Terminals have full technical documentation for maintenance purposes and some of this is being made available over the Internet. Training plays a key role as the staff at vending companies who are responsible for first-line maintenance and replenishment of machines require instruction. Using the modem links already mentioned, VendorC have the capability to offer full *goods management* to their customers i.e. both ensuring that machines are efficiently maintained and replenished with sales goods in a timely fashion. This incremental service is an important source of revenue. VendorC also sell upgrades;

they “will carefully examine the benefits of refurbishing... used terminals to extend equipment lifetime” [VendorC brochure].

- *Importance of Customer Support.* Product support generates 35% of VendorC’s sales at margins of typically 25%. These revenues are increasing as, although the new products are more reliable and require less service, “goods management” creates new business opportunities. Top management at VendorC has focused more resources on product support over the last decade due to the recognition that good support can “dramatically improve... [customers’] business performance” [Quality Manager].
- *Support Delivery Channel.* VendorC have a large field organisation and 70% of all service-related activities world-wide are conducted by them directly—the balance, particularly in certain countries being managed via third party maintenance companies. Some of VendorC’s larger customers use their own staff to carry out simple maintenance procedures. The performance of both the field organisation and the installed base of vending machines is very closely monitored by an elaborate internet-based system which collates data on all aspects of field service. Product reliability (e.g. downtime by product; by location; by cause; etc.) and service engineer efficiency (installation times; percentage first-time-fixes; etc.) are just two of the metrics which are reported daily by the field organisation. Over 18 months work was required to create this system but “I want to point out that a huge step forward was getting data that was just about instantaneous” [Product Support Manager]. Comprehensive data has been found crucial for early recognition of product problems and in “charging customers where their misuse / abuse led to service costs” [Product Support Manager]. “Quality Assurance have [subsequently] worked in partnership with several key customers to perform an overall analysis of their ‘system’ availability” [Quality Assurance Engineer].

VendorC’s strong focus on customer support has enabled them to use it to gain a significant competitive advantage from their unique combination of reliable, highly-functional products and a responsive field organisation offering a wide range of incremental services.

Case 4: AircoD

This company designs, manufactures and sells small passenger aircraft—termed *regional aircraft* in the industry. Regional aircraft is a very competitive industry and is highly regulated by a number of authorities such as the Federal Aviation Administration in the USA.

- *Product Characteristics.* The aircraft typically cost between \$6M and \$12M, depending on the size and configuration. Individual aircraft have a working lifetime of at least 20 years. Airlines may require customised products and request, for example, particular types of electronics (avionics) or “mid life updates”.
- *Key Elements of Customer Support.* Aircraft flight safety and reliability is paramount. AircoD deliver aircraft to their customers with comprehensive warranty cover, which is generally specified in cycles (e.g. the number of take-offs and landings). The warranty is specified separately for each major component of the aircraft, for instance engines. Depending on the level of usage, significant amounts of maintenance are required—approximately 3 maintenance hours per flying hour is typical in the industry. As might be expected in a highly regulated industry, high-quality documentation must accompany aircraft including: the *Flight Manual* which contains all the information for the pilot; the *Manufacturer’s Operating Manual*

(*MOMs*) which specifies all safety procedures; and maintenance manuals. Training of airline personnel is a significant support element. Induction and refresher courses for pilots and maintenance engineers are run on a regular basis by AircoD. Spare parts are sold to airlines by AircoD but alternative sources exist and so this means that AircoD only “get patchy spares revenues, particularly on second hand aircraft” [Customer Service Manager]. On the other hand upgrading aircraft is a significant business and they “make substantial revenue from enhancements” [Customer Service Manager]. A key aspect of AircoD’s strategy is their *Engineering Support*—advice to airlines on how best to manage their aircraft. This is done continually by examining trends from the customer’s monthly returns of delays and cancellation figures; comparing them against figures from similar operators; and giving advice on how to improve them. Engineering support is provided without charge to major customers and helps them improve aircraft reliability and prevent cancelled flights (which otherwise lead to loss of revenues for airlines). “The whole accent on support as far as we are concerned is getting to know your customer and helping them get the best out of our product. To ensure this we [the manufacturer] can offer to examine the customer’s operation and provide advice on how he can get the best from the product. This can be technical, operational or commercial advice” [Customer Service Manager].

- *Importance of Customer Support.* In the aircraft industry, including the regional sector, it is crucial to offer good customer support. Support is the source of approximately 20% of revenues as “spares revenues and the ground skills [maintenance courses] revenues are really the main streams of our income after sales” [Customer Service Manager]. Each aircraft sold generates about \$300K service revenues per year initially. Typically, however, AircoD earn less revenue from older aircraft, particularly second hand ones, where alternative sources for spare parts may be used. Overall, support contributes approximately 15% of profits.
- *Support Delivery Channel.* Regional airlines employ their own staff and 95% of maintenance and repair is conducted by them. Aviation regulations require that these engineers are licensed and have received training from the manufacturer. In addition AircoD has a product support organisation at the factory. This can provide aircraft maintenance and repair. However, the more important function of the factory-based support organisation is to provide engineering support to regional airlines and cater for international customers with widely varying degrees of experience—from those who are almost self-sufficient to those who require daily interface to the manufacturer.

AircoD’s focus on after-sales service has enabled them to build a reputation in the business and they intend to capitalise on this.

Case 5: DomesticE

This company designs, manufactures, sells and repairs domestic appliances, such as washing machines. They operate in a highly-competitive, price-sensitive market—shown by the fact that despite having a strong brand, DomesticE have been unable to increase their prices for the last ten years.

- *Product Characteristics.* Modern washing machines are a mix of mechanical, electro-mechanical and, increasingly, electronic components and a typical model has a factory cost in the region of \$300. Washing machines have a working lifetime of about 10 years in normal usage. Due to the number of mechanical components they

contain, washing machines are susceptible to failure—the industry average failure rate is 25% for a machines in its first year of usage.

- *Key Elements of Customer Support.* In the majority of cases customers install washing machines, or independently arrange for installation to be carried out by a local tradesman. Warranties of one year are the norm in the industry but DomesticE sometimes competes on warranty by offering the customer better terms. Washing machines used to need preventive maintenance, however, maintenance has now been “engineered out of products by designing them for the whole life cycle” (Process Manager) and service engineers are not required unless a product fails. Timely response to failures is essential in this market and DomesticE have their own, long-established and extensive service organisation. Simple and effective user documentation is important because customers seldom have much technical knowledge. DomesticE have recognised this and try to produce user documentation (covering installation, operation and simple fault-finding) which is written in a style that is accessible to typical users.
- *Importance of Customer Support.* Strong product service is recognised by DomesticE’s management as one of their competitive advantages and is strongly promoted; “our extensive After-Sales Service ensures each product produces a market-leading performance from day one onwards” (extract from a promotional brochure). Currently product service generates significant revenues at margins which are typically significantly higher than profits from product sales. DomesticE’s competitors have, in the main, not gained a reputation for the quality of their after-sales service.
- *Support Delivery Channel.* DomesticE’s own field service organisation responds quickly and repairs machines on-site. The organisation “is a major strength and strongly influences customers to purchase our products” (Process Manager). In contrast, one competitor has subcontracted all their repair work to a third party but has failed to build a good reputation for their service. A significant amount of all service-related activities are conducted by DomesticE’s service organisation; local tradesmen taking the balance of the repair work. DomesticE’s high share of the total service business is the result of their successful marketing of support and an efficient channel to deliver it. The performance of the service organisation is closely monitored, including monthly reporting of the number of customer problems which can be fixed on the first visit (a high but confidential figure). In addition, DomesticE also collect comprehensive data on product performance from their service organisation and this enables analysis of failure modes. This information is then fed back to the design team working on product enhancements.

DomesticE’s focus on customer service has helped them achieve and successfully defend their strong market position. However, they now face the challenge of needing to improve product reliability within the restrictions of a price-sensitive market.

CROSS-CASE ANALYSIS

As explained earlier, a deliberately wide range of industries was covered. It is interesting to note that, despite their very different market characteristics, customer support plays an important role in each of them. The results also illustrate how different elements of support are important in particular markets and demonstrate the different channels used for customer support.

The Importance of Customer Support

All of the sample companies acknowledged the importance of customer support to their businesses and their customers. For companies, customer support is an important source of revenue (from between 4% and 35% of total revenues) with very high margins—often much higher than the profit margins on product sales. This result empirically confirms the views of Knecht et al [1993] on the magnitude of typical support revenues.

At all five companies, customer support was perceived by managers as an essential part of their “offer” to customers. This was equally true for all the range of products; from \$300 washing machines to \$12 million aircraft. Although the measure used (managers’ perceptions) is an indirect indication of actual customers’ opinions, the results do attest that support is extremely important to customers in a range of industries.

A major implication of the findings is that researchers have not given customer support a level of attention which matches its importance as a source of revenue and in achieving customer satisfaction. This view is further reinforced by cases such as VendorC, where customer support has expanded and new services have become a greater source of revenue and profit than products sales. As recognised by previous research, “although field service has been noted as a competitive edge, information on the subject... is lacking” [Hull and Cox, 1994].

Key Elements of Customer Support

Knecht et al [1993] recognised that product characteristics—such as cost and reliability—have a strong influence over the potential for customer support revenues. However, they did not identify that the key elements of support vary between industries. The current five case studies show this strongly; row five of Table II indicates which of the main seven elements of customer support are key to each of the companies (each of the elements are listed in the same order—from *installation...* to *upgrades*—to allow easy comparison).

Three key elements are common across all markets; documentation, warranty and fast response (be it in maintenance, spare parts or repair). Customers in all five markets expect warranty cover; good documentation; and, in the event of equipment failure, fast response. Table II clearly illustrates that not every company needs to concentrate on all seven elements of customer support. For example, AutoB concentrates on only the four elements which are key in their market, whereas for VendorC and AircoD nearly every element is important and needs careful management. In addition, the latter two companies offer incremental services (*goods management* and *engineering support* respectively)—which could be classified as an eight element of support.

Installation is important for the commissioning of a system (TelecommA), or a vending machine (VendorC) but not relevant for cars for example. Training, in one form or another, is important for each company except for DomesticE; their equipment is relatively simple and is designed to be easy to use. Note, however, the emphasis placed by DomesticE on having good documentation for the user. Equipment retrofits or upgrades are an important element of customer support in three industries; telecommunications, vending machines and aircraft. Currently they are not important in the car industry or for domestic appliances. However for cars (AutoB), it remains to be seen whether this will change as more electronics—a technology which lends itself to comparatively easy upgrades—is used in products.

Which factors determine which elements of support are key in a particular market? Technology and equipment design obviously have a large influence over the key elements of customer support [Goffin, 1998]. In the companies where products have a relatively large number of mechanical components (AutoB, VendorC and AircoD), products require higher levels of maintenance. In contrast, in the telecommunications industry (TelecommA) hardware maintenance is less of an issue but software support is crucial. In between, DomesticE have eliminated maintenance but still have significant numbers of failures and, consequently, repairs.

Distribution Channels

Five different distribution channels can be identified from the sample; as shown by Table III. All five companies provide some support direct from their factory. However, the type of support provided direct from the factory should be noted. Only in the case of TelecommA is *all* customer support from the factory, using R&D engineers. In all other cases separate channels provide actual field support for the customer (e.g. on-site maintenance), whereas the in-factory organisation acts as an interface between the distribution channel and the factory. For instance, AircoD's field support channel is through airlines' own maintenance engineers, whereas the factory-based organisation offers engineering support. AutoB and VendorC both have large factory-based groups—called technical marketing—which are deeply involved in product development, ensuring that customer support issues are considered at the design stage. DomesticE has only a small factory-based organisation, which is currently responsible for spare parts management.

Table III: Types of Distribution Channel Identified at Five Case Companies.

#	Type of Distribution Channel	Case Companies	Notes
1	Direct from factory	TelecommA; AutoB; VendorC; AircoD; DomesticE	There are two categories of factory-based support: field support and technical marketing (the interface between the distribution channel and the factory).
2	Own field support organisation	VendorC, DomesticE	Both companies have highly trained field support engineers.
3	Approved dealers	AutoB, VendorC, DomesticE	Dealers may be the sole channel or used to supplement a company's own field support organisation in certain geographical areas.
4	Customers' own resources (trained engineers)	TelecommA, VendorC, AircoD	For certain tasks (e.g. first line maintenance) customers' own resources may be the chosen channel.
5	Combinations	VendorC; DomesticE	A pragmatic approach to mixing support channels was seen at two companies.

Two companies (VendorC and DomesticE) have their own highly-trained field support organisations, which conduct most of their support. However, both of these companies also use approved dealers in countries where they do not have their own organisations. AutoB also use dealers, but in their case this is their sole channel for

support—an extensive chain of authorised dealers responsible for both sales and support of AutoB cars.

For certain support tasks, such as maintenance, customers may want to use their own personnel. Three of the case companies enable trained engineers from customers to conduct support. This approach can lead to reduced costs and, in some circumstances can lead to a competitive advantage for companies which provide the means for this (for an example see [Goffin 1994]).

It should be noted that in all the companies studied the choice of support channels had been made in the past or had developed over a period of time, rather than having been decided or changed recently. Only in the case of TelecommA were discussions underway to consider a change of distribution channel; all four other companies had, at the time of the study, no intentions to make changes.

Comparisons to Loomba's Research

As it is the most detailed piece of previous research on support distribution channels, Loomba's work deserves particular mention and in particular some of his findings and propositions require discussion.

Loomba's conclusion, based on his two cases, was that customer support distribution channels are closely linked to sales channels and, for example, manufacturers operating in centralised product distribution environments will opt for centralised after-sales service support channel structures. The five cases in this current study, however, do not give unequivocal support for this.

Table II shows that AutoB has an identical channel for sales and support—via accredited dealers. Similarly, VendorC has identical channels for sales and support—its own organisation (except in certain countries where they use third parties). However, for the other three companies sales and support channels show some differences. TelecommA has a direct sales organisation but delivers all its support from the factory. Finally, AircoD and DomesticE do not have the same channels for their support as their sales. Although it appears logical that companies would normally use the same type of channel for sales and support, a broader investigation is required before conclusions on this can be reached. Current evidence indicates that the practical difficulties of creating direct support channels (e.g. costs, hiring personnel, etc.) lead some companies to rely on alternative channels, although this may change over time (e.g. TelecommA is currently considering a direct field support organisation).

Table IV: Comparison of Results and Loomba's Propositions P2 and P3

#	Company	Type of Product	Main Support Distribution Channel	Supports Loomba's Propositions 2 & 3?
1	TelecommA	Highly-customised	Direct	Yes
2	AutoB	"Commodity"	Indirect	Yes
3	VendorC	Highly-customised	Direct	Yes
4	AircoD	Highly-customised	Indirect	No
5	DomesticE	"Commodity"	Direct	No

Loomba's propositions (P2 and P3) on the influence of the type of product on support channels also require inspection. It was expected that manufacturers of "commodity" products will choose indirect support channels whereas manufacturers of

“speciality” products will choose direct channels. Three of the case studies fit with these propositions but two do not—Table IV illustrates the relationships between the type of product and the main support distribution channel for the sample companies. TelecommA produces highly-customised systems and does have a direct channel. AutoB has more standard products and an indirect channel. VendorC has complex products which are often customised and has a direct channel. Therefore the first three cases do support propositions P2 and P3, whereas the final two do not. AircoD has highly customised products but has an indirect channel. On the other hand, DomesticE has commodity products and a direct channel. These results show that the choice of the support channel is dependent on more complex factors than originally proposed by Loomba and indicate that more investigation, with a wider sample, is necessary before generalisations can be made.

CONCLUSIONS

The contribution of this research is that it provides valuable empirical evidence on the importance of customer support in different industries, both in terms of the revenue that support generates and the role it plays in achieving customer satisfaction. By investigating vastly different industries, the research also demonstrates for the first time that customer support is important in sectors other than computing. In addition, the case studies illustrate the different distribution channels that can be used for customer support.

As the sample was small, the question of whether the results can be generalised to other companies or industries arises. However, case studies are seldom representative of a population and the results from such studies should be “generalised to theory” [Yin, 1994]. From the current research, it is possible to theorise on three main points. Firstly, customer support appears to be important in industries where equipment is complex (and therefore difficult to install, or learn to use); where breakdowns occur relatively frequently, or have serious financial or other consequences for the owner; and where cost-of-ownership is significant. Secondly, the nature of the product and market characteristics (such as user skill levels) largely determine the key elements of customer support. Thirdly, there are five main choices for customer support distribution channels, although it appears unlikely that companies change channels after their initial decision.

As clearly stated in this article, research into customer support is lacking and there are a number of areas which require further investigation. The main priority is for a wide survey of companies in different industries, to determine how important support is in further sectors. In the industries covered by this study, further empirical data is to show whether all companies in these sectors perceive support as important as the sample companies (which are leaders with significant market shares). This type of investigation should also look at whether there is a relationship between a strong focus on customer support and higher market share. The case of VendorC clearly demonstrates that significant competitive advantage can be obtained from incremental services. This requires further investigation—are a high percentage of manufacturing companies offering incremental services? Further research also needs to focus on the reasons why companies choose certain customer support distribution channels.

The research has important implications for managers in all sectors where customer support plays a role. Managers in all five sample companies state that they have gained a significant competitive advantage through providing high-quality

customer support—as this message comes from market leaders then it is probably one that other companies should consider seriously.

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Table II: Summary of Customer Support at the Five Case Companies.

Row	Company	<i>TelecommA</i>	<i>AutoB</i>	<i>VendorC</i>	<i>AircoD</i>	<i>DomesticE</i>
1	No. of Employees	approx. 150	Many 1000s	several 1000	several 1000	several 1000
2	Main Interviewees	<ul style="list-style-type: none"> • Service Operations Manager Development Manager • Quality manager 	<ul style="list-style-type: none"> • Advanced Service Manager • 4 Product Support (Factory) Specialists • Financial Analyst 	<ul style="list-style-type: none"> • Support Manager • Field Service Engineer • Quality Manager • R&D Engineer • Quality Engineer 	<ul style="list-style-type: none"> • Customer Service Manager • Chief Design Engineer 	<ul style="list-style-type: none"> • Service Manager • New Product Development Process Manager
3	Main Products (cost of typical product)	Telecommunications systems (cost: \$1M)	All types of passenger cars (cost: \$15,000)	Vending systems (cost: \$15,000)	Regional passenger aircraft (cost: \$9M)	Domestic washing machines (cost: \$300)
4	Product Lifetimes	20 years	10-12 years	10 years (shorter in US)	20 years or more	10 years
5	Key Elements of Customer Support	<ul style="list-style-type: none"> -Installation - User training -Documentation -Fast problem resolution -Warranty -Upgrades 	<ul style="list-style-type: none"> -Dealer training -Documentation -Spare parts -Warranty 	<ul style="list-style-type: none"> -Full installation service -Training staff -Documentation -Maintenance & repair -Warranty -Refurbishment -Goods management 	<ul style="list-style-type: none"> -Aircraft delivery -Training -Documentation -Spare parts -Call Centre -Warranty -Aircraft enhancements -Fleet management advice 	<ul style="list-style-type: none"> -Delivery service -User documentation -Repair -Call Centres -Warranty
6	Importance of Support	“becoming more and more important”	Support “makes a difference to repeat sales”	Key to improving customers’ business performance	Crucial to ensure safety and to reduce cost-of-ownership	Service is “a major strength” and a competitive advantage.
7	Support Revenues	4% of revenues (at 60% margins)	15% of revenues (25% of profits)	35% of revenues (at 25% margins)	20% of revenues (15% of profits)	35% of revenues (“high percentage” of profits)
8	Support Delivery Channel	R&D engineers managed by the Operations Manager	World-wide accredited dealer network for sales, service and parts	70% own service organisation; customers; approved dealers	95% of maintenance and repair is done by airlines’ own personnel	95% of repair work is done by DomesticE’s own service organisation
9	Sales Channel	Direct sales	Accredited dealer network	Direct sales force	Direct sales force	Retail chains

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