

CUSTOMER SUPPORT: A CROSS-INDUSTRY STUDY OF DISTRIBUTION CHANNELS AND STRATEGIES

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BIOGRAPHICAL DETAILS

Keith R.H. Goffin studied Physics at Durham University in the UK, graduating in 1977 with first class honors. He subsequently obtained a M.Sc. in Medical Physics from Aberdeen University in Scotland, specializing in developing software for the analysis of heart function. For fourteen years he worked for the Hewlett-Packard Medical Products Group: on new product development; managing customer support groups; and as a marketing manager. Parallel to his working responsibilities he studied for a Ph.D. at Cranfield School of Management, graduating in 1993. His research on customer support and *Design for Supportability* has practical applications that have been put to use at a number of companies. In 1995, Keith joined the faculty of Cranfield, where he teaches operations management on MBA and executive seminars. His research interests are all focused on innovation including product support for high-tech products, product innovation management, and supplier management. This is his second paper in the *International Journal of Physical Distribution & Logistics Management* and he has published in a number of other journals including the *International Journal of Operations and Production Management* and the *Journal of Product Innovation Management*.

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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 a part of their own operations or through third parties. This paper describes an exploratory investigation of the distribution channels and customer support strategies of five manufacturing businesses, using case study methodology. The results show the key role that customer support plays in various industries and illustrate the types of decisions companies make on how to provide high-quality support for their customers. These findings have implications for managers in all industries where customer support is important, as they provide insights on how different channels and strategies affect the quality and efficiency of customer support.

KEYWORDS Customer support, after-sales service, distribution channels

INTRODUCTION

Customers for many types of 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 used and whether companies have their own customer support organization, or use 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 (Armistead and Clark, 1992; Athaide *et al*, 1996; Cespedes, 1995; Davidow, 1986; Lele and Sheth, 1987; Teresko, 1994).
- Can provide a competitive advantage (Armistead and Clark, 1992; Davidow, 1986; Goffin, 1998; Hull and Cox, 1994). This is true in most high-tech industries (Goffin, 1994; Lawless, and Fisher, 1990; Meldrum, 1995) but also in some 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 recognized as an important research priority” (Loomba, 1996). This article

reviews the literature and describes case study research in five different companies which had three 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
- To obtain an understanding of the factors which influence companies' strategies 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 the 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.

KEY ELEMENTS OF CUSTOMER SUPPORT

From the literature, seven main elements of after-sales support can be identified which must be provided to customers 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 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

mindful customers. A good example of the importance of easy installation is that IBM recognized in 1990 that their personal computer (PC) customers wanted to be 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; 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 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). However, where products are becoming cheaper and more reliable, as is the case with PCs, service is becoming less viable (Mandel, 1995). In order to repair faulty equipment, companies need to have efficient logistics for the management and movement of *spares*, the parts used in repairs. Some companies have focused strongly on this area, to gain an advantage over their competitors (Hull and Cox, 1994; Lele and Sheth, 1987).

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 centers via telephone lines (Bauer *et al*, 1992). The US earth-moving equipment manufacturer Caterpillar, which focuses on product serviceability—products that are easy to maintain and repair—is using similar approaches. This has led them to develop products which can be remotely monitored so that maintenance can 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 utilized for software products (*software support*) (Armistead and Clark, 1992). For example companies such as Microsoft have invested significant resources in telephone centers (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 (Lele and Sheth, 1987; Loomba, 1996). 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 have become more complex and support costs have increased, customers have started to demand 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). For example, computer manufacturers offer upgrades because they 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 which could benefit from upgrading (Knecht *et al*, 1993).

Over the last fifteen years there has been a change in the scope of support and in the recognition of its importance. 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). New technologies have led typically to more reliable but more complex products, often with many software-based functions. Consequently, 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 commonly used in the past (Clark, 1988). As the importance of customer support has become more widely recognized, companies are now taking a more professional approach to it than they did previously (Knecht *et al*, 1993).

There are two aspects of customer support, which particularly deserve management attention. Firstly, there is the need for customer support requirements to be fully considered at the design stage (Lele, 1986)—using what are called *Design for Supportability* techniques (Goffin, 1998)—in order to develop products which are economical and easy to support. Secondly, the logistics of delivering customer support through suitable channels is key. Companies which are good at both of these aspects have differentiated themselves from their competitors and won significant market share [see for example (Goffin, 1994)].

Distribution Channels

If customers are to be provided with good product support, companies need to select and effectively manage their distribution channels. Manufacturing companies may have their own—direct—organization for customer support, or they may use alternatives. 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. Table I summarizes the salient points from the only four pieces of previous research which have collected empirical data on customer support distribution channels. Even these four papers provide only sketchy information.

Little et al (1988) surveyed a sample of high-technology companies' practices in spare parts management. Although the importance of the organization used for customer support is acknowledged, the influence of different distribution channels is not considered.

Armistead and Clark's book (1992) is based on the results of survey research. It noted that more complex products usually require more support and therefore manufacturers will normally want to exert maximum control over customer support by having their own direct customer support organization. Armistead and Clark also identify the limitations of particular distribution channels, for example the high costs of a direct customer support channel and the lower degree of control resulting from indirect channels, such as dealers.

Take in Table I

Hull and Cox (1994) studied the role of customer support in six US companies in the electronics and computing sectors. Since all six companies used the direct channel, this study provided no information on the role of different channels in customer support. However, it provided six examples of the successful use of a direct channel and demonstrated the importance of good information exchange and parts management.

In a study focusing solely on support distribution channels, Loomba (1996) stated that there are five main channels:

- 1) Direct support from the factory
- 2) A direct after-sales network
- 3) Channel intermediaries

- 4) Authorized, independent third parties
- 5) Some combination of the above possibilities

Using case study technique at two US computer companies Loomba showed that the choice of customer support distribution channel is closely linked to a company's sales channel. The limitation of this study is that it only investigated two companies, both of which are in the computer industry.

The review of the literature indicated the need for a wider investigation of customer support, covering sectors other than computing and electronics.

METHODOLOGY

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*. Leading companies in various industries were contacted by letter and to obtain their agreement to participate in the research. 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 analysis 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 the associated 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); Hull and Cox (1994); Loomba (1996); and the author (Goffin, 1990). [The questionnaire also covered a number of additional issues which have

been reported elsewhere (Goffin and New, 1998). Copies of the questionnaire are available from the author.]

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 organization charts (to see where customer support fitted in the overall company organization). Companies were willing to give the researcher copies of most of these documents but, in the case of financial statements and (sometimes) organization 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), other sectors were chosen. 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. Therefore both a deliberately wide range of sectors (including both consumer and business-to-business products) and technologies (from electronics to mechanical devices) were included.

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 cooperate 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 companies, which participated.

Data Analysis

Case analysis involved three main stages.

- Each case was reviewed separately and the data analyzed 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 copies of company documentation.
- Data reduction was performed and 2-3 page case descriptions were written on each company. A number of main headings were used for data presentation 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. 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 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 summarizes company backgrounds and key findings. Data from each case has been collated under the same four headings, to make comparisons easier.

Take in Table II

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 specialized software monitoring and controlling the resulting network. Systems are sold for approximately \$1M and

customers—normally large companies or organizations—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, been written mainly 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]. This is because customers cannot afford their systems to be out of order and 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 organization. Therefore, the Operations Manager utilizing R&D engineers organizes installation, hardware and software maintenance, and upgrades. 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 organization 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 fleets—the latter is 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 mechanics. 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, which 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 running costs, as these are published per model 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 organization 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’ car mechanics 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 labor 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 which are 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 organization 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 organization 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 organization. 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 organization 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 customized 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. AircoD runs induction and refresher courses for pilots and maintenance engineers on a regular basis. 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 the trends in customers’ monthly returns of flight 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 canceled flights (which otherwise lead to loss of revenues for airlines).

- *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 maintenance engineers and they conduct 95% of maintenance and repair work. Aviation

regulations require that these engineers be licensed and have received training from the manufacturer. In addition AircoD has a product support organization at the factory. This can provide aircraft maintenance and repair. However, the more important function of the factory-based support organization 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 further capitalize 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 machine in its first year of usage.
- *Key Elements of Customer Support.* In the majority of cases, customers themselves 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 organization. Simple and effective user documentation is important because customers seldom have much technical knowledge. DomesticE have recognized 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 recognized 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 that 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 organization responds quickly and repairs machines on-site. The organization “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 up a good reputation for service. A significant amount of all service-related activities are conducted by DomesticE’s service organization; 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 organization 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 organization 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 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 to be 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 show that support is extremely important to customers in a range of industries.

A major implication of these findings is that researchers have not given customer support the level of attention, which reflects its importance as both 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 more profitable than sales of new products. As recognized 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

It should be noted that discussions with the respondents established which elements were important in each company's market. For the elements chosen as important, no further attempt was made to determine relative priority ratings. This was because each of the respondents stressed that they must offer good support across all of the elements seen as essential in their market (a complete "customer support package").

Knecht et al (1993) recognized 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 elements of support that are relevant to a particular business can vary significantly. The current five case studies show this strongly; row five of Table II indicates which of the main seven elements of customer support identified in the literature are key to each of the companies. For AutoB, only four elements are key, 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 both be classified as additional aspects of support.

Three key elements are common across all markets: documentation, warranty and fast response. Customers in all five markets expect reliable products and, in the event of equipment failure, fast response and financial cover.

What determines which elements of support are key in a particular market? Technology and equipment designs obviously have a large influence over the key elements of product support. In the companies where products have a 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. Between these two extremes, DomesticE have eliminated maintenance but still have significant numbers of failures and, consequently, repairs.

Equipment retrofits or upgrades are an important element of customer support in three industries; telecommunications, vending machines and aircraft (AircoD). Currently they are not important in the car industry (AutoB) but this may change. For example as more electronics—a technology that lends itself to comparatively easy upgrades—are used in cars. Equipment design also determines largely the amount of user training required, as has been previously noted (Goffin, 1998).

From the results, it appears that different types of products and different customers require different patterns of support. All of the elements of support which are essential to customers in a particular market need to be provided by companies as part of their high-quality customer support “offer”.

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 organization acts as an interface between the distribution channel and the factory. For instance, AircOD's main field support channel is through airlines' maintenance engineers whereas the factory-based organization offers training and 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 also has a small factory-based organization, which is responsible for spare parts management.

Take in Table III

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

Comparisons to Loomba's Research

As it is the most detailed piece of previous research, Loomba's work deserves mention and his findings and propositions require discussion.

Loomba's first proposition (P1), based on his two cases, was that customer support distribution channels are closely linked to sales channels and, for example, manufacturers with their own (direct) sales organizations will opt to establish their own (direct) support organizations. By implication, companies with indirect sales channels (e.g. companies selling to customers through dealers or retail chains) will opt for indirect support channels. The five cases in this current study, however, do not provide unequivocal evidence for this. Table IV shows that TelecommA, AutoB and VendorC have identical channels for sales and support (for AutoB the channel is dealers; for the other two it is direct). However, 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.

Take in Table IV

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

of “specialty” products would choose direct channels. Once again, three of the case studies fit with these propositions but two do not—as shown by Table IV. TelecommA produces highly customized systems and does have a direct channel. AutoB has more standard products and an indirect channel. VendorC has complex products, which are often customized and has a direct channel. Therefore the first three cases do support propositions P2 and P3. However, AircoD has highly customized products but has an indirect channel. Similarly, DomesticE has commodity products and a direct channel.

In order to fully “test” Loomba’s propositions, survey or similar methodology would need to be used and obviously this was not the case with the current study. However, in order to increase the knowledge on distribution channels it is still valuable to compare the current results with the previous propositions. Since the comparisons show equivocal results, it appears that the choice of the support channel is dependent on more complex factors than originally proposed by Loomba. From the current study, it is clear that the choice of customer support distribution channel is also influenced by:

- Companies’ desire to earn support revenues directly
- The required degree of control over the quality of customer support
- The high costs of creating direct distribution channels (especially in remote geographical locations)

A more detailed investigation, with a wider sample, is necessary on these points.

Customer Support Strategies

In addition to providing information on distribution channels, the case studies provided an insight into all aspects of how companies manage customer support. All

of the sample companies have used their expertise in customer support to gain a competitive advantage. Therefore, the data collected were also analyzed to determine which factors influence companies' customer support strategies. From this cross-case analysis, it appears that there are at least four important components to customer support strategies:

- *Identifying Customers' Support Requirements.* Understanding the customer's need for support is an intuitively obvious aspect of deriving a support strategy. However, it could well be that many companies neglect this. Most of the case study companies said that they actively conduct market research into customers' support requirements and to identify new business opportunities. One respondent summarized this as: "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" [AircoD Customer Service Manager].
- *Design for Supportability.* Since product design strongly influences how easy it is to support products, it is essential to consider customer support at the design stage. Some of the sample companies (AutoB, VendorC and AircoD) concentrate significant resources on this and have been successful at improving the supportability of their products. The ways that the sample companies manage Design for Supportability is covered in detail in a separate paper (Goffin and New, 1998).
- *Choosing / Managing Distribution Channels.* The distribution channel used for support can have a strong influence on the quality of support received (and perceived) by the customer. Therefore, the choice of the channel is an important

one and sometimes the high costs of a direct channel are more than offset by the revenues it generates and the competitive advantage it creates (e.g. DomesticE). Once a channel or channels have been chosen, companies face the challenge of ensuring that all customers receive good support. This requires good logistics; for example in the management of spare parts and ensuring that customer support engineers are quickly available to conduct maintenance and repairs. Companies also need to invest in systems for monitoring the performance of their customer support organizations (as shown by VendorC and DomesticE).

- *Promoting Support for Competitive Advantage.* Inspection of company and product brochures from the sample companies showed that they all promote the quality of their support to their customers to some degree. However, customer support needs to be skillfully marketed and one respondent company (TelecommA) stated they needed to improve in this area. Customer support managers at all five of the sample companies had a detailed knowledge of their competitors' support channels and offerings and used this information in developing their own strategies.

Customer support strategy needs to be researched further and best practices need to be identified—because this information would be very relevant to practitioners.

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 generalized to other companies or industries arises. However, case studies are seldom representative of a population and the results from such studies should be “generalized to theory” (Yin, 1994). From the current research, it is possible to theorize on four main points:

- 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.
- The nature of the product and market characteristics (such as user skill levels) largely determines the key elements of customer support.
- There are five main choices for customer support distribution channels and companies need to determine the best combination to meet their needs and customers’ requirements.
- Companies need to consider four main issues in determining a customer support strategy, which will give them competitive advantage.

As clearly demonstrated in this article, research into customer support is lacking and there many areas that 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 five industries covered by the current study, further data is needed 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? Another priority is for research into customer support strategy and whether the four components of strategy identified in the previous section are relevant to other companies.

The current research, although it was exploratory, still has important implications for managers in all sectors where customer support plays a role. Managers at all five sample companies state that they have gained a significant competitive advantage through providing high-quality customer support. Since this message comes from market leaders, then it is certainly that other companies should take very seriously.

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Table 1: 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 programs	<ul style="list-style-type: none"> • The goal of field service is to maximize the availability of spare parts and engineer utilization, whilst minimizing 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 organizations.
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)

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 (direct) field support organization	VendorC, DomesticE	Both companies have highly trained field support engineers.
3	Approved dealers (indirect)	AutoB, VendorC, DomesticE	Dealers may be the sole channel or used to supplement a company's own field support organization 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.

Table IV: Comparison of Results and Loomba’s Propositions P1, P2 and P3

#	Company	Type of Product	Main Sales Channel	Main Support Distribution Channel	Supports P1?	Supports P2 & P3?
1	TelecommA	Highly-customized	Direct	Direct	Yes	Yes
2	AutoB	“Commodity”	Dealers	Dealers	Yes	Yes
3	VendorC	Highly-customized	Direct	Direct	Yes	Yes
4	AircoD	Highly-customized	Direct	Indirect	No	No
5	DomesticE	“Commodity”	Retail chains	Direct	No	No

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"> • Development Manager • Quality manager • Operations Manager (including service) 	<ul style="list-style-type: none"> • Advanced Service Manager • 4 Product Support (Factory) Specialists • Financial Analyst 	<ul style="list-style-type: none"> • Quality Manager • R&D Engineer • Quality Engineer • Support Specialist • Field Service Engineer 	<ul style="list-style-type: none"> • Chief Design Engineer • Customer Service Manager 	<ul style="list-style-type: none"> • Product Development Process Manager • Design consultant • Service manager (by telephone)
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 -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 Center -Warranty -Aircraft enhancements -Engineering support 	<ul style="list-style-type: none"> -Delivery service -User documentation -Repair -Call Centers -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 organization; 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 organization
9	Sales Channel	Direct sales	Accredited dealer network	Direct sales force	Direct sales force	Retail chains