

Availability of operator manuals for used consumer products

Michael S. Wogalter,^{1*} William J. Vigilante Jr¹ and Robin C. Baneth²

¹*Ergonomics Program, North Carolina State University, Department of Psychology, 640 Poe Hall, Raleigh, NC 27695-7801, USA*

²*Integrated Systems Solutions Corporation, Southbury, CT 06488-0248, USA*

(Received 9 September 1996; in revised form 14 July 1997)

This research investigates the availability of operator manuals for used (second-hand or resold) consumer products. One hundred people were solicited at a shopping mall and asked various questions about 20 common consumer products (e.g. car, computer, power lawn mower, bicycle, etc.). They were queried about: (a) whether they have ever purchased the products new and/or used and, if purchased used, whether it came with an operator manual or an instruction sheet, (b) whether they personally sold any of the products used, and if so, whether they transferred the operator manual to the receiver, (c) the desirability of having an operator manual; and (d) how much they would be willing to pay for a manual assuming they had to purchase it separately. Participants were also asked to rate each product on familiarity, hazard level, and difficulty of use, and to answer a set of general manual-related questions. A second survey solicited the opinions of 39 professional sellers (dealers) of used products. Findings from both surveys indicate that while operator manuals for some used products are transferred to purchasers at moderate frequencies, others are much lower. In general, participants believed that the inclusion of the operator manual would aid the sale of used products and they were willing to pay extra to have one (particularly for unfamiliar, more hazardous, difficult-to-use products). The results suggest that manufacturers ought to address ways that would make it more likely that consumers retain the operator manual and transfer it to subsequent purchasers at later resale. Additionally, convenient ways of obtaining replacement copies should be provided to ensure that important safety-related information reaches end users. © 1998 Elsevier Science Ltd. All rights reserved.

Keywords: consumer product safety, equipment safety, product labelling, manuals

Introduction

Most consumer products, when initially purchased, are accompanied by operator (or owner) manuals that describe their assembly, operation and maintenance. Typically operator manuals also include safety information concerning the precautions that should be taken while installing, using and storing the product. The presence of consumer-directed documentation is often an indication that the manufacturer was not able to design the product so that all of its features and hazards are readily apparent to users. Thus, the manufacturer must rely on supporting ancillary material to convey to users the product's functions, benefits and limitations. Accordingly, operator manuals can: (1) enhance the benefits and performance of the product in its intended use, (2) foster ease of use and satisfaction, (3) increase safety and (4) address product liability issues arising from consumer injury associated with the product (Lust *et al.*, 1995).

Over the last decade there has been tremendous growth in research concerned with the usability of documentation for various consumer goods and work-related equipment, particularly in high-tech computer-related domains (e.g. Perlman *et al.*, 1995). Much of this research focuses on the factors that facilitate users' ability to find, comprehend and use relevant material. Another area of research that has made formidable progress in recent years concerns safety warnings, focused on the design factors that influence saliency, comprehension and behavioural compliance (see e.g. Edworthy and Adams, 1996; Laughery *et al.*, 1994). Surprisingly, however, there is very little research for the overlap of these two research domains, more specifically, operator manuals, which generally contain both technical and safety material.

The few existing studies on the ergonomics of operator manuals have explored different aspects relating to their efficacy. Young and Wogalter (1990) demonstrated that participants who were exposed to operator manuals having both conspicuously printed warnings and pictorial symbols, comprehended and recalled the warning information better than those who only had conspicuously printed warnings or symbols alone or who had neither.

*Author to whom correspondence should be addressed

Using focus groups, Showers *et al* (1992) found results that suggested that presenting obvious statements first in a list of safety warnings can discourage readers from examining the remaining warnings. However in a subsequent study, Lust *et al* (1995) found no difference in recall and recognition for obvious (vs nonobvious) warnings presented first or interspersed in the manuals. Vigilante and Wogalter (1997), using warning statements in power tool manuals, were able to empirically construct lists of warnings in prioritized order based upon participant preferences. The authors also found that these preferred orderings could be predicted by ratings of the likelihood and severity of injury implied by the warning and the perceived importance of the warning.

Wogalter *et al* (1995) examined the use of a supplementary directive in motivating people to read and comply with certain set-up instructions in a computer disk-drive manual. They found that positioning the directive at strategic points, and in particular attaching it directly on the product such that it required physical interaction (e.g. removal of a warning sticker on the product's face before they could continue the installation process), significantly increased compliance with the tasks described in the manual. In a similar study, Conzola and Wogalter (1996) studied the effects of brief supplemental voice and print directives and warnings and found that the supplemental voice messages increased compliance and recall of the manual's warnings compared to no supplemental messages.

Research has also examined factors that influence consumers' reading of operator manuals. This research indicates that people are more willing to read the manual when they are unfamiliar with the product (Celuch *et al*, 1992; Wogalter *et al*, 1995; Wright *et al*, 1982). Similarly, people's willingness to read increases with the perceived complexity of the product (Wogalter *et al*, 1991; Wright *et al*, 1982). Wogalter *et al* (1995) found that with more familiar, knowledgeable users, it was necessary to locate a more intrusive supplemental directive to get them to open the manual.

Thus, in recent years research has begun to identify the factors that determine whether and to what extent people read operator manuals. An implicit assumption in the existing literature is that the manual is present or available to be used (such as when the product is purchased new) and that people simply make decisions on whether to peruse it or not. However, this may not be the case in the real world. Many kinds of consumer products are extremely durable and have life spans of many years and the product documentation may be lost. Moreover, these products may be passed on to subsequent owners/users without the original documentation.

The present research focuses on consumers' access to operator manuals for products that have been purchased second-hand; this has received virtually no attention by researchers except for one study. Rhoades *et al* (1991) offer evidence indicating that purchasers of used products may not receive an operator manual for some used products at resale. The Rhoades *et al* (1991) study has important implications for the safe, effective use of resold products. In particular, if the documentation is not transferred, subsequent consumers will not have access to warnings, safe operating procedures, specified maintenance requirements, replacement part numbers and other pertinent information given in the manual. Under these

circumstances, users of the equipment may be unaware of personal-injury and property-damage risks.

Rhoades *et al* (1991) surveyed only four kinds of products and interviewed only a few professional used-equipment dealers. Thus, while their results are suggestive, additional verification is needed to ensure their generalizability. The present research is a larger-scale study that first surveys 100 people with respect to access to the operator manuals for 20 consumer products, focusing primarily on used products that they purchased or sold. In addition, beliefs about the products and manuals were assessed. A second survey was also administered; it was similar to the first except it was distributed to professional used-equipment dealers.

Study 1

Consumers were surveyed on their purchase of 20 common consumer products. The main focus was on the availability and beliefs about manuals for used products.

Method

Participants. One-hundred individuals (50% females) were surveyed at public shopping markets in the Raleigh-Durham, North Carolina area. Participants ranged in age from 16 to 66 years ($M = 33.8$, $SD = 11.7$) and had completed 9-20 years of formal schooling ($M = 14.8$, $SD = 2.4$). In exchange for volunteering their time, participants were offered inexpensive gifts, each worth approximately one US dollar (e.g. a NC State University monogrammed pen-and-pencil set or a coupon for a free frozen yogurt at a nearby business establishment).

Materials. Participants were surveyed on 20 consumer product categories (see Table 1). These 20 consumer products were selected to reflect durable common goods that are sold new to original consumers with some type of documentation. Also, these products were selected on the basis that they are frequently sold in U.S. newspapers (classified advertisements) in used condition. Chemical, food, or perishable products were excluded.

Participants were asked: (a) whether they had ever purchased these products new and/or used, and for those they bought used, whether products were accompanied by an operator manual or instruction sheet; (b) whether they had personally sold any of the products to someone else, and if so, whether they transferred the operator manual to the new owner; (c) how much extra they would pay (in dollars) for a manual if it was not included as part of the used-product's resale; and (d) whether they had ever contacted the manufacturer of the used products that they purchased. Also, they rated each of the 20 products on familiarity, perceived hazard level, and difficulty of use. Ratings were made on nine-point (0-8) Likert-type scales anchored with 'not at all' and 'extremely' at the low and high ends, respectively.

In addition, the survey asked several general questions that were not specific to any given product including: (a) whether they had ever been frustrated or injured using a product when the manual was not available, and if so, they were asked to describe what happened; (b) to estimate the average amount of time it would take them to find a manual in their residence and (c) to indicate where

Table 1 Mean responses from a survey of consumers for 20 product categories

Product	Survey items									
	Purchased Used	Purch. used with manual	Purchased New	Sold Used	Sold used with manual	Contact mfr.	\$ value of manual	Familiarity rating	Hazard rating	Difficulty rating
Car	0.79	0.78	0.63	0.70	0.84	0.41	21.06	5.98	4.41	3.58
Motorcycle	0.16	0.38	0.13	0.15	0.53	0.02	9.98	2.48	5.88	4.43
Boat or boat motor	0.18	0.39	0.12	0.13	0.69	0.05	12.85	2.88	4.84	4.36
Bicycle	0.38	0.13	0.77	0.30	0.20	0.03	3.06	6.00	3.09	1.79
Microwave oven	0.09	0.67	0.67	0.15	0.73	0.07	4.93	5.71	2.75	2.99
Power lawn mower	0.21	0.43	0.63	0.16	0.50	0.05	4.76	4.69	4.78	3.14
Stereo receiver	0.17	0.35	0.13	0.12	0.50	0.12	6.66	5.05	1.10	3.22
Stereo tape deck	0.15	0.07	0.12	0.13	0.38	0.08	4.76	5.20	1.21	3.04
Compact disk player	0.08	0.50	0.77	0.06	0.50	0.09	5.70	4.64	1.26	3.47
Answering machine	0.10	0.60	0.67	0.13	0.46	0.11	5.48	5.26	0.86	3.27
Stereo speakers	0.19	0.05	0.76	0.13	0.31	0.08	4.04	5.34	0.97	2.25
VCR	0.11	0.36	0.75	0.11	0.82	0.08	8.46	5.33	1.09	4.59
Television	0.22	0.23	0.78	0.21	0.48	0.15	7.09	6.22	1.77	2.87
Video camcorder	0.01	0.00	0.23	0.03	0.33	0.02	8.03	3.66	1.22	4.76
Camera	0.13	0.31	0.66	0.07	0.43	0.06	6.76	4.97	0.85	4.14
Power tools	0.18	0.28	0.51	0.08	0.25	0.08	5.47	4.24	5.67	4.22
Exercise equipment	0.20	0.30	0.52	0.14	0.29	0.08	3.49	4.75	3.01	3.14
Computer or printer	0.12	0.58	0.40	0.09	0.89	0.12	15.40	4.28	1.56	5.70
Musical instrument	0.25	0.24	0.38	0.10	0.20	0.01	4.73	3.18	0.92	3.33
Washer or dryer	0.28	0.39	0.56	0.11	0.36	0.09	8.01	5.66	1.53	2.71

they usually store their manuals (for which several possible storage locations were listed). Participants were also asked (a) their opinion on whether the inclusion of a manual would help or hurt (or make no difference) in the sale of used equipment and (b) whether a sticker or label attached to the product giving the manufacturer's full address and phone number would be beneficial. Finally, participants answered a set of demographic questions (e.g., gender, age, education level attained, etc.).

Results

Participants' responses for the 20 products from the survey were aggregated across participants and are shown in Table 1.

At some point in their lives, participants reported having purchased, on average, 51% of the items new and 20% of the items used. Of those products purchased used, participants reported that only 35% came with an operator manual. The products most often resold with accompanying documentation were used cars (78%), microwave ovens (67%), answering machines (60%), and computers/printers (58%). The products reported to be least often resold with documentation were bicycles (13%) and televisions (23%).

The participants reported having resold, on average, 16% of the listed products ($M = 3.2$ product categories), and in these sales, claimed to have transferred the documentation 49% of the time. The products most often resold with the accompanying documentation were computers/printers (89%), cars (84%), and VCRs (82%). The products least often resold with accompanying documentation were bicycles (20%) and power tools (25%).

Across all products, participants reported that they would pay an average of \$7.54 extra for an operator manual if one was not available at the time of resale. Car ($M = \$21.06$), computer ($M = \15.40) and boat/motor ($M = \$12.85$) operator manuals were the most valued; bicycle ($M = \$3.06$) and exercise equipment ($M = \$3.49$) manuals were the least valued. These values were significantly and positively related to the products' perceived difficulty of use ($r = 0.55$, $p < 0.05$), having had phone

Table 2 A selection of participants' comments describing a frustration or injury experienced while trying to use, maintain or repair a product without having an operator manual available

'Trying to get my answering machine to record for more than 2 s.'
'Could not figure out how to properly hook up audio/video equipment after losing manual.'
'Trying to set automatic recording feature on my parents VCR.'
'I tried to change cord on weed trimmer and cut myself.'
'Repairing a battery to a watch.'
'Trying to operate electrical test equipment without knowing function available on front.'
'Because you don't know how to fix something if it's broken. You don't know if it's a simple problem or totally broke.'
'Bought a word processor without manual, but I got one 'free' from the company.'
'Difficulty using VCR—programming to record.'
'Washer: belt broken and needed part numbers to replace it.'
'Trying to program VCR; took a long time because I had no manual.'
'Had difficulty operating video and computer equipment.'
'A million frustrations while fixing cars, washers/dryers, power tools, lawn mowers, tractors, and other machinery. Lacking instructions necessitates a do-it-yourself, learn-by-doing, trial and error attitude.'
'My first microwave was used. I had no idea how to set it so I ordered a manual from the company.'
'Frustrated trying to use a camera.'
'Power mower developed problems and had to take it to a dealer.'
'Not knowing how to set up a TV and VCR correctly so sent for manual.'
'Frustrated in setting up computer with incorrect manual enclosed.'
'I had to order a manual for a used car before I could reset several panel instruments.'
'Putting together items, programming VCRs, TVs, etc.'
'In using a saw, it was not clearly indicated that a push stick and hold-down device was required to keep the wood from kicking back.'

contact with the product manufacturer ($r = 0.69$, $p < 0.05$), and reported transfer of the manual to the new owner of the used product ($r = 0.73$, $p < 0.05$).

Forty-seven percent reported that they had been frustrated or injured while trying to use a product because an operator manual was not available. Participants gave a wide variety of comments, some of which are listed in Table 2.

Participants estimated that it would take an average of 8.24 min ($SD = 7.5$) to locate a typical manual in their

residence. Various storage methods were reported. Sixty-six percent said they keep their manuals with other manuals all in one place, 14% said they keep them in various places, 11% keep them filed with other papers, 6% keep them with the original product packaging, and 3% reported other storage methods (including throwing them out). The estimated time to find the manuals differed as a function of storage type (ignoring the 'other' category), $F(3, 93) = 19.67, p < 0.0001$. Comparisons using Tukey's HSD test ($p < 0.05$) indicated that individuals who reported keeping their manuals in various places also reported significantly longer search times ($M = 19.3$ minutes) to locate the manuals compared to the other storage methods ($M = 6.24, 9.3,$ and 5.0 min for the in-one-place, with-original-packaging and filed-with-other papers methods, respectively). This was the only difference that was significant.

Eighty-nine percent said that the inclusion of an operator manual with the used product would make it more appealing to consumers to purchase the product. Finally, 96% agreed that the presence of a sticker or a label on the product with the manufacturer's full address and phone number would be beneficial.

Discussion

There are several implications that can be drawn from these results. First, the findings show that the operator manuals for used products may not be transferred from the original consumer to subsequent consumers. The highest level of operator manual receipt was 78% (automobiles) indicating that 22% of used-car purchases reportedly did not include the manual. For the vast majority of the other products, receipt of the manual was much less frequent, with levels as low as 5%. For example, receipt of a manual when purchasing a used bicycle was only 13%. This result is interesting in light of the fact that the US Consumer Product Safety Commission (1992) reports that approximately 650,000 hospital emergency room admissions per year are associated with bicycle accidents (one of the highest rates of any product sold in the US marketplace). It was also rated as one of the most familiar of the set of products included in the study. This familiarity may lead people to devalue the need for an operator manual, which in turn may lead people to possibly misplace it, throw it out or not pass it on at the time of resale. When this happens important information on the product's maintenance and safe use (e.g. replacing brake pads, wearing a helmet) is no longer readily available.

Second, these results indicate that people generally want manuals for used products. Desire to have the product documentation is supported by data showing that people are willing to pay an extra \$3–\$21 ($M = \$7.54$) for the document depending on the product category. In general, people were willing to pay more for operator manuals for products that were rated as more difficult to use and for which they had made contact with the manufacturer (another indication of difficulty of use). Also, the more difficult-to-use products were more likely to be passed on with the manual to the new owners at resale. Together, the results suggest operator manuals are most desired for complex products that have aspects about them that are not obvious.

The desirability of manuals is also suggested by other items on the survey. This can be seen in: (a) participants'

narrative comments with respect to injury and frustration when the manual was not available, (b) the systematic storage of manuals to ensure that they can be located later, (c) that its availability at the time of resale makes the product more appealing to purchase and (d) that a label on the product with the complete address and telephone number of the manufacturer was perceived as beneficial. In the latter case, access to the manufacturer not only addresses consumers' request for answers to technical questions about operation, maintenance/repair, and safety, but also enables consumers to request a replacement manual.

While operators of second-hand products may want and need the information contained in product manuals, it is apparent that the documentation does not always reach them. This occurs despite the manufacturers' attempts to reach consumers through the inclusion of a manual when the product is originally purchased.

Study 2

Often people obtain used products not only from other consumers but also from businesses. The issue addressed in a second survey is whether professional used-product salespersons have opinions similar to lay persons regarding the transfer and desirability of having operator manuals for the products they purchase and sell.

In this study, used-product dealers—persons who work in businesses that sell second-hand products—participated. The focus was to determine the extent to which they purchased and sold products without the operator manual and their beliefs regarding several dimensions related to product documentation.

Method

Participants. Thirty-nine professional used-product dealers participated: 21 pawnbrokers, six rental salespersons, and 12 used-car salespersons. They were surveyed at their places of business in the Raleigh–Durham, North Carolina area. Only a single individual at each business establishment was interviewed. All three groups were sampled in an attempt to survey a wide variety of professionals who sell used products.

Materials. The same set of 20 products as the first consumer survey was included in the dealer survey. However, the dealer survey had fewer questions and the questions were modified to fit the business nature of buying and selling used products. For each product, participants were asked to estimate the number of used products during the past year that their establishment: (a) sold to consumers, (b) sold to consumers with a manual and (c) purchased with a manual.

Additionally, a set of non-product-specific questions was asked. One item asked the dealers whether they would be more likely to purchase a used product if the manual was included; another asked whether they would be more likely to sell a used product if the manual was included. Both of these questions included the following alternative responses: (1) less likely, (2) no effect, (3) more likely. The dealers were also asked to estimate the percentage of customers requesting manuals and the percentage of lost sales when the manual is unavailable. Finally, they were

also asked where they keep the manuals at their places of business and their opinion on whether a permanently attached sticker or label with the manufacturer's full address and toll-free phone number would be beneficial.

Results

The results are analysed by dealer group. The data were not collapsed across dealer groups because individuals in these groups would not be expected to have equivalent experience in selling each of the product categories. For example, used-car dealers would be expected to sell only automobiles, motorcycles and perhaps boats/motors, whereas pawn shop dealers would be expected to sell many of the product types in the 20 item set. Differences and similarities between the three dealer groups are described.

Dealer sales. The pawn dealers had a much more varied product inventory than either the rental or automobile dealers. All 20 product-types listed in the survey were available for sale by at least one of the pawn dealers. Except for cars, motorcycles, washer/dryers, boats/boat engines, exercise equipment and computers/printers, all other products on the list were sold by at least 15 of the 21 pawn dealers surveyed. The product categories sold by rental dealers were more limited in range—mainly power tools and household electronics. The product categories sold by one or more of the six rental dealers were: (a) power lawn mowers and power tools (by four dealers), (b) VCRs, video cameras, and exercise equipment (by two dealers) and (c) televisions, stereo systems, and answering machines (by one dealer). The automobile dealers sold only cars. Because of the limited number of product categories sold by the rental and automobile dealers, only the data from the pawn dealers are described in the product-specific analyses in the next section.

Sales of used products by pawn dealers. Table 3 shows the number of pawn dealers that reported selling each of the 20 products. The table also shows their estimates in the past year of the total number of items sold and the

number of items sold with a manual and the total and proportion of items sold with a manual. The products with the highest proportion sold with a manual were cars, computers/printers, boats/motors, exercise equipment and VCRs. The products with the lowest proportion sold with a manual were power lawn mowers, power tools, cameras and motorcycles. However, some of these data are probably affected by sample size. In particular, caution should be exercised in interpreting infrequently stocked products (e.g. car, boat/motor).

Additionally, the table shows the total number of products that came with the manual when purchased by the pawn dealers for their business establishment. These data show considerable correspondence between the pawn dealers' estimates of the number of products purchased with a manual and the number of products sold with the manual ($r = 0.985$, $p = 0.0001$).

Transfer of manuals by dealers across products. Across all used products sold to consumers in the past year, the pawn dealers reported that approximately 19% of the items included the operator manual as part of the transaction. The automobile dealers reported that 54% of the cars that they sold included a manual. However, the rental dealers reported including a manual for only 8% of the products that they sold.

Dealer beliefs regarding operator manuals. Table 4 shows the tabulated responses to the item asking the dealers whether they would be more likely to purchase a used product if it came with a manual. In general, 46% of the dealers said that they were more likely to purchase a product if an operator manual was included, 49% said it would make no difference and 5% said that the manual would make the purchase less likely, $\chi^2(2) = 14.00$, $p < 0.001$. However, the table also shows that the purchase likelihoods differ as a function of dealer type. Pawn shop dealers reported that they were more likely to purchase used products if the manual was part of the transaction. However, this pattern is less apparent for the other two kinds of dealers, particularly the used-car

Table 3 Data obtained from pawn dealers on the 20 product categories

Product	Number of the 17 pawn dealers selling	Total number of used products sold	Total number sold with manual	Proportion sold with manual	Total number purchased with manual
Car	1	2	1	0.50	1
Motorcycle	2	11	1	0.09	1
Boat or boat motor	4	21	7	0.33	7
Bicycle	9	351	36	0.10	29
Microwave oven	16	1075	166	0.15	132
Power lawn mower	13	286	12	0.04	25
Stereo receiver	15	1023	246	0.24	151
Stereo tape deck	15	864	189	0.22	114
Compact disk player	14	1201	354	0.29	328
Answering machine	14	301	44	0.15	50
Stereo speakers	15	761	141	0.19	98
VCR	15	1673	500	0.30	436
Television	15	1398	211	0.15	166
Video camcorder	14	199	50	0.25	52
Camera	13	1285	122	0.09	123
Power tools	13	1820	110	0.06	103
Exercise equipment	5	28	9	0.32	8
Computer or printer	6	72	29	0.40	24
Musical instrument	13	2250	608	0.27	612
Washer or dryer	1	10	1	0.10	1

Table 4 Dealer beliefs of the effect of manual availability has on consumers' purchase of a used product

	Less	No effect	More	Total
Pawn	0	8	13	21
Rental	0	3	3	6
Automobiles	2	8	2	12
Total	2	19	18	39

dealers. Chi-square analysis on the nine-cell data set shown in *Table 4* is not significant at the conventional level of significance, $\chi^2(4) = 9.19$, $p = 0.06$. However, when the 'less' and 'no effect' categories are combined to form a six-cell matrix, a significant dependency between dealer type and response category was found, $\chi^2(2) = 6.33$, $p < 0.05$.

Table 5 shows dealers' beliefs about the salability of products when the manual is included. A consistent pattern across dealer types can be seen. In general, 69% of those surveyed indicated that including the manual helps to sell the product, 28% said it would make no difference, and 3% said it would hurt the sale, $\chi^2(2) = 26.46$, $p = 0.001$. Chi-square analyses on the nine- or six-cell data sets (as described earlier) showed no significant differences among dealer types, $\chi^2(4) = 6.19$, $p = 0.18$, and $\chi^2(2) = 4.80$, $p = 0.09$, respectively.

The dealers reported that 34.6% of their customers specifically request the manual when considering a purchase. They also estimated that 5.9% of their potential sales are lost due to the unavailability of the manual. There were no significant differences among dealer types for these two (consumer-request and sales-lost) items, p 's > 0.05 .

Table 6 shows the methods of storing the manuals for the used products. Virtually all of the pawn and automobile dealers keep the manual with the product. However, the rental dealers showed a tendency to store all of the manuals in a single location. A chi-square analysis of the data in *Table 6* was significant, $\chi^2(2) = 20.4$, $p < 0.0001$.

Table 7 shows the dealers' beliefs regarding the benefits of having a permanently attached sticker or label on the product with the manufacturer's address and telephone number. All of the pawn dealers, and all but one of the rental dealers, agreed that this information would be worthwhile. Six of the 11 automobile dealers also agreed, but two disagreed and three did not know. A Chi-square analysis of these data was significant, $\chi^2(4) = 12.00$, $p < 0.05$.

Discussion

This second survey dealt with the information gathered from professional used-equipment dealers. These individuals make their living from the sale and rental of used products and have an interest in doing what they can to enhance sales. In general, the results indicate that professional used-equipment dealers believe that (1) operator manuals are an important consideration in the purchase of used products by their establishment (although the trend is not as strong for rental and car dealers), (2) inclusion of the manual helps in the sale of products to consumers and (3) some sales are lost if the manual is not available. Also the dealers reported that approximately 35% of their customers ask about the manual when

Table 5 Dealer beliefs of the effect of manual availability on the sale of a used product to consumers

	Less	No effect	More	Total
Pawn	1	5	15	21
Rental	0	4	2	6
Automobiles	0	2	10	12
Total	1	11	27	39

Table 6 Methods of storing operator manuals by used-product dealers

	With the product	With other manuals	Total
Pawn	19	2	21
Rental	1	5	6
Automobiles	11	0	11
Total	31	7	38

Table 7 Dealer beliefs on whether a permanent on-product label with the manufacturer's full address and phone number would be beneficial

	No	Don't know	Yes	Total
Pawn	0	0	21	21
Rental	0	1	5	6
Automobiles	2	3	6	11
Total	2	4	32	38

considering a product purchase. Despite these indications that manuals are important, the data collected from the dealers indicate that purchasers of used products frequently do not receive the manual. In fact, only 10 of the 20 product categories were sold with manuals at levels above 20%. The low levels of manual transfer is apparently not due to the dealers (at least for the pawn dealers). The correspondence with the total number of products purchased and sold with manuals by the pawn dealers in the past year suggests that they tend to transfer the manuals if they received them in the first place. Possibly this high level of transfer is facilitated by the storage methods that they employ. They report keeping the manuals with the products and therefore do not have to look for them at the time of sale.

Although the reported loss in sales because of unavailable manuals appears relatively low (about 6%), the monetary loss for the establishment could be substantial over the long run. Moreover, the lack of a manual probably affects the transaction in another less obvious way since it can facilitate the demonstration of the product's operation and features to customers by the dealers.

Most of the dealers (except one rental and a few car dealers) believed having a permanently attached label on the product with the manufacturer's address and telephone number is a good idea. This label could assist in contacting the manufacturer to ask for help on technical questions and for a replacement manual if needed.

Finally, one limitation of this study should be noted. We sampled three groups of dealers in an attempt to survey a wide variety of professionals who sell used products. However, these three groups (pawnbrokers, rental salespersons and used-car sales persons) do not comprise the whole set of used product dealers in the US.

For example, professional antique dealers and sellers of used goods at 'flea-markets' could have been sampled but were not. This restricted sampling could limit the findings' generalizability.

General discussion

The results from these studies suggest that purchasers (professionals and lay consumers) of used equipment frequently do not receive the documentation that originally accompanied the product when it was new. Access to the manual is essential to inform users of the safe set-up, operation and maintenance of the product, to promote consumer satisfaction, and to reduce the potential for personal injury and product damage.

Manufacturers should encourage original (and subsequent) purchasers of their products to retain the operator manual (i.e. to store it in a place where they can find it later such as with the product itself or filed in one place with other manuals). Retention and accessibility of the manual is important not only to aid consumers who purchase the product new, but also to facilitate the transfer of the manual upon any subsequent resale to another person. One possible way to encourage this behaviour is to explicitly emphasize the manual's value with respect to its usefulness for them and future users (e.g. that it contains information on how to avoid serious injury, maintenance, etc.). Also, consumers might be further persuaded if told that the product is more appealing to potential purchasers if the manual is included in the transaction. Moreover, purchasers of second-hand products should be made aware that they may need to explicitly request the manual from the seller (i.e. to avoid its being forgotten despite its being available).

With 66% of the participants reporting they prefer to keep the manuals with the product, it might be possible to incorporate a compartment in some products to store the operator manual. Automobiles and boats already have such compartments, but other kinds of products (e.g. stereo receivers, VCRs, etc.) probably could also be designed to incorporate a small drawer on their underside that would hold the manual.

Also, manufacturers should provide convenient ways in which consumers and dealers can request a replacement copy of the documentation if the original becomes inaccessible. One way to accomplish this is to attach a permanent label on the product which gives the full name, address and phone number of the manufacturer and a product identification number. Virtually all of the participants (both surveys) favoured having this information on products. Also, the results show that consumers are willing to pay extra for a manual if one is not available, indicating that manufacturers can charge a reasonable amount for a replacement copy. This finding indicates that the costs of servicing the requests are probably recoverable through sales of the documentation. In addition to serving the public well, such practices might reduce the likelihood of product liability lawsuits that frequently accompany severe product-related injuries in the US.

There are three limitations of the present research that should be mentioned. First, the 20 product categories were not chosen randomly. They were selected to represent a range of durable consumer products that (a) include

documentation when sold to the original consumer and (b) may be sold to another consumer in used condition with or without the documentation. Nevertheless, this restricted sampling may limit the study's generalizability to other kinds of consumer products.

Second, the primary purpose of the manual differs depending on the product. For example, the primary purpose of an automobile manual may be to provide information on routine maintenance. However, the primary purpose of a VCR manual is to allow the owner to set-up and operate the device, and this may be impossible without the manual. For other products, such as power tools, the primary purpose may be to communicate important safety information. The products could be categorized on the basis of how the manual is used, in order to determine reasons for the desirability of the manual. At this point we do not know the reasons why people would want to pay more for some product manuals compared to others. However, the focus of this initial research was not to delineate how people use product manuals; additional research is necessary to address this issue.

Third, there were a few broad nonspecific questions that were asked in the surveys including, e.g. 'Have you ever contacted the manufacturer of a used product you purchased?' Responses to this question are difficult to interpret because we do not know why the consumer contacted the manufacturer (e.g. to request a manual, to order replacement parts, etc.). More specific questions could be asked in future research to determine why people contact manufacturers and how this relates to manual use.

Lastly, new and developing technology could provide effective alternatives to conventional paper documentation for delivering product information to consumers. For example, product documentation is increasingly being made available electronically on various computer storage systems (e.g. on floppy disk or CD-ROM) or accessible by modem (e.g. through the Internet, commercial on-line services and electronic bulletin boards) or by phone or fax. Additionally, many consumers now have ready access to cassette players and VCRs. Use of this equipment not only allows presentation of product information in a highly salient manner but also can provide real-time demonstration of the product being used correctly (Racicot and Wogalter, 1995; Wogalter and Young, 1991). These alternative methods of information disclosure are likely to complement the conventional product manual.

Acknowledgements

We would like to thank Stephanie Terry for assisting us in carrying out this research. Portions of this research (the first survey) were presented at the 38th Annual Meeting of the Human Factors and Ergonomics Society in Nashville, Tennessee, USA (Wogalter and Baneth, 1994).

References

- Celuch, K. G., Lust, J. A. and Showers, L. (1992) Product operator manuals: an exploratory study of nonreaders versus readers *J Applied Social Psychology* 22, 492-507
- Conzola, V. C. and Wogalter, M. S. (1996) Compliance and recall of operator manual instructions: the use of supplemental voice and print directives and warnings' in Mital, A., Kruegger, H., Kumar, S.

- Menozi, M. and Fernandez, J. E.** (eds) *Advances in Occupational Ergonomics and Safety I*, International Society for Occupational Ergonomics and Safety, Cincinnati, pp 936-941
- Edworthy, J. and Adams, A.** (1996) *Warning Design: A Research Perspective*. Taylor & Francis, London
- Godfrey, S. S., Allender, L. E., Laughery, K. R. and Smith, V. L.** (1983) Warning messages: will the consumer bother to look? in *Proceedings of the Human Factors Society 27th Annual Meeting*, pp 950-954
- Godfrey, S. S. and Laughery, K. R.** (1984) The biasing effects of product familiarity on consumers' awareness of hazard in *Proceedings of the Human Factors Society 28th Annual Meeting*, pp 388-392
- Laughery, K. R., Wogalter, M. S. and Young, S. L.** (eds.) (1994) *Human Factors Perspectives on Warnings: Selections from Human Factors and Ergonomics Society Annual Meetings 1980-1993*, Human Factors and Ergonomics Society, Santa Monica, CA.
- Lust, J. A., Celuch, K. G. and Showers, L.** (1995) An investigation of the effects of placement of obvious warnings and safety warning format in product owner manuals in *Proceedings of the Marketing and Public Policy Conference*, pp 11-20
- Perlman, G., Greene, G. and Wogalter, M. S.** (eds.) (1995) *Human Factors Perspectives on Human-Computer Interaction: Selections from Human Factors and Ergonomics Society Annual Meetings 1983-1994*, Human Factors and Ergonomics Society, Santa Monica, CA
- Racicot, B. M. and Wogalter, M. S.** (1995) Effects of a video warning sign and social modeling on behavioral compliance *Accident Analysis and Prevention* 27, 57-64
- Rhoades, T. P., Frantz, J. P. and Hopp, K. M.** (1991) Product information: is it transferred to the second owner of a product? *Proceedings of Interface '91*, Human Factors Society, Santa Monica, pp 100-104
- Showers, L., Celuch, K. G. and Lust, J. A.** (1992) Consumers use of product operator manuals' *Advancing the Consumer Interest*, 4, 22-28
- U.S. Consumer Product Safety Commission** 1992 NEISS Product Summary Report, (US CPSC, Washington, DC)
- Vigilante, Jr., W. J. and Wogalter, M. S.** (1996) On the prioritization of safety warnings in product manual *Int J Ind Ergonomics*, 20, 277-285
- Wogalter, M. S. and Baneth, R. C.** (1994) Availability of owner's manuals for second-hand consumer products in *Proceedings of the Human Factors and Ergonomics Society 38th Annual Meeting*, pp 447-450
- Wogalter, M. S., Barlow, T. and Murphy, S. A.** (1995) Compliance to operator's manual warnings: the influence of familiarity and the placement of a supplemental directive *Ergonomics* 38, 1081-1091
- Wogalter, M. S., Brems, D. J. and Martin, E. G.** (1993) Risk perception of common consumer products: judgments of accident frequency and precautionary intent *J Safety Res*, 24, 97-106
- Wogalter, M. S., Brelsford, J. W., Desaulniers, D. R. and Laughery, K. R.** (1991) Consumer product warnings: the role of hazard perception *J Safety Res*, 22, 71-82
- Wogalter, M. S. and Young, S. L.** (1991) Behavioral compliance to voice and print warnings *Ergonomics*, 34, 79-89
- Wright, P., Creighton, P. and Threlfall, S. M.** (1982) Some factors determining when instructions will be read *Ergonomics* 25, 225-237
- Young, S. L. and Wogalter, M. S.** (1990) Comprehension and memory of instruction manual warnings: conspicuous print and pictorial icons *Human Factors* 32, 637-649