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AN EMPIRICAL INVESTIGATION OF FUNCTIONAL ROLE EVALUATIVE CRITERIA IN AN INDUSTRIAL PURCHASE DECISION

Daniel H. McQuiston and Rockney G. Walters

A factor analytic methodology is used to measure and interpret the evaluative criteria used by the functional roles represented in an industrial decision making unit during their consideration to purchase a piece of capital equipment. The results of the study indicate that the criteria employed by each decision maker during the evaluation of this equipment varied by functional role. The attributes contained in each evaluative dimension were directly related to each functional role's primary job responsibility.

INTRODUCTION

A generally accepted view in organizational buying behavior is that most purchase decisions in an organization are made by a buying center or decision making unit (DMU) -- that collection of individuals whose input receives some consideration in the purchase decision. Choffray and Lilien (1980) propose that an individual will go through a four-step process to make a decision about an industrial product: perception, evaluation, preference, and choice. For the industrial vendor, the evaluation stage is of key importance because it is here that the individual decision maker will compare the attributes of each of the product alternatives in an effort to determine how each will meet the needs of the project. The purpose of this study is to examine an actual purchase of a piece of capital equipment by a number of business firms to (1) determine how different functional roles in the DMU grouped product attributes into composite dimensions, and (2) to determine if these dimensions differed across functional roles. By discovering more about which criteria are used in the evaluation of a product, marketing managers can better direct their communications to different members of the DMU. Marketing researchers can also benefit from these findings by gaining a better understanding of the complexities of the industrial decision process.

PREVIOUS RESEARCH

There have been a number of studies which have examined the evaluative criteria of organizational buyers (e.g., Dickson 1966, Pingry 1974). Generally, these studies found: (a) when evaluating a product industrial buyers consider a long list of product attributes; (b) different roles within an organization attach different degrees of importance to these attributes; and (c) the individuals involved and their evaluative criteria can vary by both the product and type of situation. However, even though industrial decision makers will consider a lengthy list of attributes in their evaluation of a product, research has shown that they will not be able to recall all the positive and negative points about each attribute. This is due to the fact that individuals have limited cognitive capabilities, and as a result can process only a limited amount of information at any given time. When placed in a situation where a large amount of information must be processed, individuals are likely to adopt a simplifying strategy which will involve grouping a large number of product attributes into a smaller number of composite evaluative dimensions according to some type of communality between them (Bettman 1979). The dimensions that are retained will be those that are most salient to the individual buyer. These composite dimensions are then used in place of the individual attributes in the subsequent evaluation process. For example, an industrial buyer may consider the attributes of past experience, vendor reputation, product test results, and extent of warranty in his or her evaluation. However, rather than try and remember each point about each attribute, he or she will combine them into a single evaluative dimension and assign it a name something like "product quality". In any future evaluation of the product, the individual will refer to this one composite dimension rather than the individual attributes.

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THE RESEARCH PROJECT

Data for the study were collected with the aid of a large manufacturer of capital equipment. Customer firms who had purchased one of three models of a single product line (commercial weighing equipment) within the 18 months immediately preceding the collection of the data were chosen for study (company records previous to that time were incomplete). Each model in the product line had a number of different components -- that is, a buyer could purchase the entire "package" or only a portion of it. The product was highly technical in nature and represented a major expenditure (\$25,000) for most firms when they bought the entire package.

The product attributes chosen for study were determined using a two-step procedure. An initial session was held by a researcher with the director of marketing research and two product managers of the sponsoring company. Based on their experience in dealing with the sale of this product, this session produced a list of 23 possible product attributes that prospective purchasers might consider in their evaluation of this equipment (product attributes include both core and augmented attributes -- e.g., service quality, compatibility with facility, etc.). A pretest was then conducted with individuals in organizations that had actually purchased the product who offered their suggestions as to any additions or deletions from this list. Based upon their recommendations, the list was revised to add, subtract, and combine certain attributes. This resulted in the present list of the 18 attributes. A second pretest was then conducted with a different set of actual purchasers to gain their opinions of the revisions. The general conclusion among them was that these 18 attributes included all the important considerations they had used when evaluating the equipment; therefore, no further revision was deemed necessary.

The data come from a self-administered questionnaire mailed to respondents. Sales representatives of the vendor company provided the name of one individual in each of the purchasing organizations whom they felt to be the key informant. The key informants were sent a prenotification letter and then contacted by telephone. The purpose of the telephone call was not only to secure their cooperation in the study but to obtain the names of other individuals in the organization who had had some input into the purchase decision. These other individuals were then contacted by telephone to verify their participation in the decision, secure their cooperation in the study, and identify other members of the decision making unit. A total of 273 questionnaires were sent out, of which 160 (58.6%) were returned and usable for this analysis. A total of 77 different companies representing a variety of different industries were contained in the sample. Of the 160 usable responses, 33 (21 percent) were in purchasing, 28 (17 percent) were in plant management, 56 (35 percent) in engineering, and 43 (27 percent) in operations.

DATA ANALYSIS

Factor analysis is ideally suited for the task of studying differences in evaluative criteria in that it can take the product attributes under consideration by different functional roles and reduce them into a smaller set of independent evaluative dimensions. Choffray and Lilien (1980) have developed a methodology for examining differences in evaluative criteria. Briefly, respondents are divided up into homogeneous groups and asked to give importance ratings on a number of different attributes. A covariance matrix is computed for each group on all attributes. The matrices between groups are then tested for equality. If the matrices are equal a factor analysis is performed on the pooled sample; if they are not equal, a separate factor analysis is performed for each group.

Each respondent gave an importance rating for each of the 18 product attributes. A 5-point scale was employed, with '1' designating "very unimportant" and '5' designating "very important". Ratings were collected for each of the following attributes:

Vendor offers a broad line	Many options available
Ease of maintenance	Competence of service technician
Overall service quality	Product warranty
Delivery (lead time)	Construction costs
Time to install	Having lowest price
Vendors willingness to negotiate price	Financial stability of vendor
Vendor's reputation for quality	Salesperson competence
Compatibility with facility	Ability to interface with computer
Recommendations from other purchasers	"Turnkey" installation available

Respondents self-selected themselves into one of four groups: purchasing, management, engineering, or operations. Each group's variance-covariance matrix was estimated and tested for equality with the other groups. The hypothesis of equality of the matrices was rejected. Therefore, a factor analysis with varimax rotation was performed for each of the four groups.¹

RESULTS

The results of the factor analysis are provided in Table 1 and show some interesting findings. The most obvious is that purchasing and plant management retained two evaluative dimensions of criteria while engineering and operations retained four. While purchasing and plant management retained only two dimensions, more product attributes were contained in these dimensions. While having fewer dimensions suggests that purchasing and plant management employed a less complex evaluative process than did engineering and operations, the fact that more attributes are contained in these dimensions reflects a more global frame of reference and shows that there are similar ratings on a number of different attributes. Another observation is that each functional role formed their evaluative criteria based on how the product would affect the completion of their assigned job responsibility. This is in line with previous research that has proposed that employees will strive to improve their performance on those activities of their job which are measured and rewarded (Anderson and Chambers 1985). In the sections below, each role will be examined separately.

Previous research has shown that in highly technical purchase situations such as this one the purchasing function will employ a less cognitively complex evaluation process than other roles (Scott and Wright 1976) and will typically act as the 'gatekeeper' -- gathering and distributing information to other members of the DMU as necessary. Their task will be to provide information to each member of the DMU as they require it. Because each member of the DMU will consider a number of different attributes about the product, the purchasing agent will have to collect a lot of information to supply these needs. Thus, purchasing will be concerned about a large number of attributes, but mostly from the standpoint of gathering sufficient information to distribute to other members.

Looking at the attributes in the two dimensions retained by purchasing, two distinct patterns are noticed. While eight different attributes load on the first factor, they generally reflect a concern with pre-transaction evaluation -- factors that would have to be resolved before the sale would be completed. These concerns are shown by the wide range of areas that are included in the first factor -- product concerns (lowest price, warranty), vendor concerns (financial stability, reputation), flexibility concerns (broad line, product options), and availability concerns (time to install, computer interface). The second factor retained by purchasing appears to reflect more of a post-transaction evaluation -- concerns that would have to be dealt with after the sale was consummated. These attributes, while fewer in number, still reflect the gatekeeper role of the purchasing function. They indicate a concern with cost of implementation (construction costs, compatibility) and service (maintenance, service quality).

The primary job responsibility of the plant manager is the smooth and profitable running of the entire facility. Because this includes virtually all of the activities of the facility, plant managers also have a wide range of concerns. This evidenced by the number and nature of the attributes that are present in both dimensions. Factor one reflects an overriding concern with product reliability -- dealing with a reputable company that is able to stand behind what they sell (service, warranty, reputation). The second factor shows management's concern with profitability -- that the product is flexible and has the ability to contribute to the productivity of the facility. This is reflected by the attributes of available options, compatibility, and low price that are found in this factor.

Factor analysis of the engineering and operations functions reveals significant differences between the evaluative dimensions retained by these roles. Because the job responsibilities of these roles tend to revolve around a much more defined set of responsibilities than either purchasing or management, the dimensions contain fewer attributes that are more focused around the successful completion of the main job function.

The engineering function would be primarily responsible for determining the specifications for the project and endeavoring to find the product that would best meet them. Because the specifications will to a large extent determine the product that will be selected, engineering will want to participate to ensure that a product is chosen that will perform satisfactorily in both the short and long term. This concern is reflected in the first factor of service capabilities -- once the product is installed, can it be expected to be serviced efficiently. There is also a concern as to whether the product will perform up to the stated expectations. This is reflected in factor three -- the reputation of the vendor and whether the product can be easily maintained.

Conventional wisdom in organizational buying behavior has usually been that engineering was concerned mainly with the performance of the product with little regard for other factors. However, the remaining two dimensions retained by engineering appear to refute this premise. Factor two is directly related to costs -- price of

TABLE 1
A COMPARISON OF FACTOR SOLUTION FOR THE FOUR FUNCTIONAL ROLES^a

	Purchasing	Management	Engineering	Operations
Factor 1	Vendor offers a broad line	Competence of service technician	Competence of service technician	Ease of maintenance
	Many product options available	Overall quality of service	Overall quality of service	Competence of service technician
	Product warranty	Product warranty	Product warranty	
	Time to install	Salesperson competence		
	Equipment is lowest price	Vendor's reputation for quality		
	Financial stability of vendor			
	Vendor's reputation for quality			
Factor 2	Ease of maintenance	Vendor offers a broad line	Construction costs	Construction costs
	Overall quality of service	Many product options available	Equipment is lowest price	Salesperson competence
	Construction costs	Equipment is lowest price		
	Compatibility with existing facilities	Compatibility with existing facilities		
Factor 3			Ease of maintenance	Time to install
			Vendor's reputation for quality	Delivery (lead time)
Factor 4			Financial stability of vendor	Product warranty
			Salesperson competence	Vendor's willingness to negotiate price
				Financial stability of vendor

^aAttributes with factor loadings of approximately .5 or more presented in table. More than two attributes had to load on a factor for it to be considered

the equipment and construction costs to install it. Thus, not only are engineers concerned that the equipment meet the project specifications, but they are also interested in whether it can do so economically. Factor four shows a broader concern with the competence of the vendor company and its employees. Evidently, engineering wants to ensure that if their company expends a lot of resources for the equipment that the vendor company has the financial strength to stay in business.

The primary job responsibility of the operations function is getting the equipment up and running and having the resources available to keep it operational. This is reflected in the first and third factors. The underlying dimension behind factor one is clear -- how well the product will be maintained. Factor three centers around the time before the product can be operational, being mainly concerned with delivery and installation time.

As with the engineering function, the operations function showed a concern with cost factors, albeit in a different manner. Factor two is a combination of construction costs and salesperson competence. In some cases, their department may be operated as its own profit center and operations personnel will be concerned with the costs of installing and operating the equipment. This translates into operations wanting an idea of what the equipment would cost and, because of the highly technical nature of the product, depending upon the sales representative to give them an accurate assessment of that cost. Factor four is a combination of a number of economic concerns. One attribute, financial stability of vendor, indicates a concern with the vendor company being able to stand behind what they sell. The other attribute, vendor's willingness to negotiate price, indicates a general concern with obtaining the best value for the money.

DISCUSSION

The results obtained in this study provide useful information for both industrial marketing practitioners and researchers. For practitioners, insight is gained as to how different members of a decision making unit evaluate a product described by a larger number of product attributes. By determining the evaluative criteria used by different functional roles, vendors can better develop sales presentations and advertising themes in order to reflect the differences in criteria across roles. Vendors can expand the use of the factor analytic procedure to determine differences in the evaluative criteria used by various decision makers in different industries for an assortment of product lines and characteristics. This information will help the vendor develop profiles of users and prospective clients which can aid them in their marketing efforts.

These results have interesting implications for industrial marketing researchers as well. The finding that purchasing agents and managers use fewer evaluative criteria than engineers and operations personnel supports the findings of previous research that the former two functions employ a less complex evaluative process for this type of purchase situation. Therefore, researchers who survey only purchasing agents may not be capturing the full complexity of the organizational decision making process. Also, the differences in criteria across the four functional roles presents vendors with the difficult task of effectively communicating the competitive advantages of different product attributes to the various members of the DMU. One way to make the task easier would be to achieve some level of coordination between the marketing research department, the advertising department, and the sales force. The role of the marketing research department would be to determine which product attributes each functional role considers important and how these attributes are grouped into evaluative criteria using the above procedure. This information could then be forwarded to the sales and advertising departments who would in turn develop communication themes to reflect the differences in evaluative criteria between functional roles.

The present study is subject to several limitations. First, since factor analysis is used to assess differences in evaluative criteria across different functional roles, the various limitations associated with the technique apply. These limitations include the subjective aspects of factor analysis such as determining the number of factors to use, the naming of the factors, the type of rotation to employ, and interpretation of the factors. A second limitation of the study is the generalizability of the findings to all industrial purchase decisions. The product examined in this study was an infrequently purchased, major piece of capital equipment. Thus, the product attributes regarded as salient by different roles in the organization may change according to the nature of the purchase decision. For example, the finding that operations personnel was the only group concerned about willingness to negotiate price and a similar discovery that only managers were concerned with equipment options and compatibility may be specific to a new purchase and not important when members of the DMU are more familiar with the product.

CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

The findings of this study provide results which benefit both marketing practitioners and researchers. Practitioners should note that significant differences in the evaluative used by different members of the DMU indicates the importance of tailoring their marketing communication to different groups to increase the chances of making the sale. For researchers, future studies must broaden their scope of inquiry to include not only the purchasing function, but other members represented in the DMU in order to capture more accurately the true nature and full complexity of the industrial decision process.

The results of this study indicate that evaluative criteria differ across functional roles in the purchase of a new piece of capital equipment. The task for future researchers is to determine what other factors present in an industrial purchase situation (e.g., perceived importance, competitive activity, time pressure) will effect the evaluative criteria of each functional role. This study, combined with the suggested future research, can provide more insight into the complex area of industrial decision making.

FOOTNOTES

¹A table with the factor loadings is available from the authors upon request.

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