Optimal warranty arrangements for the design of accounting information systems

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Abstract

This paper investigates optimal price/warranty arrangements for the design of accounting information systems (AISs) when the user of the system has alternative sources of information. A mathematical model is developed that focuses on two systems design scenarios commonly encountered in practice: (1) enhancement and (2) replacement. In an enhancement scenario the AIS user hires the AIS designer to enhance the value of the current AIS by incorporating additional features into the original system. Systems replacement, on the other hand, implies that the designer produces a new system that makes the original system obsolete. Under a replacement system, a simple limited warranty implements the user's optimal decision rule so that no losses occur due to unobservability of the user's decision. For the enhanced AIS design however, the user's action may depend upon the signal from the user's preexisting AIS. Therefore, when the user's decision is not observable, the designer does not know if the user's decision is a result of the systems enhancement or a result of the original system. Due to incomplete contracts, a more complex and costly warranty arrangement is required. Hence, losses occur under enhancement AIS although quality can be maintained with a limited warranty. Since it is difficult to assess the quality of the information system prior to purchase, the potential for a market failure exists where high-quality systems are driven from the market by low quality systems. These findings show that a market failure can be prevented in the design of information systems through contractual warranty arrangements. These warranty arrangements, however, must be tailored to the specific design task. © 2000 Elsevier Science Inc. All rights reserved.

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1. Introduction and background

This paper examines the issues inherent in contracting for the design of information systems when the system user has alternative informational sources. We develop a principal–agent model where the system user hires a system designer to develop an accounting information system (AIS) to aid in the user's decision-making. Due to unobservability of the system development, the quality of the information system can only be detected by observing an outcome affected by the user's decisions. However, the user's decisions may be a result of information from the alternative sources rather than the system provided by the developer, providing additional complication in the contracting process.

The intangible nature of information provides for unique contracting problems.[1] Cushing (1990) noted that the information system development process is characterized by the existence of some degree of friction between system users and system designers. If these two parties do not have perfectly congruent goals, a contract is developed to specify their relationship. The inability to monitor the designer directly leads to the use of performance measures to represent the designer's actions to the user.

Unless such performance measures can be developed, high quality may not be sustained in the market for information systems. As with many products, the user cannot readily discern the quality of the information system prior to using it and, at the same time, increased quality may prove costly to the designer. Applying the theory of the market for lemons (Akerloff, 1970), users without additional information on system quality will tend to underprice higher-quality systems while overpricing lower-quality systems. Therefore, as designers of high-quality systems do not recoup their investment, low quality systems will push high-quality systems from the marketplace. Such a market failure can be avoided if the designers of higher-quality information systems can credibly signal that quality to the marketplace (see, for example, Spence, 1974). One such signaling process found in the market for many products is a limited warranty (see Cooper and Ross, 1985; Mann and Wissink, 1988). With a limited warranty, the designer promises to share the risk of product failure between him and the user.

In the particular case of AISs the measurement of product failure is determined by the specific purpose of the AIS. AISs normally support two broad functions in an organization. The first of these functions performs structured financial transaction processing and success may be measured by the accuracy and timelessness by which reliable reports are generated. This function reports on past events rather than predicting future events.

The second function is to aid in managerial decision-making. In this case, the AIS aids the user in making decisions under uncertainty to achieve some risky outcome (for example, profitability). The ultimate measure of the AIS's success is its ability to predict future random events. The user brings to the problem a level of expertise that presents itself in the form of using the AIS to aid in the choice of possible decision alternatives.

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[1] Examples of studies examining contracting issues in information systems include Gurbaxani and Kemerer (1990), Whang (1992), Richmond et al. (1992), Banker and Kemerer (1992), Arya et al. (1997) and Rasch and Yost (1997).