Portfolio Selection For Service Systems

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ABSTRACT

The decision of selecting the portfolio of services to be included in a service system and the issues that complicate this decision problem are discussed. A general portfolio decision making framework is presented and compared with the Microsoft® Operations Framework (MOF) Business/IT Alignment Service Management Function (SMF).

Keywords: service system, portfolio selection, decision problem

INTRODUCTION

*I*n the broadest sense, a service system is any type of system designed and constructed to provide and sustain services. That includes for example a bank, providing loan and money management services; a government agency, such as the Virginia Department of Motor Vehicles, providing services including the issuing of drivers' licenses, titling cars, etc.; or an automatic teller machine (ATM) that allows customers to get cash on a credit or debit card. Another example of a service system may be a Web page for an on-line travel reservation business. Services may be include booking airline flights, booking hotels, booking rental cars, and booking tickets to specific events. To book a flight, the system may provide services that allow customers to search for the cheapest flights at specific dates, or within a range of dates. It may provide services to search for the cheapest airports from which to fly or to which to fly, within a specific country or area. The possibilities are huge, but for economic and technical reasons, the Web page must restrict itself to a limited number of services. More options may satisfy more customers, but more options also make the system more complex and expensive. A service system may be, but does not have to be, information technology (IT) based.

A service system both provides, as well as consumes services. Thus a bank consumes services such as electronic money transfers from other institutions, credit checks on loan applicants, and delivery of bills and coins for customers. The Department of Motor Vehicles consumes services such as identity and record checks of customers, title checks for cars, etc. An ATM consumes services such as account balance checks of the customers, validity checks of the credit or debit cards, and restocking of cash. The consumption of services is required in order for the service system to provide its designated services.

Selecting the precise set of services to be included in a service system is not a trivial problem. For example, what type of loans should the bank provide? What type of money management accounts should it provide, such as checking and savings accounts? What specific services should be provided by an ATM? Should it be able to dispense any amount of cash, or only designated amounts, such as $50, $100, and $200? Should it be able to give change, i.e. allow a customer to insert a $100 bill and get five $20 bills? Should it provide coins as well as paper money? Should it allow a customer to check and print his/her account balance on a specific bank account? Should it allow a customer to check the account balance on any account, if the customer provides the bank number and account number? Should a customer be able to put in money for deposit to a specific account? Providing too many different services makes the system too complicated and expensive to build and operate, thus a limited portfolio of services must be selected.

SELECTION OF SERVICES

Comparing services for inclusion in a system involves multiple criteria, such as the cost of providing the service, its value to specific consumer groups, and perhaps legal complications that may arise with a particular service. Multi-criteria decision making, in the last twenty years, has become an established field of research, with extensive

theory, a wide choice of solution methods, and many available computer-based decision support packages (see for example Weistroffer and Narula, 1997; and Figueira, Greco, and Ehrgott, 2005). However, most service systems provide a portfolio of services, rather than just a single type of service, which complicates the decision problem. Evaluating each potential service individually and then picking the top n services may not result in the "best" portfolio of services, as the dependencies, synergistic effects, and interactions between services must be taken into account as well. The problem is still a multi-criteria problem, but in addition to the criteria that characterize individual services, the criteria that characterize the whole portfolio of services must be considered as well. Such criteria may include the breadth or scope of customer needs that are being satisfied, and the cost of providing the portfolio of services, which may be higher or lower than the sum of costs of the individual services. The problem of selecting services for a service system thus becomes a portfolio selection problem (Weistroffer and Smith 2005). The general portfolio selection problem deals with selecting a group (portfolio) of items (or services) that as a whole provide the most appropriate ("best") solution in a given situation.

Some services may naturally go together. Thus for an ATM to pay out cash on a debit card, it must check the customer's account balance; the service of providing the customer with the account balance information then does not add much cost to the system. Similarly, to book a flight, some sorts of searches for appropriate flights must be provided.

Some services may complement others. Providing the option to book a rental car at the destination may increase the value of an airline booking. Though this extra service adds separate costs to the system, the total value provided to the customer by the combined services may exceed the sum of the values of the individual services due to synergy. In other cases, some additional services may provide very little extra value to the customer. For example, if the ATM provides for dispensing cash in the amounts of $50 and $100, the extra service of allowing for an amount of $75 may not be particularly important. Thus, the value of some services depends on which other services are being provided. Looking at each service individually may not be a useful way to assess the total value of the whole portfolio of services.

The portfolio of services my consist of a fixed number of clearly defined services, like the ATM machine, or it may consist of somewhat vaguely defined services which may then come in many variations, like perhaps the loan department of a bank, which offers several type of loans, but the amounts may be variable and the conditions may be negotiable.

PORTFOLIO SELECTION FRAMEWORK

The general portfolio decision problem arises in any decision situation where a set of alternatives must be selected from a pool of options. That includes for example assembling the national soccer team from all eligible players; selecting an investment portfolio; or determining the range of products that a business may decide to market. Just picking the best individual players may not result in the best soccer team; the players need to complement each other and be able to play as a team. When selecting an investment portfolio, issues such as risk spread must be taken into account. Determining the product range for a manufacturing company must balance the objectives of providing as wide a range as possible to customers with cost, which generally is lower with fewer products. Weistroffer and Smith (2005) proposed a general framework for selecting portfolios. This framework, when applied to service systems, shows much similarity to the *Microsoft® Operations Framework* (*MOF*) in its *Business/IT Alignment Service Management Function* (*BITA-SMF*) (Microsoft 2008), which provides a 5-step process that includes developing and evaluating an IT service portfolio. Table 1 compares the steps of the Weistroffer-Smith (WS) framework with the processes of the BITA-SMF.

The first step in the WS framework is *prescreen alternatives*. In the general portfolio decision problem, this step is where the criteria and constraints for evaluating alternatives are determined. With respect to service systems, these criteria are defined by the business goals and functions, which are major ingredients in an IT service strategy, the first process of the BITA-SMF. The second step in the WS framework is *perform individual analysis*, which refers to examining and assessing the various alternatives in the pool with respect to the previously determined criteria. In the case of service systems, possible services that support the business goals and functions are investigated; the corresponding BITA-SMF process is *identify and map services*. The third step in the WS framework, *screen alternatives*, is where a

preliminary selection takes place, and alternatives that do not meet identified constraints or score low on evaluation criteria are eliminated. For service systems, this means removing services from consideration that do not sufficiently support the business goals and functions, or for which customer demand is low. The corresponding BITA-SMF is *identify demand and manage business requests*. In the fourths step, *select portfolio*, an initial portfolio of alternatives is determined, based on identified goals; this portfolio is adjusted and refined in the fifth step, *adjust portfolio*, where alternatives in the portfolio are weighed against others not in the portfolio, for possible substitution, addition or removal. For service systems, an initial portfolio of services is developed, which is then examined for additions, removals, or substitutions; corresponding to the BITA-SMF process *develop and evaluate IT service portfolio*. The MOF Business/IT Alignment SMF includes an additional process, *service level management*, which refers to monitoring and managing the services in the portfolio provided to customers, allowing for maintenance of the selected portfolio.

Table 1: Services Portfolio Development

Weistroffer and Smith (2005)	MOF Business /IT Alignment	Summary of Activities
1. Prescreen Alternatives	1. Define an IT Service Strategy	• Identify Business Goals • Prioritize Business Functions
2. Perform Individual Analysis	2. Identify and Map Services	• Identify Services • Analyze/Describe Services
3. Screen Alternatives	3. Identify Demand and Manage Business Requests	• Evaluate/Prioritize Services
4. Select Portfolio	4. Develop and Evaluate IT Service Portfolio	• Select Services for Portfolio
5. Adjust Portfolio		• Evaluate and Modify Portfolio
	5. Service Level Management	• Manage Services

Though the WS framework and the BITA-SMF processes show much similarity, the WS framework is meant to be just that: a broad and general framework. On the other hand, the BITA-SMF consists of fairly detailed guidelines, not shown in Table 1, for developing certain kinds of IT service systems. However, these detailed guidelines may not be appropriate for all types of service systems. The broader WS framework may provide a basis for developing specific and more appropriate guidelines for different types of service systems.

CONCLUSION

The purpose of this short paper was to direct attention to the decision problem involved in selecting the services to be included in a service system. The issues that complicate this decision problem were discussed, and a general portfolio decision making framework was presented and compared with the Microsoft® Operations Framework (MOF) Business/IT Alignment Service Management Function (SMF), as a guide for service system developers. Future research may use this framework as a basis for developing more specific and detailed guidelines and procedures for service portfolio selection in specific types of service systems.

REFERENCES

1. Figueira, J., Greco, S. and Ehrgott, M. (2005). *Multiple Criteria Decision Analysis: State of the Art Surveys*, Springer.
2. Microsoft (2008). Microsoft® Operations Framework Version 4.0 − Business/IT Alignment Service Management Function. http://www.microsoft.com/technet/solutionsaccelerators.
3. Weistroffer, H.R., and Narula, S.C. (1997). The state of multiple criteria decision support software. *Annals of Operations Research*, 72: 299-313.
4. Weistroffer, H.R., and Smith, C.H. (2005). A Framework for Describing and Classifying Multicriteria Portfolio Selection Problems: An Object-Oriented Approach. *Journal of International Technology and Information Management*, 14(3): 33-42.

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