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BEST PRACTICE IN TECHNOLOGY ACQUISITION: EARLY LICENSING OF TECHNOLOGY BEFORE OR DURING PROVE-OUT PHASE

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Best Practice in Technology Acquisition: Early Licensing of Technology before or during Prove-out Phase

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Abstract

Best Practices in procurement within the defense industry include various strategic practices to assure that supplies are adequate to meet demand and support military readiness. Existing practices in procurement may often be sufficient to assure an adequate supply, but they are not sufficient to assure an adequate supply of technology-based, mass-produced goods. An example of such a technology-based, mass-produced good is body armor. A proposed best practice in technology acquisition is early licensing of technologies underlying such goods. This paper explores the advantages of using early licensing to assure that supplies of technology-based goods are adequate to meet demand.

Introduction

Best Practices in procurement within the Defense industry include various strategic procedures to ensure supplies are adequate to meet demand. For example, in the context of commodities, such strategies historically included bulk purchasing and warehousing of supplies. In contrast, an example of a more recent strategic practice is supply-chain management; this method includes just-in-time production, which is often appropriate for procurement of complex systems such as aircraft and other vehicles. Yet, neither of these strategies is necessarily appropriate for new technologies that must be mass-produced. First, successful implementation of bulk purchasing and warehousing requires goods which have a long design-life and results in increased warehousing costs and the potential stockpiling of out-dated commodities. Second, just-in-time production depends on stable demand and does not address large fluctuation in demand—e.g., a steep ramp-up. Therefore, another strategy is necessary in order to deliver supplies of such goods adequate to meet demand with neither incurring excessive costs in warehousing nor excessive delays in delivery.

To facilitate such technology acquisition, the author proposes that the prove-out phase should be conducted under a licensing agreement that requires the supplier to license to the Department of Defense [DoD], or its suppliers, the right to manufacturer the technology at a predetermined royalty rate on sales—from 3% to 10%—depending on the particular technology. This paper explores the advantages of using early licensing. By using this approach, the DoD can shorten the technology acquisition process and can utilize multiple suppliers of a technology to ensure continuity in its supply chains in the event that one vendor cannot meet DoD requirements. A similar approach could be used for acquisitions of proven technologies as well.

BACKGROUND

In conjunction with the Department of Defense's strategic realignment of military forces, Rumsfeld (2004) is seeking to make combat troops "lighter, more readily deployable, and more self sufficient" (para. 4). To meet these strategic objectives, the DoD has realigned military acquisitions toward various communications technologies, including networking technologies. Yet, a recent report demonstrated that military planners relied extensively on networking technologies that were not sufficiently robust for reliable use by soldiers on the battlefield (Talbot, 2004). The technology did not meet the specific communication requirements of the field combat soldier; thus, prove-out of the technology failed. This paper will examine the effect of operational objectives on the field combat soldier whose vital importance is recognized in urban settings, especially in view of recent operations in Afghanistan and Iraq. The field combat soldier is expected to function as a "land warrior" and, at times, is also expected to be a "peacekeeper." The role of the field combat soldier is often a subject of debate in the defense community. Notwithstanding the debate, the field soldier must be equipped to meet operational objectives. First, the field soldier is expected to be lighter—which implies less-heavy equipment, but not necessarily less-protective gear—to increase mobility. Second, the field soldier is expected to be more readily deployable; this requirement also implies less-heavy equipment to reduce logistical and transportation effort. Third, the field soldier is expected to be more self-sufficient to decrease required support.

The role of acquisition should be proactive with respect to these strategic objectives in order to insure the field combat soldier is prepared to meet operational mission objectives. To meet such objectives, a field combat soldier requires certain equipment and training to increase survivability and operational effectiveness. A discussion of training is beyond the scope of this paper. Yet, in regard to equipment, a field combat soldier should have appropriate weapons, protective gear, and tools. The appropriateness of specific weapons, protective gear, and tools is often a subject of debate by members of the defense community. The appropriateness of a particular weapon, protective gear, or tool would ideally be determined by operational objectives rather than economics. However, assuming the appropriateness of a particular weapon, protective gear, or tool were determined by operational objectives, the availability of such weapons, protective gear, or tools is controlled by the economics of supply and demand. For example, the availability of one such protective gear (e.g., body armor) was limited by supply despite its appropriateness to operational objectives. In another example, availability of adequate supply of RF receivers used for battlefield communications was limited by the failure of networking technologies. This failure was due in part to placing undue reliance on networking technologies not yet proven effective in the battlefield conditions (Talbot, 2004). Yet, miniature RF receivers could be integrated into helmets—similar to pilots'—to reduce the reliance on networking technologies. In a further example, lightweight portable gates are commercially available that could be configured to make suitable roadway check points. However, availability of portable gates to establish conspicuous roadway check points was limited by operational objectives.

Prove-out of such technologies requires testing in the laboratory setting and in the field environment, e.g., actual combat. Since the field testing is generally superior to laboratory testing to prove-out a particular technology, acquisition and procurement officers typically order a small quantity of product based on a technology in order to perform field tests to demonstrate its effectiveness on the battlefield. The DoD would place a larger order of the technology only after proof of a technology's robustness. This incremental approach to procurement is a practice called pilot testing. Such a practice may be successful in avoiding the risk of procuring a large quantity of goods that fail to meet requirements. However, after such testing, there remain other risks that are not addressed—including the lack of adequate supplies to meet demand (as demonstrated by the inadequate supply of body armor in Iraq) (Moss, 2005).

RESEARCH METHODOLOGY

This research project examined procurement of technology-based, mass-produced goods rather than complex systems. The research first examined the two traditional approaches to procurement of such goods: "make" vs. "buy" (PMI, 2004). Assuming that the defense sector would normally "buy" such goods from commercial sources rather than "make" such goods, the research examines the traditional approaches to acquisition of goods: "purchase" vs. "lease" (Ammons, 2002). Given the nature of such goods (i.e., consumable), this research project eliminated the alternative of acquisition through a leasing arrangements and focused on the alternative acquisition through purchasing. Yet, acquisition through purchasing does not acquire the rights to underlying technology. Hence, in the context of technology, another approach deserved examination—namely the acquisition of the underlying technology. However, given that many technologies have both military and commercial applications, outright purchase of the rights to the underlying technology is not feasible. Nevertheless, a partial purchase of rights (a.k.a. a "non-exclusive license") is feasible; this research explored the conditions under which such a license would be exercised. Finally, this research conducted a case study of the body armor.

DISCUSSION

Ertex and Griffin (2002) explain that a supply chain can be dominated by either supplier or buyer; they assert that in recent years certain large buyers have increased dominance over their suppliers. Yet, the DoD has not exerted such dominance over its suppliers. Currently, federal agencies such as NASA and the DoD often demand only a royalty in return for providing research funding. Yet, the Federal Acquisition Regulations [FAR] (Part 27, Subpart 27.3) grant a compulsory, non-exclusive license to the government for technologies invented under government-funded contracts (FAR, 2004). For example, since the DoD controls the funding, the DoD has the leverage to demand superior contract terms from the researchers inventing the technology. A superior contract term would be to obtain a non-exclusive license from the researchers to manufacture goods based on the technology in the event that inventors fail to bring the technology to market within a reasonable time. Similarly, the DoD does not demand the right to assure adequate supply of a particular good in return for placing a large order with a single manufacturer. Even though the compulsory license under the FAR may not apply, the DoD could make such a license an express term or condition of the contract. A superior contract term or condition would be to obtain a license to carry out the manufacture of the good upon either of the following terms:

- With respect to labor-intensive goods, failure of supplier to increase production by 100% upon 30-days notice and by 200% upon 60-days notice (by adding a shift or shifts).

- With respect to capital-intensive goods, failure to expand production capacity by 100% upon 60-days notice and by 200% upon 120-days notice (by adding a production line or lines).

The license would enable the DoD to obtain adequate supplies by ordering from additional suppliers. By exercise of the license, the DoD would pay a royalty at a rate of from 3% to 10% to the supplier if (and only if) the technology the DoD used had been patented or made proprietary by the supplier. The royalty rate would be determined to approximate the typical royalty rate in the industry and not to exceed the audited net profit of the supplier. In this way, the supplier could not use patented or proprietary technology to prevent the mass production of goods at the order of the DoD.

CASE STUDY

In summary, body armor is a consumable good based on the underlying technology of ballistic-resistant panels. The best available commercial technology comprises plates of boron carbide (Bernstein, 2002). To meet demand, body armor must be mass produced. The DoD had a contract with a single manufacturer to deliver body armor containing the boron carbide plates. In response to increased orders from the DoD, the manufacturers increased production to maximum capacity at 25,000 jackets per month (Loeb & Labbé, 2003). Yet, months are still required to produce a supply adequate to meet the demand of more than 80,000 jackets. Although the manufacturers marginally increased production, the DoD lacked sufficient leverage to force manufacturer(s) to dramatically increase production by opening a new production line, let alone building a new production facility. It is noteworthy that demand will continue to outpace supply if all armed military personnel, including reserves and the national guard, are to be issued such body armor. Thus, in this case, early licensing of underlying technology would have been appropriate; it would have enabled the DoD to place orders with other manufacturers if the existing manufacturers could not deliver sufficient supplies to meet the demand.

FUTURE WORK

Many research laboratories in the United States are busy developing technologies with military applications. An example is the human exoskeleton which is currently in laboratory testing and will soon undergo prove-out in the field (Berkeley, 2004). Undoubtedly, a successful prototype of the exoskeleton will involve inventions for which inventors will seek patents. If the DoD pursued enforcement of the compulsory government license pursuant to FAR 27.302(c) for the exoskeleton, the Department could increase production of exoskeletons without the inventors' refusal. Even if a commercial entity further develops the exoskeleton without government funding, and the compulsory license did not apply, the DoD could pursue an early-licensing approach under a contract with that commercial entity when ordering a small quantity of exoskeletons prior to the prove-out phase.

CONCLUSION

Early licensing of technology—prior to the prove-out phase—is a best practice to acquire rights in underlying technology. Such early licensing will be useful when the DoD seeks to rapidly increase supplies of technology-based goods. Simply increasing orders may insufficiently increase supply if a supplier has little incentive to increase production. Moreover, if the goods ordered by the DoD are based on patented or proprietary technology, the DoD may be unable to seek out other suppliers. Thus, use of early licensing of underlying technology would provide the DoD the leverage to force a supplier to increase production or to split orders among other suppliers.

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