Economic Modelling 29 (2012) 926–935

Contents lists available at SciVerse ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

The interactive trade decision-making research: An application case of novel hybrid MCDM model

Tsung-Cheng Wang

Department of Information Management, Lungha University of Science and Technology, No. 300, Sec. 1, Wanshou Rd., Guishan, Taoyuan Country 333, Taiwan

ARTICLE INFO

Article history:
Accepted 1 February 2012

Keywords:
MCDM (multiple criteria decision making)
DEMATEL (decision making trial and evaluation laboratory)
ANP (analytic network process)

ABSTRACT

The changing structure of international trade practices has caused reciprocal effect between the factors of politics, diplomacy, military, and technology over the past twenty years. In particular, the new burgeoning countries expect to acquire extra advantages such as technology or compensation from other parties during this interactive trade.

The policy of interactive trade can be regarded as multiple criteria decision-making (MCDM) problems; therefore, the interdependence and feedback between criteria and alternatives among MCDM methods should be considered. This paper proposes a novel hybrid MCDM model; it combines the decision making trial and evaluation laboratory technique (DEMATEL), as well as the analytic network process (ANP) to solve the dependence and feedback problems and to decide an appropriate interactive trade strategy. Finally, this paper discusses Taiwan's optimal interactive transaction policy, furthermore proposes a framework of interactive trade for the future.

1. Introduction

The international interactive trade, also known as Industrial Cooperation Program (ICP) in Taiwan is called offset has received increased attention over the past twenty five years. Offset, is one alternative marketing strategy recently introduced to the international marketplace. Offset agreements are flexible in nature, and they allow various combinations of different contracts at the same time. The concept of offset is a relatively new development for most defense companies and governments. Buyers' governments and firms ask for offsets that require industry and commercial compensation as a condition for the purchase of expensive military contracts or extensive commercial transactions.

Offsets are being used by newly industrial countries (NICs) to forge an interactive trade strategy in order to become major players in global business market. Exporters rely on offset to find the future business opportunities. The offset agreement is mainly for defense-related contracts, and it can divide into foreign military sale (FMS) and direct commercial sales (DCS) two ways. The principal players in an offset agreement include a supplier of defense related equipment in a developed country and a foreign government buyer (Palia, 1993). Since 1975, many countries purchasing major equipment have required offset agreements to boost their industrial economies. Kremer and Sain (1992) said the offset agreement may be part of a government-to-government agreement or commercial sale of defense articles or services. Liu et al. (2010) show that a distributor's economic satisfaction directly promotes market knowledge transfer, while a distributor's social satisfaction will enhance market knowledge transfer only when positive economic satisfaction already exists. Waller (2003) believed that the world's defense environment has been significantly changed in the world after the Cold War and the breakup of the Warsaw Pact. Within this new environment of mega-defense suppliers chasing fewer customers, offset packages play a more critical role in global defense procurement competitions.

If a country asks for a technical capability upgrade using an advanced technology transfer from a seller country, this request becomes one of the main conditions for offset. The basic philosophy behind a countertrade or offset agreement is to structure the commitment so that the seller, who will fulfill a contract, rewards the buyer. Palia and Liesch (1997) thought countertrade had many benefits and many latent motives. Radasch and Kwak (1998) found that the motivating factors may be the potential for economic or social growth, advanced technology or increased sales for other domestic goods in exchange for the buyer's purchase. Because of the complexity and multi-units to be involved in this research, the author prepared an acronym list (as Table 1.) for easy reading.

1.1. Offset roles and funds flow

All of the offset processes are very complex and dynamic which need people and funds to execute. When the major players want to join this game, they need to fully understand the critical process and the relationship between the buyer and seller in this competitive game. The former researches show us the relationships between sellers and buyers only from a seller's perspective but lack the buyer's

E-mail address: jamesw0728@yahoo.com.tw.

0264-9993/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
doi:10.1016/j.econmod.2012.02.001

Table 1
Acronym and definition.

Acronym	Definition
AB	Armament Bureau
AIDC	Aerospace Industrial Development Corporation
ANP	The Analytic Network Process
CASID	Committee of Aviation and Space Industry Development
DISAM	Defense Institute of Security Assistance Management
DCS	Direct Commercial Sale
DEMATEL	Decision Making Trial and Evaluation Laboratory
ECOFFSET	Industrial Cooperation Program Executive Committee
FMS	Foreign Military Sale
ICA	Industrial Cooperation Agreements
ICP	Industrial Cooperation Program
IDB	Industrial Development Bureau
IRM	Impact-Relation Map
MCDM	Multiple criteria decision-making
MND	Minister of National Defense (Taiwan)
MOEA	Ministry of Economic Affairs
NRM	Network Relation Map
PRC	People's Republic of China
TFT-LCD	Thin Film Transistor Liquid Crystal Display panels

viewpoint (DISAM 2003, 1995). Yang and Wang (2006) focused on this point and integrated above buyer's and seller's procedures, creating a new illustration for main players and the flow of funds for offsets under a FMS or a DCS.

When buyer governments purchase valuable merchandise such as advanced-fighter, warship, satellite, nuclear power plant, high-speed transportation system through the process of FMS or DCS, they ask for some feed-back from the seller. This feed-back is government to government activities and most of the countries name it offset. Any offset projects need capital to execute what they really want to achieve. However, the power of approving the budget belongs to the legislature of either the buyer or the seller. The buyer's government transfers FMS or DCS funds to defense contractors as payment for the product. The defense contractor recovers expenditures associated with direct offset transactions through the buyer's government payments for the sale. For indirect offsets, the seller's contractors are reimbursed only for administrative costs by the purchasing government. They recover any other costs through resale or marketing assistance for products manufactured in the purchasing country by returns on their investments, or by other market mechanisms. Indirect offsets also may be related to the production of defense articles sold. Whether direct or indirect, offset transactions return funds to the purchasing country. The offset funds spent in the buyer's country to fulfill offsets are, therefore, a means by which the purchasing government redirects public expenditures back into its own country. The purchasing country distributes offset credits to execute their government's specific offset goals, for instance, technology transfer, local procurement, local investment, cooperative R&D, marketing assistance and training. Most buyers focus on technology transfer for reducing R&D cost and schedule, so they need national level R&D organization to take the new technology and transfer it to local industries. The relationship of the seller and recipient are depicted in below Fig. 1.

1.2. The offset problems in Taiwan

The Taiwanese government is currently confronted with traditional industries forfeiting their competitiveness because of expensive labor hour and slow growth in high technology industries. In the meanwhile, the People's Republic of China's (PRC) economy is rising rapidly and the PRC has already become the most dynamic economic system in the world. Taiwan's export industries are moving to the PRC to set up factories and invest money because of the cheaper labor rates and the prodigious markets. For Taiwan to continue its economic growth its Industrial Development Bureau (IDB) of Ministry of Economic Affairs (MOEA) in 2005 announced that building up high-technology industries and developing critical-technology are the main targets for upgrading industry.

From 1986 to 2007, the MOEA published a compilation of offset results in 2009 showing that Taiwan ICP credits have already accumulated a $2.936 billion US Dollars credit. In total, sixty-nine industrial cooperation agreements (ICA) were signed by MOEA with twelve

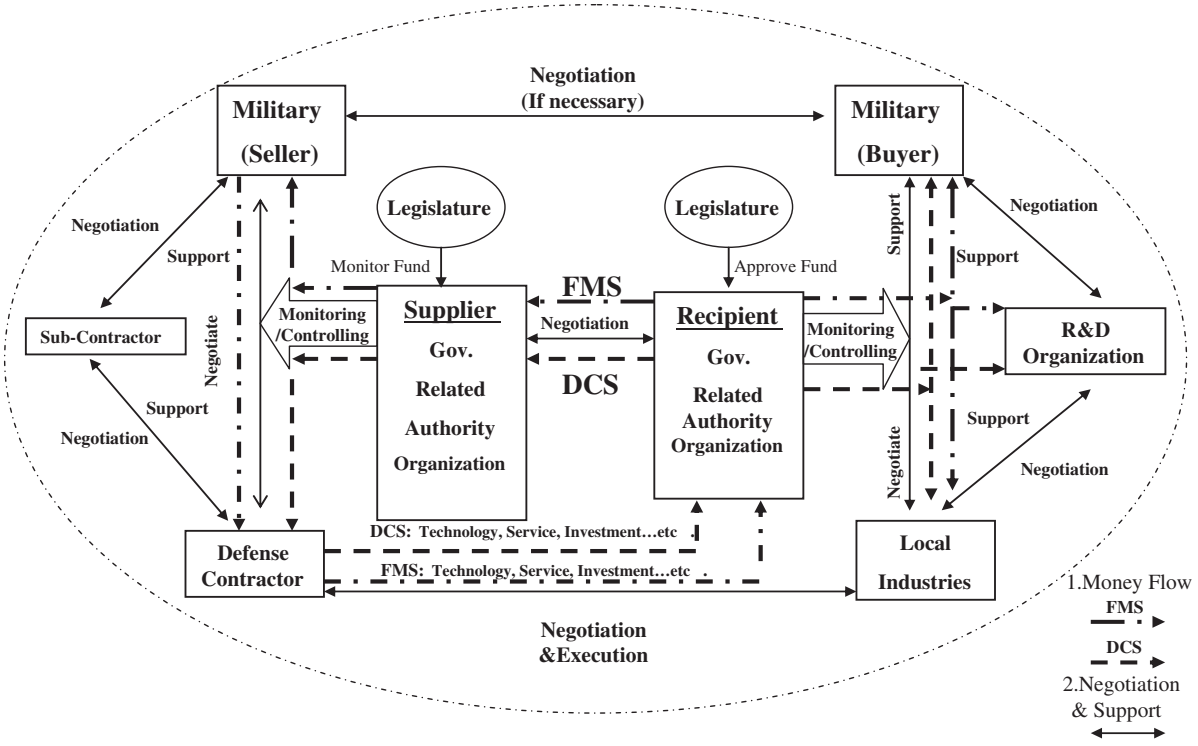

Fig. 1. Illustration of the relationship of the buyer's and seller's offset.