



Relationship strength and network form: An agent-based simulation of interaction in a business network



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ABSTRACT

Given an international business network with the same focal resource, the same source and markets, but exhibiting two different inter-related sub-networks with different internal organization, we study how these network forms affects interactions. The purpose is to compare and explain differences between the two network forms and the effects this have on dyadic international relationship development using a qualitative experimental methodology involving computerized simulations. We simulate various changes in quality variation of the focal resource as well as changing demand preferences of buyers to investigate the impact on relationship strength. From this we develop three scenarios.

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摘要

假定两个国际商业网络具有相同的重要资源、相同的来源和市场，但表现出两种迥异的相互关联的子网络和不同的内部组织，我们研究这些网络形式对相互作用产生怎样的影响。采用涉及计算机仿真的定性试验性方法，目的是对比和解释两种网络形式之间的不同以及对国际关系发展所产生的双重影响。我们模拟重点资源的各种质变以及买方需求的变化，调查对关系牢固程度的影响。从这个角度，我们开发了三个方案。

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1. Introduction

Norwegian Spring-Spawning Herring (NVG, from the Norwegian name, *Norsk Vårgytende Sild*. Hereafter referred to as “herring”) is a very high quality product due to its spawning cycle and migration patterns. When the fish is at peak quality, it has migrated into Norwegian waters where it is caught by Norwegian fishermen and supplied to customers worldwide. Until recently, the sole major supply of herring has come from Norwegian waters and vessels (Asche and Tveterås, 2005).

However, in the early 2000s Iceland emerged as a serious competitor. A combination of changed herring migration patterns and some serious investments on the part of Icelandic companies made this development possible. Now, about half of the world’s herring catch is Icelandic, reducing the Norwegian share to the remaining 50% (Følgesvold and Prenekert, 2009). What is really interesting with this change is that it has come to pass despite the fact that the herring delivered by Iceland is of inferior quality to the Norwegian catch.

This paper examines this by recognizing that the Icelanders and the Norwegians are organized in distinct and dissimilar ways that

can account for these developments. We assert that, in part, these developments can be attributed to differences in the internal organization of the two international supply structures. The aim of this paper is to examine these differences in order to increase our understanding of the functioning of such structures.

Based on the common denominator of herring, we posit that both the Icelandic and the Norwegian supply networks belong to one, large network that supplies herring to consumer markets in Europe which we call the “North Atlantic Herring Network.” This network has a common core resource (herring) coming from a common source (The North Atlantic); and the product has a common final destination (European consumers). Its two component networks differ substantially, however, in the way they bring the herring to market, that is, in their internal organizations – or *network forms*. Where one is based on an auction system, the other is not. This creates two different, but interrelated network forms that are particularly suitable for comparison. In this paper we demonstrate how these two network forms affect the interactions within them.

Specifically, we ask to what degree network forms impact the strength of the international relationships among herring exporters and buyers in the two sub-networks respectively and the effects that differences in structure have on the two networks’ ability to handle dynamics in terms of changes in the quality of

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the input and in the demand heterogeneity from buyers of the system output. Prior research on international business relationships informs us that they function as a source of learning and a destination for FDI in international business (e.g., Blankenburg Holm et al., 1996; Johanson and Vahlne, 1977, 1992; Forsgren and Johanson, 1992). Research on “toe in the water” international business strategies (Maitland et al., 2005) shows many examples of the importance of strengthened business relationships and their role for MNCs (Johanson and Vahlne, 1977; Hallén et al. (1987)), for example resulting in division headquarters moving abroad (Forsgren et al., 1995) and even MNC headquarters relocating overseas (Birkinshaw et al., 2006). Obviously, relationship strength is an important mechanism for understanding international business. In this paper we use a computerized model of international business relationships in the North Atlantic Herring Network as a special methodological tool to investigate this. We simulate various changes in quality variation of the herring input into the network as well as changing demand preferences of the buyers of the processed herring to see what impact it can have on relationship strength for each of the two sub-networks.

The purpose is to explain differences between the two sub-networks with regards to their network forms and the effects they have on dyadic international relationship development, by means of comparison, using a qualitative experimental simulation method.

1.1. Outline of paper

The following section introduces the case upon which this study draws heavily. Then we discuss the methodology employed and argue for our choice of a qualitative case and simulations to investigate our problem. Then follows a literature review, first about international business relationships, networks and relationship strength and then about industrial networks as complex adaptive systems (CAS) and the use of agent-based simulation models (hereafter denoted “ABMs”) in this context. Here we also begin reporting on our findings as parts of the quality assurance of the research tool for the specific problem under scrutiny in this paper. The main results section comes next in which we report on the findings from our use of the research tool for experimentation. The paper closes with a section in which we discuss our findings and its implications for international business research and practice.

2. Introducing the case: the North Atlantic Herring Network

The main difference between the Norwegian and Icelandic sub-networks of the North Atlantic Herring Network lies in the organization between the catch actors, primary processing actors and exporters. In Norway, all landings are matched to buyers via an electronic auctioning system operated and owned by *The Norwegian Fishermen’s Sales Organisation for Pelagic Fish (Sildesalgslaget)*. This system is used to establish prices and volumes of the herring in such a way as to ensure that the fishermen receive as high a price as possible for their catch (*The Norwegian Fishermen’s Sales Organisation for Pelagic Fish, 2009*).

In contrast to the auction market organization found in Norway, the interaction between fleet and industry in the Icelandic sub-network is characterized by a high degree of vertical integration, in which 70–90% of all vessels are physically integrated, meaning that primary processing takes place on-board the ship at sea. In terms of ownership and control, this integration also incorporates the export function, which means that the Icelandic suppliers act as completely integrated companies in relationship to their customers abroad.

The processing industry in countries such as Poland happily welcomed the Icelandic suppliers as an alternative to the

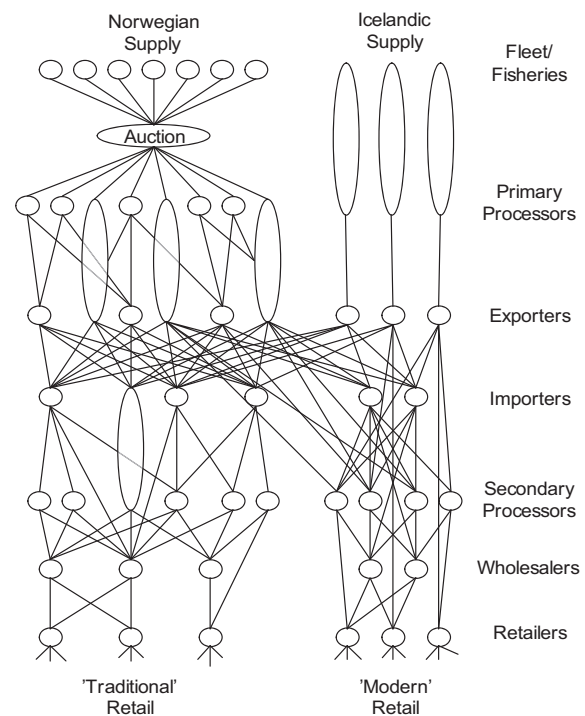


Fig. 1. A principal overview of the North Atlantic herring network. Adapted from Følgesvold and Prenkert (2009: 531).

Norwegians particularly because the Icelandic suppliers offered far more predictability in terms of price and supply stability (*The Norwegian Export Council for Fish, 2009*).

Based on empirical observations of the end users of herring products, the main destinations for herring can be split into two distinct categories, differentiated by the demand they put upon their suppliers. We label these end users *more* and *less demanding* in our analysis as they represent the “modern” and “traditional” retail in Fig. 1. The first category are highly influenced and controlled by the large, modern retail chains. These industrial users put specific demands on the supply networks connected to their supply systems (*Collins and Burt, 2001; Marfels, 1992*). The second category consists of industrial users that are accustomed to a different use pattern compared to big retailers. Consumers served by these industrial users have traditionally bought their herring on markets with lots of small sellers, and this supply organization, created to serve this type of retail sales, is still dominant in countries such as Russia, Ukraine and Belarus. The consumers that these users serve generally purchase products that have been through relatively little industrial processing, and they generally require lower quality products (*Asche and Tveterås, 2005*).

3. Methodology: the use of qualitative data and simulation

This study investigates the impact that network form has on the strength of international business relationships. This involves agent-based modeling as a methodological research tool to conduct experiments. It also involves a qualitative case study as the empirical setting in which the ABM-tool is embedded (*Prenkert, 2012*).

3.1. Using a qualitative case

Any model represents a target reality (*Scott Poole, 2004: 14; Leik and Meeker, 1975*) and the part of the real world on which

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