

# **Entrepreneurial Behavior in Agri-Food Supply Chains: The Role of Supply Chain Partners**

By

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# **Entrepreneurial Behavior in Agri-Food Supply Chains: An Agent-based Approach**

## **Problem Statement**

Technological innovation, globalization and market segmentation have led to increasingly complex agri-food supply chains and uncertain agri-food markets. Both of these characteristics can strain an agri-food manager's ability to make fast and accurate strategic decisions. However, as recent agribusiness scholars (Ross, 2008; Ross & Westgren, 2008; Roucan-Kane, Boehlje & Gray, 2008) have suggested, increased complexity and uncertainty also provide agri-food managers with significant opportunities to create new wealth by exercising entrepreneurial behavior.

Entrepreneurship is a process in which firms search for, discover and exploit new profit opportunities by engaging in arbitrage or innovation activities. The literature of entrepreneurship suggests that several characteristics of the entrepreneurial firm affect the outcomes of this multi-step process: alertness to new opportunities, subjectivity and judgment, decisiveness /speed to market, and uncertainty-bearing, and aspirations (Ross and Westgren, 2008). However, entrepreneurial opportunities are not often exploited in isolation. Instead, many entrepreneurial individuals or firms must establish alliances with partner firms, both upstream and downstream, to exploit such opportunities. This is particularly true in the agri-food industry where the complex structure of the industry (i.e. multiple industry players, multiple governance structures and interfirm relationships, commodity and niche markets, biological uncertainties, etc.) and the length of supply chains often precludes individuals and firms from establishing the supply chain alone.

The presence of existing supply chains can have a significant impact on the performance of entrepreneurial firms. Entrepreneurial firms that utilize existing supply chains face lower costs associated with delivering (i.e. logistics, marketing, and procurement) value to end-users, and have advantages in information-sharing and learning. On the other hand, rent-sharing and agency costs in networks can reduce the economic returns available to entrepreneurial firms

## **Objectives of Study**

The objective of this study is to investigate the role of supply chain partners in the entrepreneurial process. In particular, we will examine the differences in entrepreneurial performance between firms that discover and exploit new wealth creation opportunities within existing supply chains as opposed to those that decide to establish the supply chain themselves. In doing so, we introduce an agent-based model that explicitly simulates entrepreneurial discovery, rent appropriation and the dissipation of those rents via competition and resource depletion in the presence of supply chain partners.

## **Procedure**

Within this study, three specific research propositions will be addressed. The first two of these research propositions build on the work of Ross and Westgren (2008). In their study, Ross and Westgren examined the effect of various entrepreneurial capabilities on the performance of firms across various institutional

landscapes in the agri-food system. The results of their study indicated that firms with developed capabilities for entrepreneurial alertness and efficiency outperformed those firms that did not in competitive environments characterized by market segmentation and uncertainty. However, the competitive environments used in the Ross and Westgren (2008) did not include the presence of other supply chain partners. As stated above, these players may have a significant impact on the dynamics of the competitive environment. This study addresses this missing element. In particular, we examine two propositions related to the affect of entrepreneurial alertness and efficiency in the entrepreneurial process given the presence of supply chain partners.

***Proposition 1: Ceteris paribus, firms with high levels of alertness will generate greater entrepreneurial returns than those with lower level of alertness.***

***Proposition 2: Ceteris paribus, firms that can efficiently covert resources to revenues will generate more entrepreneurial returns than those that are less efficient.***

Furthermore, this paper also examines the role of supply chain partners in the entrepreneurial process. As stated above, entrepreneurial firms that utilize existing supply chains face lower costs associated with delivering (i.e. logistics, marketing, and procurement) value to end-users, and have advantages in information-sharing and learning. On the other hand, rent-sharing and agency costs in networks can reduce the economic returns available to entrepreneurial firms

***Proposition 3: Ceteris paribus, entrepreneurial firms that form alliances with supply chain partners to exploit new profit opportunities will generate more entrepreneurial returns than those that do not.***

To test these propositions, this paper develops an agent-based simulation model (ABSM) to examine the differences in performance between firms that link to existing supply chains and those that do not to exploit entrepreneurial opportunities. The advantage of the ABSM approach is that it is able to capture the complex and dynamic nature of the entrepreneurial process. Furthermore, ABSMs facilitate the modeling of a heterogeneous firm attributes and are able to capture the consequences of individual firm-level decisions at the system-wide level.

The basic setup on our simulation model follows the framework introduced by Ross (2008) where agents search for, discover and exploit strategies for new wealth creation on a strategic landscape. However, in this model, two types of agents exist: firms and supply chain partners, and if desired, these two types of agents may link together to exploit an entrepreneurial opportunities together. Individual firms and supply chain partners are described based on their ability on different attributes. For firms, these attributes include: entrepreneurial characteristics (i.e. alertness, judgment, aspirations, etc.), linkability to supply chain partners and rent extraction (i.e. efficiency); and for supply chain partners, these attributes include region size (range of firm strategies partner can serve), attractiveness (perceived ability to improve firm

efficiency), and power (ability to improve firm efficiency). In addition to the specification of these attributes, behavioral rules are also defined for each firm to govern their interactions with supply chain partners, other firms and their resource environment. We also specify rules to allow for organizational learning which may occur either by executing a consistent firm strategy over time, by interacting with other firms, or by interacting with the same supply chain partners over time.

As part of the simulation exercise, several (16 in total) simulation experiments have been designed to examine the propositions described above. For each experiment, we parametrically vary one firm attribute while keeping all others fixed at mid-range levels. At the same time, we also parametrically vary one or more partner attributes depending on the simulation design. Upon execution of these experiments, the model results reveal the system-level behavioral patterns that develop from these firm-level specifications.

## **Results**

The simulation experiments reveal several interesting results that have consequences for agri-food managers interested in engaging in entrepreneurial behavior. The results of these experiments include:

1. Unexpected tradeoffs exist among entrepreneurial characteristics
2. Firms that have high linkability characteristics face lower rent dissipation from competitor firms in the market
3. Search behaviors for new opportunity are altered by the existence of existing chains
4. Wealth increases with a firm's alertness level, because it permits firms
  - a. to find most valuable strategic niches; and
  - b. to find supply chain partners with superior network linkages

## **Conclusions**

The results of the simulation experiments summarized above indicate that the use of existing supply chain networks to exploit entrepreneurial ventures can have a significant effect on firm performance. Furthermore, the results of the simulation experiments support the research propositions introduced in this study. Wealth and survivability both increased with a firm's level of alertness. This finding was true for both linkable and non-linkable firms. Though this finding is not particularly unexpected, it does indicate that firm alertness permits firms to find the most valuable strategic niches for all types of firms, and allows linkable firms to find supply chain partners with the advantageous network links. Likewise, firm efficiency was found to increase both wealth creation and survivability for both firms. Finally, and of particular interest to this study, the ability of a firm to align with strategic partners to appropriate the returns to entrepreneurial behavior (i.e. firm linkability) was shown to increase the overall wealth creation ability of entrepreneurial firms via lower rent dissipation from competitor firms in the market. This finding supports our third research proposition.

However, even though our research propositions were generally supported by the simulation experiments, several unexpected results were also evident. First, the presence of existing supply chains decreased the need for entrepreneurial abilities (i.e. alertness) both for linkable and non-linkable firms. For linkable firms this is not particularly surprising. As noted earlier, supply chain partners reduce rent dissipation

via competition for competitor firms and thus reduce the frequency with which firms need to search for alternative profit opportunities. However, for non-linkable firms this result appears counterintuitive. As noted by Ross and Westgren (2008), spatial heterogeneity among strategic niches increases the need for firm alertness. One potential explanation for this finding is that with linkable firms attracted to supply chain alliances more strategic niches are available for non-linkable firms outside partner service regions. This result requires further attention.

Overall, though, this study suggests that ABSMs are an appropriate tool for analyzing entrepreneurial behavior in supply chains. This type of methodology permits the investigation of complex interactions among entrepreneurial characteristics within and between firms, while highlighting performance outcomes. Models that assume equilibrium conditions or homogeneity of variables on the other hand would not be able to adequately capture the dynamics and complexity of entrepreneurial firm behaviors.

Finally, it is apparent that the characteristics that reflect an entrepreneur's ability to link to, and share rents with, supply chain partners require more investigation. In particular, the question of why supply partners reduce the entrepreneurial capabilities needed by non-linkable firms to create wealth and survive should be to be addressed. Furthermore, if this is the case, do industries characterized by long supply chains naturally have fewer entrepreneurial ventures? This study suggests this might be the case, but further research is needed in this area.

## **References**

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