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Knowledge management in e-commerce short food supply chains in China and regenerative manufacturing

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Abstract. This paper investigates e-commerce short food supply chains (SFSC) of Taobao villages in China from a knowledge management (KM) perspective and its links to regenerative manufacturing. Using Knowledge Based View (KBV) and Resource orchestration theory (ROT), this paper addresses the research question: *How does knowledge management support the e-commerce SFSC in a local context and what are the links to regenerative manufacturing?* Using case-based research involving two e-commerce SFSC, 20 semi-structured interviews are analysed, these are complemented with secondary data. The results show that KM activities of acquisition, possession and utilisation are integrated and enabled by the e-commerce platform. This paper provides a theoretical foundation for the study of KM, internal operations and e-commerce SFSC. SFSC managers can identify ways of capitalising on the knowledge embedded in their operations. KM in SFSCs contribute to an overall regenerative system of change, which allows for and promotes self-organisation.

Keywords: Short food supply chain, e-commerce, knowledge management, case-based research, regenerative manufacturing.

1 Introduction

This paper studies e-commerce Short Food Supply Chains (SFSCs) to show the intricacies on how knowledge is managed and explores the links to regenerative manufacturing. SFSCs are more regenerative than traditional ‘long’ food SCs, i.e. disintermediation allows better quality products to reach the customers, by speeding up the delivery of perishable food items, while at the same time allowing socio-ecological benefits for all stakeholders [1]. Furthermore, farmers and other players in the SC can receive better economic, environmental and social benefits [2]. Little is known about e-commerce SFSCs in China. This paper sheds light on the local managers’ experiences of Taobao villages in China, a type of SFSC, which trades specialised food products and where transactions are facilitated via an e-commerce platform provided by *Taobao.com*.

The operational practices in Taobao villages in China offer novel insights, such as the ability to use an e-commerce platform to help entrepreneurial rural farmers sell their

products in a more transparent way, remove costs of selling and obtain a price uplift [1]. Knowledge management (KM) is chosen because it helps understand the production and trading practices of food in a local context, especially in developing economies [3]. We posit that the observed operational practices are the result of their ability to orchestrate their specific KM activities and organizational elements using disintermediation via e-commerce for achieving regenerative manufacturing. Therefore, the following research question is addressed: *How does knowledge management support the e-commerce SFSC in a local context and what are the links to regenerative manufacturing?*

2 Literature Review

A commonly used definition of SFSC is “the supply chain with limited economic operators and it commits to co-operations, local economic development and the geographically and socially close relationships in between producers, processors and customers; moreover, the SFSC has at most one intermediary between producers and customers.” [4]. Through disintermediation and considering all stakeholders (including producers’ local knowledge) e-commerce SFSCs can help transition towards a regenerative manufacturing paradigm, as they help improve the natural environment, local economy, employees’ wellbeing and quality products.

The overall aim of regenerative supply chains is to enhance the capacity of the system to self-renew and evolve beyond their previous condition [21], we posit that SFSC are part of the transition towards this aim.

Besides categorizing the SFSC by region or food type that causes fragmented results [5], the SFSC can be categorised based on how customers perceive closeness towards food processing and production, hence including: face-to-face SFSC, proximate SFSC, and spatially extended SFSC [6]. Proximity in SFSC has also been studied by [7].

Previous research on e-commerce SFSC have focused on SC practices enabled by social media platforms and digital sales support tools [8,10]. Typically, end-to-end food SC frameworks have considered the operational aspects of purchasing, operations, distribution, marketing, and sales. Furthermore, the digitalization of end-to-end food SCs has been proposed as a way forward to tackle food security, food waste and sustainability issues. However, such digitalization is regarded as a digital transformation challenge, as it needs substantial capital investment, e.g. support from Government in the form of subsidies, infrastructure, etc. [10]. SFSC such as Taobao villages are supported by the Chinese government, to promote rural development and growth, and they have been in operations for a while [11].

Previous research [12] discussed the distribution design and its performance in different scenarios and show the determinants to more sustainable distribution—i.e. SC orientation, coordination, innovation, and strategy [13]. Furthermore, previous research reflected that SFSC can help achieve balance between costs and outcome. In the same vein, findings by [14] indicate that KM practices can increase sustainability performance, when organizations engage in collective intelligence, best practices and ecological systems management. Furthermore, [15] stated that e-commerce platforms help cut

out the middlemen and therefore increase the profit margins of the participants of the new SC, which we call SFSC.

Some researchers [8,16,17] present the positive outcomes by integration of the ICT (Information and Communication Technology) and the SFSC in practice: re-connecting producers and customers, promoting agroecological cooperativism and factors facilitating this outcome such as social network building, and platform's strong capability. Although their works disclose how the SFSC is positively affected by the ICT to some extent, they lack in-depth consideration of potential negative outcomes and risks.

The impact of digital technologies on risk identification and its mitigation in the food SC dynamics was assessed in [18]. They found that field innovation and development of transparency in food SCs operations channels constitute a mitigation risk strategy to ensure promotion of the various innovative solutions, such as digital technology integration.

Previous research on knowledge governance mechanisms has focused on the link to performance of the SC. In this vein, [19] studied knowledge governance mechanisms in the context of agri-food SCs. They found four different types of knowledge governance mechanisms, namely: reciprocity-based, trust-based, market-based and contract-based. We focus on Taobao villages where the trust-based type of knowledge governance is the prominent mechanism.

Some recent studies, e.g. [20] unveil the motivations of farmers in Greece to engage in SFSC practices. They found that farmers participate in these types of SCs when they perceive value in learning (voluntarily rather than imposed) which helps them to develop their skills both individually and collectively.

3 Methodology

Two Taobao villages were selected due to their representativeness, uniqueness and accessibility. Case studies allow exploring phenomenon or system within real-life context and of benefiting interpretivism in research scenario setting [22].

According to [23] and [24], case study indicates “an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” [23, p.13], and this empirical investigative enquiry has been normally processed by “detailed, in-depth data collection involving multiple sources of information...and reports a case description and case themes” [24, p.97].

A multiple case study methodology is chosen to help develop stronger analysis [25], than a single case study [23,25]. The SFSCs selected and analysed were composed of responsible, organic, agroecological, conservation farming – i.e., the farming itself cares for human and non-human wellbeing – for the two Taobao cases of Seafood and Hickory nuts production.

Semi-structured interviews were used because of the exploratory nature of the topic. They provide realistic findings from an in-depth investigation and then they were related back to the initial conceptual framework of KM acquisition, possession and utili-

sation. Ten interviews for each case (20 in total) were conducted face-to-face, in Chinese language, facilitated by Taobao village gatekeepers, which allowed for observations of the Taobao villages' operations. The interviews were later translated and transcribed into English language for analysis. The interviewees were intermediaries and direct sales staff and after ten interviews in each case, saturation was achieved.

Furthermore, secondary data was collected from Chinese Government's website, available booklets and leaflets informing local e-commerce industry, and pictures of local contents provided by interviewees. Again, these sources of data were translated into English language for analysis. The data were coded, following a template analysis [22]. The data were analysed and interpreted using an iterative-abductive process.

[23] proposes four dimensions that are developed from reliability and validity discussion to maintain rigor of case study research. For construct validity, this research used semi-structured interviews and secondary data collection; upstream and downstream SC are collected; data analysis was shared with senior academics for feedback. For internal validity, planning the coding and carrying out the analysis on a chain of evidence. For external validity, planning a sampling strategy for suitable case selection. For reliability, a research protocol is followed according to ethics approval, and data consists of audio recording, transcripts, notes and memos.

We use two theories Knowledge Based View (KBV) and Resource Orchestration Theory (ROT) because of their complementarity, i.e. KBV focuses on the 'what' of KM, whereas ROT provides the 'how' of KM implementation.

4 Findings

4.1 Knowledge acquisition

When comparing managers' experiences from the two cases, the four activities that explain knowledge acquisition (identifying, creating, storing and sharing knowledge) relate to managers' self-developed solutions for the SFSC operation in the local context, i.e. maintaining active perception and reflection by being effective in practice.

Identifying and sharing knowledge mean the outward emotional activities structured on managers' perceptions of external contents, whereas creating and storing knowledge mean the inward emotional activities structured on the managers' reflections of internal contents. These findings show how the four activities have highly integrated with managers' operation of the e-commerce SFSC in a local context, which is also the main reason that managers have been executing KM in Taobao villages without noticing.

4.2 Knowledge possession

Explicit knowledge. This specifies all knowledge types that can be articulated and detailed. In the two cases, managers possessed food knowledge types that were unique from one another, such as: management of aquaculture fields, and management of nut processing plants. However, besides this difference caused by knowing different local foods, the explicit knowledge types required for practicing the e-commerce SFSC can

be divided into three groups, regardless of the varying contexts of the cases. The first group is digital literacy, and it includes the knowledge around knowing ICTs when in e-commerce practice—such as basics of internet and computing. The second group is general operational practices, and it includes the knowledge around knowing of common and shared practices in operation of local SFSC—such as cost allocation and online customer services. The third group is managers' exclusive knowledge and includes the knowledge around fitting situations of managers. For instance, for the managers whose operations are more advanced or evolved than others', knowledge around establishing and managing professional operational teams has been exclusive to them in a local context.

Tacit knowledge. This specifies knowledge that is less tangible and difficult to encapsulate, hence this is often in individuals' minds and learnt through reacting to certain situations. From the cases, two groups can be identified. The first group is individual agency, and it includes knowledge types that can affect managers' ability to take actions and fulfil intention especially when in a local context. The second group is operational philosophy, and it includes knowledge types that contribute to managers' fundamental thinking of how the operations in a local context are seen. Overall, it is suggested that the tacit knowledge types included by the two groups could determine quality of managers' operations and further lead to varying operational outcomes. For example, in the Hickory nuts case, although most managers share the experience of failing to register with nut roasting and packaging licences, the outcomes of their SFSC operations are still varying because of the level of individual agency.

4.3 Knowledge utilization

Managerial activities of structuring, bundling and leveraging. From the two cases, local managers develop a common mindset that nature of the SFSC is the utilization of fragmented knowledge components. Hence, to fulfil the effective utilization that ensures positive outcome, the procedure of structuring fragmented knowledge components into oriented bundles for later leveraging is required, and it is carried out in a bottom-up and additive manner. Furthermore, this procedure also interprets how the operation of the SFSC is formed by individual practices in a local context, as each of the individual practices can be defined as an oriented bundle of smaller knowledge components, hence SFSC operation relies on leveraging outcomes of oriented bundles.

Impact of governance and organizational structure. Three types of governance structure are identified. First, an institutionalised structure, which is highly stabilised and supported by advanced equipment, practices, process and the team management arising along with SC segmentation, its managers operate with high individual agency, professional operational philosophy, and strong capability to support fulfilling agency and philosophy. Second, a semi-institutionalised structure, which is stabilised and is supported by reliable equipment, practices and process, the structure is testified to long-

term operation. Third, a low institutionalised structure, which is newly established and not yet stabilised, facing multiple operational options that can all be explored in future.

Impact of business model. As the main theoretical essence of the SFSC is committing to emotional proximity through creation of customers' perceived closeness, the role of business models is key and customer-oriented in the operation of the SFSC, and it is verified across the two cases. Previous evidence shows that numerous and constant efforts are made by managers to improve customers' experience—such as recruiting skillful services teams, applying customer-friendly policies, making customer-related practices a vital part of everyday operations. E.g. customers' feedback regarding product quality could lead a manager to improve the original production line or introduce management of the quality control team, hence triggering institutionalization of the operation.

Impact of innovation. Innovations in local managers' operations are primarily adaptive and accumulative rather than being independent and radical. For instance, in the Seafood case, local managers innovated the packaging methods according to the type of seafood and the season, due to regional accessible packaging materials and past experiences. Similarly, in the Hickory nuts case, due to the difficulties registering with the licences of nut roasting and packaging, local managers who failed the registration looked to maintain enterprising operations, innovate various strategies to cope with the difficulties—such as using simplified processing equipment, selling other local products in low seasons, and cooperating with suppliers.

Synchronization of all six KM activities and elements. Managers' understanding of e-commerce SFSC consists of the fundamental practices that form the complete operation, i.e., structuring, bundling and leveraging, during which required knowledge components are organised into effective utilization. The managerial activities constitute only the start because the formed operation then faces the test of the diverse material and spiritual contents reserved in a local context. Hence, to achieve the framework within which the operation operates in a stable manner, local manager's adoption of the governance and organizational structure that best fits their individual situation. For example, when facing constraints of local limited land, many managers of Hickory nuts case choose to adopt the structure of home business via which they integrate operation into living space for securing management. Also, it is found that managers' customer-oriented business models and operational innovations participate in the formation and stabilization of the SFSC operation in the local context of Taobao villages, and they have the capability of facilitating this process.

This research places KM in SFSCs as part of the shift towards regenerative manufacturing systems, by considering the benefits that they bring towards all stakeholders.

5 Discussion

The research question addressed was: *How does knowledge management support the e-commerce SFSC in a local context and what are the links to regenerative manufacturing?* The different KM activities and elements, from KBV and ROT, were studied via two Taobao villages in China: Seafood and Hickory nuts. The results show that KM activities of acquisition, possession and utilization are integrated and enabled by the e-commerce platform.

The four knowledge acquisition activities, i.e. identifying, creating, storing and sharing knowledge, have enabled the relationship between the diverse contents of a local context and the SFSC operation. This is in line with [20] who stated that personal goals and values influence the participation of farmers in knowledge acquisition, such as training programmes. Therefore, the following proposition is put forward:

Proposition 1: *Managers' execution of knowledge acquisition enables contents of a local context to shape operations of the e-commerce SFSC.*

Structuring, bundling and leveraging knowledge activities were found in each of the individual practices of the e-commerce SFSC. This involves the utilization of fragmented knowledge components, and execution of these activities to accomplish the utilization in a bottom-up and additive manner.

Overall, only until all six KM managerial activities and organizational elements synchronously take effect while in operation, the SFSC is both complete and prepared to operate in the context of Taobao villages. This is in line with [2] who provided a framework that includes socio-demographic and cultural factors. Therefore, the following proposition is set forth:

Proposition 2: *Knowledge possession and utilization are realised after all six KM managerial activities and organizational elements of the SC synchronously take effect during the e-commerce SFSC operations.*

The findings show that sustainable regional development can be achieved via the use of knowledge sharing [26], in the form of collaboration among actors in the same agri-food ecosystem. They posit that value is derived from the combination of internal and external resources, with particular emphasis to the local context, culture and environment.

This paper defines managers' individual agency as the ability to take actions and fulfil operational intention, and its effect takes place when managers decide to commit to the SFSC operation. Additionally, managers' operational philosophy is defined here as the fundamental thinking of how operations in a local context are carried out. This chimes with the demonstrations of organizational knowledge including self-proactiveness mentioned in [27]. Therefore, the next proposition is put forth:

Proposition 3: *For operations of the e-commerce SFSC, managers' individual agency and operational philosophy are the two determinants of its outcome.*

The definition of managers' self-developed solution is: "maintaining active perception and reflection by being effective in practice", this paper has shown that the four activities of knowledge acquisition and the solution shared the same fundamental behaviours as "perception" and "reflection", because the nature of identifying and sharing activities can be understood as the outward emotional activities structured on managers'

perceptions of external contents, and the nature of creating and storing activities can be understood as the inward emotional activities structured on the managers' reflections of internal contents. Therefore, the next proposition is set forth:

Proposition 4: *Executions of knowledge acquisition, possession and utilization are driven by the managers' self-developed solutions in the operation of the e-commerce SFSC.*

The last two propositions are in line with [28] which shows that mostly it is people's issues (rather than processes and the technology itself) that are at play when using technology for the management of the food SC. See Figure 1.

In relation to regenerative manufacturing, this research shows that while KM in SFSCs is helpful, there is a dependency on all interwoven stakeholders to shift towards this operational model to further propel regenerative systems.

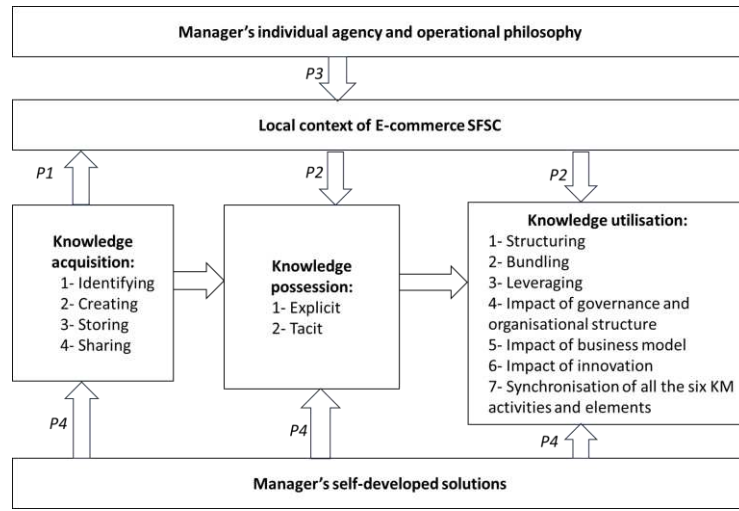


Fig. 1. Proposed Conceptual Framework for E-commerce SFSC in a local context

6 Conclusions

The study of SFSCs in China provides an opportunity to ascertain the benefits of KM and their links to regenerative manufacturing. KM activities of acquisition, possession and utilization are integrated and enabled by the e-commerce SFSC platform. This KM in SFSCs links to regenerative manufacturing by considering the improvement of all stakeholders in the SFSCs of Taobao villages.

The practical contributions of this paper are two-fold. First, SFSC managers can identify ways of capitalising on the knowledge embedded in their operations and the self-developed operational solutions that comprise the local mechanism directly in their SC operations. Second, they can also capitalise on the important roles of individual agency and operational philosophy in practice.

However, there are some limitations, which include adopting interpretivism and case study methodology, which could be regarded as subjective and having a bias during the interviews. This bias was reduced by having multiple informants per case and including secondary data. Also, this study provides a snapshot of SFSCs in time, ideally a longitudinal study could help show their contribution towards regenerative manufacturing.

Future research avenues emerge. First, it would be useful to further explore e-commerce SFSC using methodologies, such as survey questionnaires or mixed methods. Second, it is suggested that other types of knowledge governance mechanisms, i.e. reciprocity-based, market-based and contract-based, need to be studied [19]. Finally, investigating the role of other digitalization technologies, i.e. IoT, digital twins, Blockchain, etc. and their effects on the KM in SFSC could be interesting.

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