Freight logistics services for rural economies: User needs and future challenges

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Abstract: The purpose of this paper is to identify requirements for logistics and transport services of small and micro rural businesses. This paper explores the empirical findings of two case studies of small rural business. These findings suggest that businesses are confined to small-scale commercial activities due to a basic communication and information sharing problem. We argue that, in order for businesses to operate on a larger scale, appropriate support for the logistics requirements of rural businesses calls for intelligent software platforms that provide solutions to this basic problem. We suggest the use of Electronic Logistics Markets (ELM) for choosing services and infrastructures to manage trans-shipments in an efficient manner and to allow service providers to offer certified services, via trusted third parties.

1 Introduction

Today's rural economy is a complex mix of commercial activities, where food production coexists with tourism, recreation, and various public and private services (HM Government, 2002). A significant potential for growth has been recognised for the rural economy (Lowe and Ward, 2007) and with the advent of the digital economy, online sales systems and information platforms become enablers, in particular, for small and micro rural businesses to expand their commercial activities beyond local and regional areas.

Although selling products to consumers without geographical boundaries is now a reality, there is generally no straightforward strategy for how businesses handle the logistics of distributing their products globally. We, therefore conducted a detailed study into how small rural businesses operate and, in particular, how the delivery of goods to customers is planned and managed. We identified the phenomenon of small businesses establishing localised "eco systems" – a company producing goods is working together with one or two trusted transport service providers for delivery and, often, are serving only a small clientele with their products.

The purpose of this paper is to identify logistics and transport needs of micro and small rural businesses. The paper also seeks to examine the use of existing logistics solutions and their applicability in a rural business context. Ultimately, we aim to elicit the features required of a software solution that aids businesses within the rural economy to overcome logistics issues.

With businesses delivering to wider target markets, there is also now a growing need to consider the environmental impact of their logistics operations. An example of how technology can help in tackling such issues is the MIT m-Logistics initiative (MIT Center for Transportation Logistics, 2010), which presents a mobile software platform that can enable distribution of products to low-income markets with substantially lower overhead. The remainder of this paper will outline the theoretical background to the empirical investigation; address the method for data collection; show the results of the fieldwork followed by discussions pointing out key requirements for logistics services faced by small rural business. Finally, future challenges and conclusions provide some insights into the kinds of digital technologies that could be applied in order to establish solutions to these requirements.

2 Logistics Customer Service

"Customer service is a process for providing significant value-added benefits to the supply chain in a cost effective way" (La Londe et al., 1988, p. 5). From a logistic perspective, customer service is the result (output) of all logistics activities or processes within the supply chain (logistics system) (Ballou, 2004, Lambert, Stock and Ellram, 1998). Over the years, the meaning of customer service presented here has been identified in different ways, including logistics customer service (Huiskonen and Pirttilä, 1998) and physical distribution service (Mentzer el al., 1989). In this study we use the term Logistics Customer Service (LCS).

La Londe and Zinszer's work (1976) is among those seminal in the discipline of logistics. They classify the elements of LCS in terms of pre-transaction elements, transaction elements, and post-transaction elements (Figure 1). This classification was used as the basis for the development of our study. This perspective of the logistic system is particularly useful in this research for grouping into one single model the key elements of interest. Other frameworks based on the principle of integrated business processes across the supply chain (Lambert, Cooper and Pagh, 1998) would add complexity that is not relevant to small rural business, even though they are important to LCS in general.
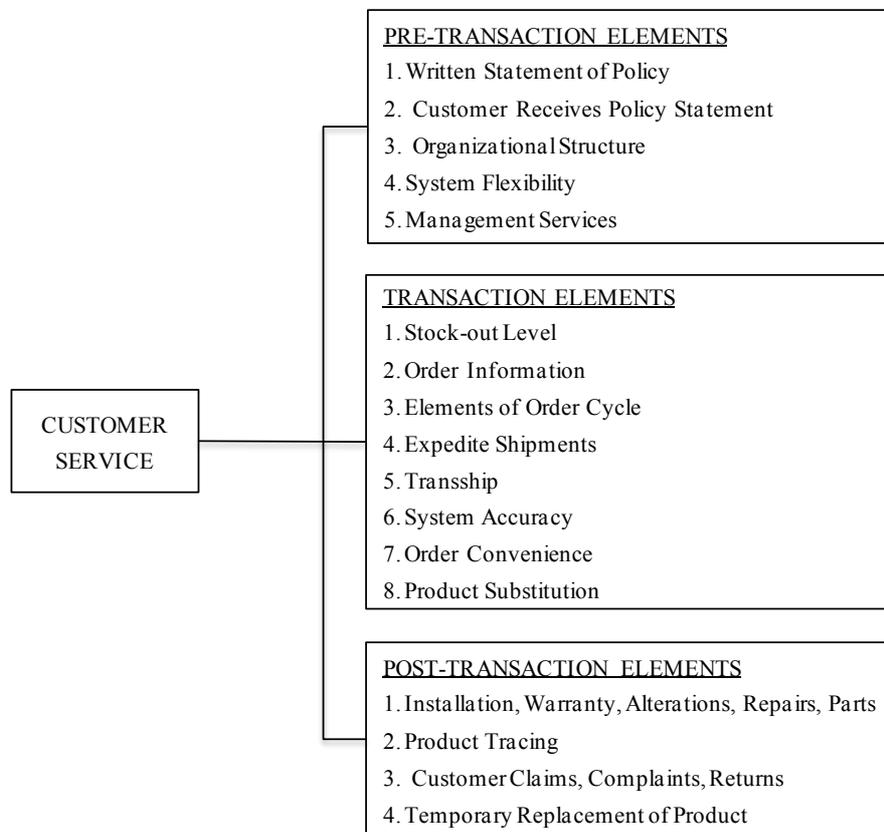
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                          ┌─────────────────────────────────────┐
                          │ PRE-TRANSACTION ELEMENTS            │
                          │ 1. Written Statement of Policy       │
                          │ 2. Customer Receives Policy Statement│
                          │ 3. Organizational Structure          │
                          │ 4. System Flexibility                │
                          │ 5. Management Services               │
                          └─────────────────────────────────────┘
                          ┌─────────────────────────────────────┐
                          │ TRANSACTION ELEMENTS                 │
                          │ 1. Stock-out Level                   │
                          │ 2. Order Information                 │
 ┌──────────────┐         │ 3. Elements of Order Cycle           │
 │  CUSTOMER    │         │ 4. Expedite Shipments                │
 │  SERVICE     │─────────│ 5. Transship                         │
 └──────────────┘         │ 6. System Accuracy                   │
                          │ 7. Order Convenience                 │
                          │ 8. Product Substitution              │
                          └─────────────────────────────────────┘
                          ┌─────────────────────────────────────┐
                          │ POST-TRANSACTION ELEMENTS           │
                          │ 1. Installation, Warranty, Alterations, Repairs, Parts │
                          │ 2. Product Tracing                   │
                          │ 3. Customer Claims, Complaints, Returns │
                          │ 4. Temporary Replacement of Product  │
                          └─────────────────────────────────────┘
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Figure 1: Customer Service Model.
Source: La Londe and Zinszer, 1976, p. 281.

It is worth mentioning that LCS models agree that the degree of importance attached to each service element varies from case to case. In other words, different groups of customers tend to have specific needs, which should result in different services. Fisher's work (1997) can be used as an example of how to address different needs. He classifies products as functional versus innovative, which would require a physically efficient process and a market-responsive process respectively. The discussion of the possible categorizations of products and the relationship with the supply chain design are beyond the scope of this paper.

3 Research Method

The research design applied was an exploratory qualitative approach with multiple case studies. Such a design emphasizes the perspective of people involved with research issues, the description of context where the studied phenomena happens and the time line of events (Bryman, 1989, Yin, 2003). One characteristic of the qualitative approach that is worthy of note is the flexibility it provides the investigation through the use of observation, interviews and document analysis (Bryman, 1989).

The choice of multiple case studies was motivated by the need to cover different types of small businesses at this exploratory stage. There are benefits of carrying out more than one case study as this provides more external validity of findings and enables a range of companies with different service level requirements to be surveyed (Yin, 2003).

The elements of LCS (La Londe and Zinszer, 1976) provided the foundation for a semi-structured questionnaire. By taking the small rural business as the focal company in a supply chain, we explored the LCS that the focal company offers to their customers and what is the expected logistic service level in this link within the supply chain.

4 Main Empirical Findings

We conducted several interviews with owners of small and micro businesses from different sectors located in rural areas in Northeast Scotland. In this paper, we highlight the results from two of these cases, which are referred to as Company A and Company B in order to keep the real names of the companies confidential. The reasons for emphasizing these two cases are: first, because they represent two completely different situations, one of them being more focused on business to consumer (B2C) sales and the other business to business (B2B); and second, because the shelf-life of the products sold by each company differ significantly. The main product of Company A has a shelf life of one day, while those of Company B have a shelf life of at least 12 months. Even though the market sectors they operate within are different, they face a common issue – both have human-based procedures, which could be automated.

4.1 Case 1 - Company A

Company A is a small farm-based business located in a rural area, which started operations in 2006 and currently employs 3 people full-time. The main products of Company A are premium fresh fruit coated with chocolate. Their annual turnover is £80,000 and they sell their products via two different channels: 50% through trade partners, and 50% through online sales directly to consumers. We interviewed the owner of the company as the main source of data, and also gathered data from the company's website.

4.1.1 *Pre-transaction elements of customer service*

Company A does not have an explicit policy in terms of delivery, warranty and returns. The interviewee justified this since each case is slightly different. For example, sometimes the receiver doesn't know about the order, because it is a gift, or they may not be at home or on holiday at the time of delivery. If problems occur during delivery or with the quality of the product delivered, the company encourages the customer to get in touch with them as soon as possible, so they can solve the problem. Besides this, a customer can contact the company anytime via phone or e-mail, if there is a problem with an order.

4.1.2 *Transaction elements of customer service*

Most customers use Company A's online ecommerce system to place orders, with orders over the telephone being the exception. In order to make the online system as friendly as possible, it was extensively tested before making it available to consumers. When Company A receives an order, the priority is to make sure that the product is delivered in the best possible condition. Given that the product has a shelf life of one day, punctuality of delivery is critical. One order dispatched but not delivered will become waste. Failure to deliver also increases the risk of losing the customer.

Company A uses courier companies (3rd party couriers (3PC)), as a logistic service provider for the distribution of all their products/orders. Mainly they use the services provided by a courier, which we call "3PC-a", for deliveries in mainland UK, and a different courier (which call "3PC-b") as

a second option for logistic services. According to the owner of Company A, 3PC-a is one of the few companies that offer a next day delivery service for a package leaving from a rural area in the Northeast Scotland, including the collection of orders at the farm. The owner of Company A emphasizes that they have built up a very good relationship with 3PC-a over the years, so there is a mutual understanding of each other's businesses.

Company A has a backup option, 3PC-b. Even though 3PC-b offers a next day delivery service that is more expensive than the same service offered by 3PC-a, 3PC-b services are used to cover some areas where 3PC-a does not offer next day delivery. The problem with 3PC-b is that the communication between the shipper, in this case Company A, and the courier service is formal and very restricted – Company A will only be informed whether the goods have been delivered, but no further information regarding exceptional events during transport and whether there was a quality issue at delivery. That is all the information available to the Company and consequently to their customers. Company A, therefore, prefers to work with 3PC-a, as this business partner is very good at keeping Company A informed about where their products are and what the status of the delivery is. According to the interviewee, this is due to the relationship they have developed over the years.

Normally, Company A monitors all orders via the tracking system supplied by the courier. They also work closely with the courier company. The interviewee stated: "*they (the courier) keep us informed, and we can keep the customer informed as well. We are proactive and try to contact the customer before they face the problem*". Although the company emphasises the close relationship with 3PC-a, the interviewee explained that the biggest problem they have is the courier not delivering the product to their customer. So any improvement in Company A's delivery system requires improving the courier system, i.e. the third party logistic service provider.

From placing an order and receiving the goods, the customers of Company A have two check points – the first one is an e-mail sent to the customer when the order has been placed, and the second is another e-mail sent when the order has been dispatched.

4.1.3 *Post-transaction elements / After sales*

Regarding the post-transaction elements of LCS, the interviewee explained that, for example, if on a very hot sunny day a product has not been delivered by 6 pm, they can anticipate that potentially the product will be damaged when it reaches the consumer. As soon as they get a phone call or e-mail from the customer, Company A offers to arrange either a complementary delivery or a refund.

Given the short shelf life of the products, the after sales contact is immediately one or two days after the product had been dispatched. Most of the problems that require any action usually come to their attention in the first two days after the handover of the product. Any complaint after that would lose its value, as the company states on their website that the product should be consumed on the day of delivery.

4.1.4 *Process improvement*

When asked about issues related to process improvement, greater traceability and provenance, and actions to reduce the environmental impact of their business, the owner of Company A believes that greater traceability wouldn't add value to their business. Because they are a small company, they are able to keep all their customers informed. In terms of provenance, the origin of most of their products is the farm itself and this information is in the company's website. The consumers like the fact that the company is based in a farm, but the Company does not believe that better traceability would influence potential customers in their future purchasing decisions. The interviewee recognizes that this can be due to the lack of competition, given that they offer a premium product and there are no competitors in the market.

Regarding the environmental impact of their business, they offer a free post return bag for the cooling bags used for the delivery. This is a way to avoid a cooling box being disposed of when it is still in good condition to be reused.

4.2 Case 2 - Company B

Company B is a small home-based business in a rural area, which started operation in 1999 and now employs 3 people full-time and 2 part-time. The main products of Company B are organic preserves. Company B has three distribution channels: trade partners, online sales directly to

consumers, and farmers' markets. Most of the volume is sold via trade partners. We interviewed one of the owners of the company.

4.2.1 *Pre-transaction elements of customer service*

Similar to Company A, Company B does not have an explicit policy in terms of delivery, warranty and returns. When communicating with shops or trade partners, Company B informs them what to expect in terms of delivery, which usually means delivery within a week. The same informal communication applies to return procedures. All the information available to the end-user/consumer is the phone number and the e-mail address printed on the product label. Trade partners have direct contact through the actual handover of the product at delivery.

Even though the amount of information to the customer is limited, the company gives priority to solving any complaints related to the product as soon as possible, aiming to reduce potential damage to the image of the company. Regardless of the reason for the complaint, the consumer/customer has only to provide the batch number of the faulty product, which will be replaced either by an alternative or by the same variety of the previous one.

4.2.2 *Transaction elements of customer service*

Company B's customers and consumers place their orders over the phone or via e-mail. For the orders placed via e-mail, there is an order form available to download from the company's website, which shows only preserves that are in stock. The customer downloads, completes and sends the form via e-mail. The interviewee recognised that this could be confusing, given that the website lists the entire portfolio, but the order form lists only those products that are currently available. Other than the website, the company sends a monthly email to their regular customers and trade partners with the list of products that are available.

Once they have received an order, the delivery system will vary. For an individual customer, they will try to be as fast as possible using a third party service. On the other hand, for a trade partner it can take longer, up to a week. In this second case, they deliver the products themselves, but they try to get more orders in the delivery area in order to reduce the number of journeys and to make each journey more efficient.

In common with Company A, Company B has a main logistic service provider responsible for the distribution to individual consumers. The interviewee explains that they have tried over ten different 3PC companies, but the level of complaints from consumers was high. When using 3PC-b, also used by Company A, as service provider, in many cases the jars of preserves were broken by the time they reached the consumer. In addition, the courier would not provide any compensation for the product lost or for the delivery service, based on the argument that there was no evidence that the product was damaged during the transport and handling processes.

After several problems with the service provided by 3PC-b, a courier service, which we call "3PC-c", became an alternative, with better performance in terms of delivery and lower costs. The interviewee states: "*they are owner drivers who seem to take more care with our products*". Other than the distribution to individual consumers, the delivery to trade partners is done by Company B themselves, which has the advantage of personal interaction with their customers, but also has the disadvantage of being time consuming.

Company B also monitors the orders sent via courier using the tracking system supplied by the courier. The customer/consumer will have two check points sent via e-mail. The first one is to confirm that the order has been placed. The second one, which applies only to deliveries made by the courier, is an additional e-mail to inform the consumer that the order has been dispatched. For the trade partners there is also the possibility of a backorder, resulting in additional information about the postponed items and new date for the delivery.

4.2.3 *Post-transaction elements / after sales*

The products supplied by Company B have between 12 and 18 months of shelf life, so during this period any consumer has access to the company in order to make a complaint about the quality of the product. If one complaint about quality of the product is made, they would recall the whole batch in order to check if there was a problem with the product and try to identify the causes of the problem. For the consumer making the complaint, the product will be replaced free of cost, even if the reason for the complaint is based on personal taste.

4.2.4 *Process improvement*

Company B has a shared transport system in place. It is a small and closed system in which they share the delivery with two other small businesses. The major driving force for the shared transport system was to reduce the cost of delivery; however, they also see it as an action to reduce carbon emissions, and this has also a wider impact in the potential for future adopters of such an initiative. They use a shared online calendar to visualise and inform each other about any new pending delivery scheduled by one of the other two companies in this small shared operation.

Regarding greater provenance, the interviewee emphasizes that consumers like to know the origin of the ingredients. It is more a marketing tool than anything else. For this reason, every time they use ingredients that are not from the farm, they will indicate on the label the origin of the ingredients. If they could add more information, or even provide the path of the product online, this would possibly add value to their products.

5 Discussion

Based on the data collected, we can identify two different profiles for logistics customer services. The first is companies dealing with highly perishable, personalized and low weight products. The second is companies with low value/high weight products, non-perishable and standard products. Each of these profiles has specific LCS requirements.

For the perishable products, the company prioritizes concerns like quality and on-time delivery. For this kind of product, to be as fast as possible is crucial. Therefore, in order to deliver according to these criteria, they have established long-term relationships with a select group of logistic service providers. Given the high value and premium characteristics of the products delivered by Company A, the cost of a courier does not affect the business margins, as the consumer is willing to pay for a next day delivery because this service is not overly expensive in this context. However, the weakness of this business model is the dependence and tight relationship between Company A and the courier service provider.

In terms of the organic preserves, the fact that this is a product with a relatively low price compared to its weight makes the use of a courier service too costly and, therefore impractical. Also, the total sales per delivery are low, resulting in an insufficient utilisation of available transport space. Company B, therefore, is in a situation where their products are too heavy to be sent by mail and too small and too few to fill up a truck at each delivery. This is a clear inhibitor for them to expand their area of distribution. An interesting result from the analysis of the second case is the actual solution put in place by Company B: they operate with a select group of partners and co-ordinate their own deliveries with their partners' deliveries, so they can share the transport. They use a simple software solution to maintain and share an online calendar for facilitating communication among the partners. This initiative shows that software support is already necessary at this small scale in order to allow these businesses to perform their commercial activities. This becomes even more prevalent in terms of expanding such a business, reaching more customers and handle delivery of goods more efficiently.

For both cases, we see a strong potential of improvement with the right software technology. In case 1, the lack of choice and principal dependency on a single logistics partner can be attributed to the lack of information about other options available to the business. Moreover, sensitivity to the quality of service in terms of delivery and meeting delivery deadlines can be observed, which indicates the need for early intervention when disturbances occur during transport (e.g. re-shipment). In case 2, companies have established procedures and use certain online facilities to organise transport and utilise capacities better. In its current form, this business situation is restricted to small-scale and personal contacts in order to tackle complexity. But it clearly points to a need to introduce better digital platforms to support these business models.

In both cases, we see a common problem, communication and information sharing. In their logistics tasks, companies are engaging in two basic activities (1) planning (e.g. organising the delivery of goods to be delivered before a certain deadline) and (2) executing a delivery according to plan. During execution, there is a need to monitor the progress of a transport, expecting feedback from transport service provider to the company. In particular, companies should be alerted early enough to any problems that would lead to delays in delivery or a degradation of the quality of the product in transit, so that appropriate countermeasures can be taken to alleviate such problems. Appropriate

support for rural businesses, therefore, calls for intelligent software platforms that provide solutions to the communication and information-sharing problem. For this, we see the need to employ software technology for (a) supporting the planning phase of delivery activities, such as better information for a wider variety of options when choosing services and (b) managing trans-shipments in an efficient manner.

6 Logistics Management Infrastructure

One proposal to tackle these problems is the utilisation of Electronic Logistics Markets (ELM) (Wang et al., 2007; Ambrosino et al., 2005) and concepts of Autonomous Logistics (Windt and Hülsmann, 2007). An ELM is a kind of electronic hub that links producers, customer, shippers and carriers together for the purpose of collaboration or trading. Such an electronic market operates as the communication and information sharing infrastructure that allows transport providers to inform about available capacities and potential customers to describe their demands. During the execution of transport activities, it can serve as a platform that allows fast information exchange and the forwarding of events and alerts to the right stakeholders.

Based on the analysis performed earlier, we can identify particular concerns that such an electronic platform has to address to support the planning and execution of transport tasks:

- A supplier of goods needs a better insight what transport services are available; on the other hand, transport providers need a better insight into the current demand for transport services; therefore, solutions have to be made available that allow transport providers to "advertise" the services they want to offer to potential customers, and to allow producers of goods to choose appropriate transport services from a larger number of options for transport; this requires means to share this information and to match transport demand with transport availability

- From the studies performed, a need for collaboration among producers to share transport resources as well as transport providers to optimise their business in collaboration with other transport providers can be detected; again, this also requires means for sharing information among these two groups of stakeholders in transport activities, so that, for example, a group of producers can approach a transport provider as a collective and share transport costs and capacity / space;

- The stakeholders (producers, transport providers and customers) of such a transport activity are interested in having clear and up-to-date information about the ongoing execution of that activity, therefore, monitoring is essential to determine whether delivery will take place on time; means to make monitoring information available to all the stakeholders is essential so that they can react early to deviations and problems that could arise.

The concept of electronic logistics has the potential to fulfil the basic need of information sharing and allows the provision of means for collaboration between stakeholders. This will include real-time tracking and tracing, performance evaluation of logistics providers, and security and trust concerns. In the following paragraphs we review some innovative logistics solutions that attempt to satisfy some of the requirements we mentioned above. We introduce the concept of autonomous logistics and discuss two novel technologies (object memories and e-contracting) that have been used to implement autonomous logistics. Examining existing work gives us useful insights into which innovative technologies and ideas can be integrated in our software implementation, as well as helping us to identify relevant research questions we would like to focus on.

In general, the paradigm of autonomous logistics decentralizes control and decision-making to some logistic entities (products, packages, truck, etc.) that participate in the transport and logistics processes. It is suggested that these logistics entities (typically implemented as intelligent software agents) are able to process information, to make and execute decisions on their own, and to cooperate with each other to achieve their optimal objectives (Schuldt, 2012). In line with autonomous logistics, the ideas of object memory and e-contracting have been proposed.

The basic idea of smart objects is to associate each physical object (artefact) with an object memory in which various object-related information are organized and stored. This includes general properties of the object, dynamic annotations updated by users or applications, and historic information about the previous states or uses of the object (Uckelmann, 2008). With the presence of

RFID technology, sensors and wireless networking, a smart object is able to communicate with other objects and to interact with the environment during its lifecycle. Those activities are conducted on the basis of exchanging and sharing information available in the object memory, as well as resulting in information being accumulated in the memory. In the context of transport and logistics, a product memory with enriched product information can be used to optimize the transport and logistics processes, monitor the product quality, and enable the producer and customer to be better informed about the product.

In order for smart object systems to be widely deployed, we believe that at least two questions have to be answered. Firstly, how shall we represent the memory content so that users and intelligent applications are able to reason about the represented information? Secondly, what are the security measures to ensure that only authorized users have access to sensitive information?

To address the first concern, Schneider et al propose a general object memory model based on OWL and RDF specifications (Schneider, 2007; Schneider and Krüner, 2008). Furthermore, the W3C Incubator Group (2011) has been working on a unified object memory model on the basis of an XML format, and proposes to use such an object memory model as a building block to support arbitrary smart object applications.

In contrast, as far as we are aware, the second question has received less attention. Schneider (2007) identifies a list of security and privacy issues that are relevant to the use of object memories, but there is no solution proposed to solve these issues. Brandherm et al. (2010) employ, as a part of research objectives in the Semantic Product Memory project (SemProM, 2010), a role-based access control mechanism, using an electronic identity card as an authentication mechanism to protect the memory data against unauthorized access. In short, we believe that it would be desirable to develop a general unified policy framework in response to these two questions.

A transport and logistics contract specifies all the terms and conditions for the carriage of goods (Ignaciuk et al., 2011). For example, it will contain obligations to deliver on time, and it may specify penalties or sanctions when contract terms are not fulfilled (late delivery, payment schedules not followed, etc). The representation of those established contracts in an appropriate electronic form is an essential prerequisite for the development of online monitoring and management systems of transport activities based on contracts between producers and transport providers. These kind of "electronic" contract specifications allow detailed specifications of how a transport has to be performed (arrival of a transport at a particular location in time, maintaining a low temperature throughout transport etc.) and the automated checking of whether any deviations from it occur and have to lead to alerts to the stakeholders. It suggests that supporting real-time monitoring of the execution of such a contract and immediate reactions in case of deviations has an important impact on delivering logistics services in an effective and satisfactory manner.

7 Conclusion

In this paper, we presented a detailed analysis of two rural business cases in accordance with the framework of logistics customer services. The study of these two cases illustrates that they have completely different logistics requirements due to the nature of their products. By analysing the existing solutions that have been adapted by these two businesses to meet their logistics needs, we identified that, in general, the distribution of goods in rural business suffers from a lack of communication and information sharing. With that, companies don't have any mechanisms in place to receive real-time feedback about the logistics processes and there is no flexible way to deal with exceptional events.

We suggested that it is necessary to develop an intelligent software platform that helps to alleviate the above problems. We outlined a set of requirements for our initial implementation of such a system. We also examined current novel technologies that have been used in the development of smart logistics systems. As a consequence of the deployment of these technologies, we expect that producers may reach a wider market for their produce, that they can plan their logistics more efficiently, that producers can collaborate in transport tasks and reduce costs and impact on the environment and that such a system lowers the barrier for transport providers to enter such a service market and reach their potential customers more easily.

Acknowledgements

References

Ambrosino, G, Boero, M, Nelson, J D and Romanazzo, M (Eds) (2005) Systems and Advanced Solutions for eLogistics in the Sustainable City. Rome: ENEA.

Ballou, R. H. (2004). *Business Logistics Management*. 5th ed. Prentice-Hall.

Brandherm, B., Haupert, J., Kroner, A., Schmitz, M. and Lehmann, F. (2010). Demo: Authorized access on and interaction with digital product memories. *In Proceedings of the Eight Annual IEEE International Conference on Pervasive Computing and Communications*, p. 838–840.

Bryman, A. (1989). *Research methods and organization studies*, Unwin Hyman: London.

Department for Transport (2008). *Electronic Logistics Marketplaces Research Report*. Cardiff University Innovative Manufacturing Research Centre.

Fisher, M. L. (1997) What is the right supply chain for your product? *Harvard Business Review*, 75 (2), p. 105-116.

HM Government. (2002). *Response to the Reports of the Foot and Mouth Inquiries*, Cm 5637. HMSO: London.

Huiskonen, J and Pirttilä, T. (1998). Sharpening Logistics Customer Service Strategy Planning by Applying Kano's Quality Element Classification. *International Journal of Production Economics*, 56-57, p. 253-260.

Ignaciuk, N., Alias, C., Rialland, A., Olsen, O., Turkay, M., Koestler, A., Zahlmann, M., Heyne, S. and Stollberg, M. (2011). Requirement Analysis and Selection of Technology Baseline for Logistics Contract Manager. In Marquezan, C., editor, *D8.1–WP8 Logistics Contract Establishment and Managment*. FInest – Futue Internet enabled optimisation of transport and logistics networks.

Karaenke, P. and Kirn, S. (2010). A Multi-tier Negotiation Protocol for Logistics Service chains. *In Proceedings of the 18th European Conference on Information Systems*.

La Londe, B. J. and Zinszer, P. H. (1976). *Customer Service: Meaning and Measurement*. National Council of Physical Distribution Management: Chicago.

La Londe, B. J., Cooper, M. C. and Noordewier, T. G. (1988). *Customer service: A management perspective*, Council of Logistics Management.

Lambert, D. M., Cooper, M. C. and Pagh, J. D. (1998) Supply Chain Management: Implementation Issues and Research Opportunities. *International Journal of Logistics Management*, 9 (2), p. 1-19.

Lambert, D. M., Stock, J. R. and Ellram, L. M. (1998) *Fundamentals of Logistics Management*. Irwin McGraw-Hill: New York.

Lowe, P. and Ward, N. (2007). Sustainable Rural Economies: Some lessons from the English experience. *Sustainable Development*, 15, p. 307-317.

Mentzer, J. T., Gomes, R. and Krapfel Jr, R. E. (1989) Physical Distribution Service: A fundamental marketing concept? *Journal of Academy Marketing Science*, 17 (1), p. 53-62.

MIT Center for Transportation Logistics (2010). *MIT m-Logistics Initiative Developing Next Generation Mobile Logistics Platforms in Resource Constrained Environments*. Available at: http://ctl.mit.edu/sites/default/files/MIT-m-Logistics.pdf. Access on: 05th March 2012.

Schneider, M. (2007). Towards a General Object Memory. *In Proceedings of the 1st International Workshop on Design and Integration Principles for Smart Objects*, p. 307–312.

Schneider, M. and Kroner, A. (2008). The Smart Pizza Packing: An application of object memories. *In Proceedings of the 4th International Conference on Intelligent Environments*, p. 1–8.

Schuldt, A. (2012). Multiagent Coordination Enabling Autonomous Logistics. *Künstliche Intelligenz*, 26(1), p. 91–94.

SemProM Project (2010). SemProM Digital Product Memory. Available at: http://www.semprom.org/SemProm_BMBF-Flyer_2010_en.pdf. Access on: 05th March 2012.

Uckelmann, D. (2008). A Definition Approach to Smart Logistics. *In Proceedings of the 1st Russian Conference on Smart Spaces*, p. 273–284.

W3C Incubator Group (2011). Library Linked Data Incubator Group Final Report. Available at: http://www.w3.org/2005/Incubator/lld/XGR-lld-20111025/. Access on: 27/04/2012

Wang, Y, Potter, A. and Naim, M. (2007) Electronic Marketplaces for Tailored Logistics. Industrial Management & Data Systems, 107 (8), p. 1170-1187.

Windt, K. and Hülsmann, M. (2007). Changing paradigms in logistics – Understanding the shift from conventional control to autonomous cooperation and control. In Hülsmann, M. and Windt, K., editors, *Understanding Autonomous Cooperation and Control in Logistics: The Impact of Autonomy on Management, Information, Communication and Material Flow*. Springer.

Yin, R. K. (2003). *Case Study Research: Design and Methods*. 3.ed., Sage Publications: London.