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Abstract **- Electronic commerce can dramatically alter the current delivery and sales channels, as well as value chains in many industries. Accordingly, consumers will change or supplement their channel preferences with increasing amount of electronic services available. This study focuses on the different types of business models used in the grocery retailing industry, to serve consumers. The empirical part of he analysis is based on a longitudinal analysis of existing EGS' in 1998 and 1999 in Europe, North America and Pacific Asia. The analysis shows that the majority of the electronic grocery shops are extensions of existing physical stores. There are, however, some signs of interesting new business strategies. These strategies are compared to the theoretical alternatives proposed by the model of Customer Channels and conclusions are drawn regarding the development of electronic commerce in grocery industry.**

I. INTRODUCTION

Diffusion of the Internet to business-to-consumer markets and the availability of low cost computer equipment has created a new type of customer who wants an easy and convenient alternative to regular shopping in physical stores [16]. The recent proliferation of consumer-oriented virtual storefronts supports the proposition that the Internet enables vendors and customers to bypass intermediaries and to streamline the logistics, and that it potentially reduces the prices of goods [12]. Consumers are expected to be empowered to make an almost infinite number of choices in the evolving electronic marketplace [17]. Moreover, they are expected to be able to save time and have more control because they can shop from home or work whenever they want [9].

Electronic networks can replace the whole value chain from production to delivery for digital products, but the case of physical products is more complex. Depending on the types of products and services as well as business practices, different types of intermediation are still needed. In many industries the value chains from production to consuming will have to be reorganised in order to make EC feasible and cost-effective [20]. Thinking grounded on old business models based on traditional value chains does not work well with the emerging global information infrastructure, within which the logic of operations and relationships between parties is continually changing. EC is not only about technologies and systems; to be economically profitable or beneficial to involved parties, different business models are needed for different customers and for different types of products and services [20].

In the grocery retailing industry, against the expectations that the consumers would eagerly grasp the opportunity to dismiss the daily chore of shopping and rely on electronic channels, the usage of EGS (Electronic Grocery Shops) has been slower than anticipated. Most of the current EGSs are based on the current industry infrastructure that has been optimised for bricks-and-mortar stores. These EGSs offer a number of value-adding services, that are appealing to consumers seeking improved services. However, the consumers looking for lower "bargain" prices have been disappointed. To attract these cost critical consumers, EGSs have to apply different, new business models.

The objective of this paper is to look at the development and current status of electronic commerce (EC) in grocery retailing industry. We use the model of Customer Channels to describe four different business models for EGS. In the empirical setting we explored the web sites of 47 EGSs in 1998 [13] and 51 EGSs in 1999 in Europe, North America, and Pacific Asia. We had a list of over one hundred EGSs all over the world (http://www.innovell.com/supermarkets/) and selected those that offered information on the net in English, German, French, Swedish or Finnish i.e. languages that someone in our research group was able to understand. The data was collected during Summers 1998 and 1999. Collection of the data sets was conducted by a group of four people who cross-checked the observations of each others. The data collection instrument was designed based on a model of customer buying process (see eg. [[3], [7]]) and the model of Customer Channels separation. The data collected is used to illustrate existence or indicate signs of emergence of the four business models introduced in this study.

II. MODEL OF CUSTOMER CHANNELS

The model for the separation of distribution channels called the Customer Channels framework was introduced by Vepsäläinen and Saarinen [21] and extended by Heikkilä et al [8]. It synthesises the previous viewpoints on the evolution of different channels (see eg. [1], [2], [15],[18]).

The interest in BPR and process management has led companies to organise their operations along business processes [5]. Instead of internal functional division to departments, the new restructured organisation consists of inter-functional business processes, in some cases exceeding organisational boundaries. The process-based organisations will operate in networks to achieve improved efficiency by carrying specialised tasks in the value chain. The resulting value chain consists of several channels with a group of channel members participating in defined tasks within the value chain. Instead of performing tasks within the organisation, they are outsourced from other channel members. Consequently, the inherent assumption in the model is that in the future, channels are the central way of organising the business and firms in the value chain. The existence of a channel means that there are capabilities offered in the marketplace independent of any individual producer, merchant or customer.

The Customer Channel model suggests that there are four different types of channels :

1) *Marketing Channel* that communicates the market offerings to the customers, carries out persuasion and provides for feedback from customers.
2) *Financing Channel* supports the payments, funding and insuring of transactions and, in general, manages the return on investment, risks and incentives for co-operation.
3) *Ordering Channel* that facilitates the administration orders, guarantees, customer complaints and other commitments.
4) *Transferring Channel* that accomplishes manufacturing and deliveries through the warehouses to the final customer, managing as well after sales services and maintenance.

Since the channels provide standardised access across different industries, the consumer will become an active party joining manufacturing and trade in the value-added processes.

Some examples of services emerging along the Customer Channels can already be observed. The customers are joining virtual communities [4] to share information on market offerings and to gain weight in the creation of them. Within the Financing Channel, the credit card companies and venture capitalists provide much of the funding of consumption and innovation, respectively. In the Transferring channel, logistics service providers take care of the transportation, warehousing and distribution of products on behalf of other organisations.

The concept of Customer Channels suggests that the control of the distribution chain moves forward. However, the channelling of services seems to take place at a slower pace than the technological progress would to allow. One reason is that the concept assumes an adaptation on the level of industries, and even across industries, to gain from market-wide economies of scale and scope. The separation of channels also pre-supposes reorganisations challenging the power of existing players. Supply Chain Management [1] and Business Process Redesign [5], [19], while operating on the level of individual chains and businesses, have already pointed out the opportunities for larger scope of reintegration and new co-ordination systems to reach the critical mass.

The most critical challenge for the co-ordination of separated channels has been the activities of the customer in retail store. We are used to the most primitive routine-based co-ordination, wherein the customer integrates herself the distribution chain in the store by looking for information on products and prices, picking up goods and carrying them through the cashier's desk. This procedure is easy to implement – everybody knows how to do it – but it has severely restricted the development of the logistics and marketing activities by forcing them to converge at the store. It has also limited the options of the customer to choose between getting a relief from the tedious daily shopping routines by electronic ordering or performing the purchases by traditional means.

A. Alternative Models of Electronic Commerce

Basically, consumers are looking for either better service or cheaper prices from electronic commerce [10]. These two objectives are difficult to fulfil with a single concept. This denotes two alternative EC models based on different customer needs, and subsequently also two different strategies for the supplier side. The first one is *Service critical model*, for the consumers looking for improved service, and the corresponding strategy of current retailer is EC based on the same premises as the existing shops. The second one is *Cost critical model*, for those customers in search for lower prices, which for current retailers would mean EC using specialised terminals and streamlined delivery chains.

In addition to these models, we have recognised two other, more advanced, business models for EGS. Thus, the introduction of electronic shopping is expected to follow roughly the following four forms and the corresponding models, which will be to a large extent complementary alternatives to each other:

1) *Electronic Storefront* supported by an existing physical store
2) *Dedicated Electronic Store*
3) *Separated Channels* co-ordinating the shopping services
4) *Intelligent Channels* providing automated or smart shopping services and channels

1. Electronic Storefront

The majority of existing electronic stores have been developed to add value to or support an existing retailing infrastructure. This mode of operation is illustrated in Fig. 1.

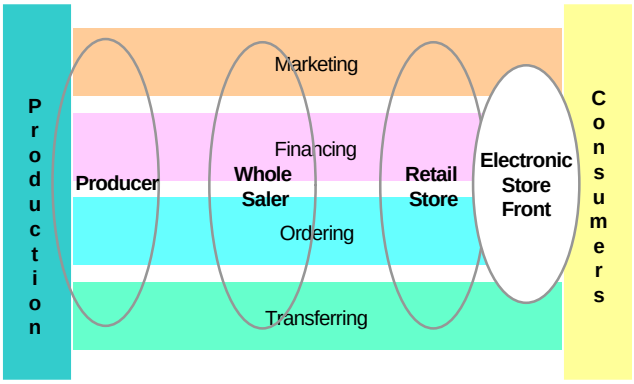

Fig. 1. Electronic Storefront built on top of existing structure.

Electronic Storefront offers product information, ordering and various kinds of search facilities on the electronic store. The majority of existing electronic storefronts have been developed to add value to or support an existing retailing infrastructure. Typically the ordered products are picked from the shelves of retailers' brick-and-mortar outlet and then delivered to the customer's home or to another place from where the customer can pick the products up. The underlying logistics systems are the same for both the physical and *electronic* store. The extra cost of order picking and delivery is usually transferred to the customer, either as included in the product prices or as an extra fee. The electronic storefronts can, however, provide customers with value-adding information services such as purchase recommendations based on customer profile and preferences, or shopping history. Thus, electronic storefront is an add-on electronic store that cannot compete with price but rather with the additional services provided. Particularly the home delivery is appreciated by some consumer groups, such as busy families or elderly people.

2. *Dedicated Electronic Store*

Dedicated Electronic Store (Fig. 2) is a more advanced business model in the sense that it utilises improved logistics by dedicated purchasing and warehousing systems, instead of relying on existing traditional processes. The streamlined logistics can include some tasks of the wholesaler, in addition to those of the retailer. The aim is to reduce the costs in order to serve consumers seeking for lower costs. This is achieved by specific cross-docking terminals organised especially for handling small and pre-packaged batches and with efficient order picking systems. Also order processing can be automated and any pre-ordering information can be utilised in replenishment. Dedicated electronic store can offer the customer the same value-adding services as the electronic storefront, but the better co-ordination and more efficient logistics services allow for low cost strategy, while maintaining responsive service.

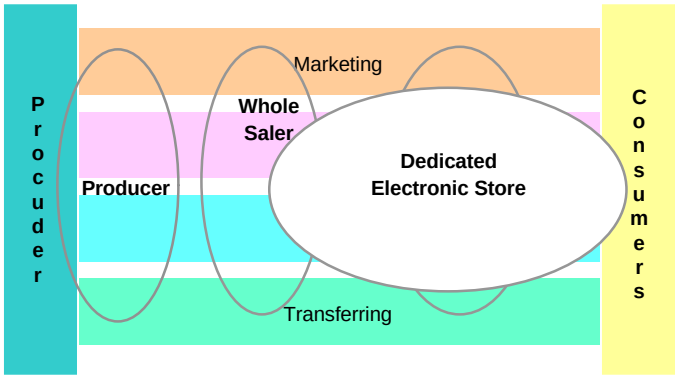

Fig. 2. Dedicated Electronic Store specialised for electronic shopping

3. *Separated Channels*

The preceding solutions are based on the control of sales and delivery by the store manager and converging the promotions, ordering and payments at the customer's premises. The next step could be, figuratively and electronically, out of the store and home – each of the tasks of shopping are separated to specialised organisations and the channels are co-ordinated independent of the place and time of customer needs (Fig. 3).

Separated Channels offers the services of specialised channels, making them available to service providers in other channels. The channels are co-ordinated independent of the place and time of customer needs. The marketing channel provides e.g. recommendations of goods and services by search agents or virtual communities. For grocery shopping the service options may be based on shopping history, life style or the like. Similarly, the delivery services used by a consumer can arranged by one service provider, such as UPS, FedEx or DHL, irrespective of the electronic store used in each individual purchase. Also the financing may be centralised to the preferred financial institution, such as Visa or American Express.

The separated channels will assist the consumers in shopping by providing and co-ordinating services offered in the Interned. The co-ordination may be based on long-term agreements or one-off needs. However, the consumer will make the final purchasing decision.

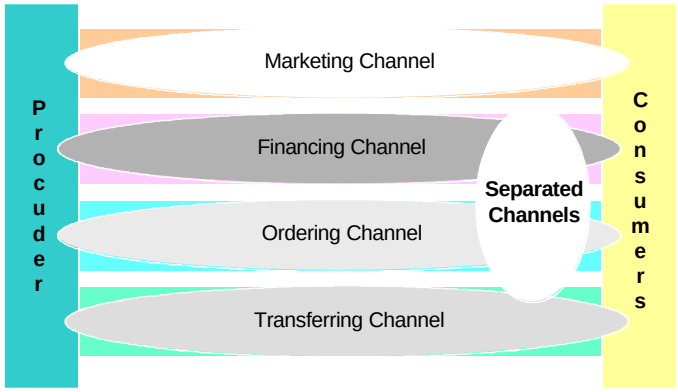

Fig. 3. Separated Channels co-ordinating the Electronic Shopping Services

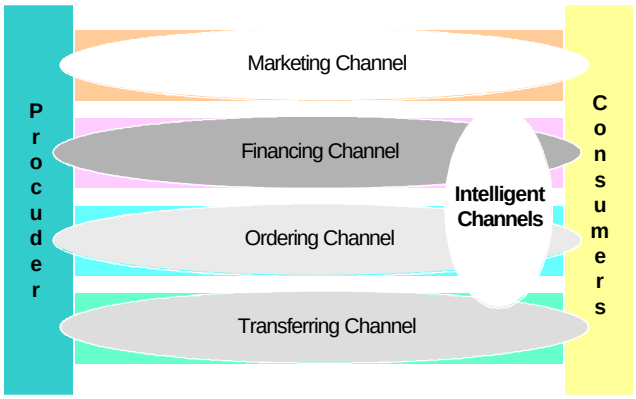

Fig. 4. Intelligent Channels for Electronic Shopping Services

4. *Intelligent Channels*

Intelligent Channels (Fig. 4), an advanced form of distributed Customer Channels is an intelligent customer-driven shopping system that learns the needs of the customer and is capable of co-ordinating the order and delivery from the low-cost or preferred point of supply. The intelligent search agents may totally eliminate the need for customer action in many of the traditional tasks, such as ordering (via automatic inventory tracking in icebox) and payment (via extended credit line and automatic trading of credit). Hence the active role of customer doesn't mean a lot of "clicking activities" or any activities, for that matter. Some new benefits can be achieved by delegating the customer service to market makers or channel managers who are in the best position to share and accumulate the information on demand and supply. Independent third party data agents or infomediaries provide advanced data on customer behaviour and preferences, as well as, track the market supply of suitable goods and services for the benefit of consumer. This creates possibilities to the trusted third-party data agencies.

III. Analysis of Grocery Retailing Industry

Electronic commerce of daily grocery goods means the ordering of groceries on the Internet. EGS offers an electronic ordering interface, and the retailer takes care of picking, and typically also delivery of the goods to the customer. The groceries are one of the most difficult objects of trade for electronic commerce: material flows are distinct from information flows, the number of frequent customers is very large, and an average purchase consists of many items. It is more local than for example selling digital products that are easily accessible throughout the world. It is also more difficult than EC of many other physical products such as books or clothing, because of low value-to-weight ratio of groceries and shelf time limitations of perishable goods. Also lack of suitable delivery systems, particularly delivery equipment with temperature controlled storage, cause additional difficulties to EC in groceries. Furthermore, purchasing habits of consumers are rather well established, and consumers do not calculate the cost of time spent shopping or transport costs of using their own cars.

Yet, there is a lot of potential for EGS: groceries form the largest category in retail, the buying patterns are rather stable, and customers can learn to use a new channels quickly as they potentially use it frequently, also for other purchases. The customers are expected to benefit most from the ease and convenience of shopping electronically, as compared to the traditional way. In addition to home delivery, EGS can provide the consumer with new, value adding services, particularly in various planning related tasks [7]. Other features increasing the potential of EGS include its capability to facilitate collecting consumer preferences and purchasing history, and high shopping frequency enabling close customer relationship.

We first look at the basic way the studied EGSs are organised. As Table I shows, majority of EGSs around the world are based on the current grocery industry infrastructure, with not too much change from 1998 to 1999. This means that the products are picked from the shelves of an existing super/hypermarket, or a wholesale outlet. This is the case even in the EGSs, which operate only on the net. They usually have an electronic storefront and utilise the existing retail or wholesale outlets in a traditional way. The supply chain up till the retail or wholesale outlet remains unchanged. However, the fact that there are EGSs operating only on the Net indicates business models approaching the dedicated electronic solutions. For example, Ruoka.net service, launched in 1998, is available only on-line. It is targeted at both consumers and corporate customers in the area of Greater Helsinki in Finland. The objective is "to develop a streamlined logistics company, that is able to take care of picking and delivery more efficiently than anybody else in the world". The company owns no inventory and outsources warehousing, delivery as well as IT operations. Some of the EGS companies, Peapod (http://www.peapod.com) in the US for instance, have shifted closer to that business model after the initial round of data collection by building "dedicated fulfilment centres" [14].

There is a clear growth, however, in the number of businesses with local orientation, suggesting that also smaller entrepreneurs are increasingly starting to recognise the opportunities provided by the Internet and electronic commerce (Table II).

TABLE I
BUSINESS MODELS OF EGSS

	1998 (n=47)		1999 (n=51)	
Electronic Storefront - On the top of existing retail outlet	23	48,9 %	24	47,1 %
Electronic Storefront- On the top of existing wholesale outlet	7	14,9 %	8	15,7 %
Dedicated Electronic Store	17	36,2 %	19	37,3 %

TABLE II
SCALE OF OPERATIONS

	1998 (n=47)		1999 (n=51)	
Local	16	34,0 %	29	56,9 %
Regional	10	21,3 %	13	25,5 %
National	13	27,7 %	11	21,6 %
Global	4	8,5 %	1	2,0 %

We will next look at the findings from the empirical data sets in terms of the Customer Channel Model, both in order to assess the current situation as well as to evaluate potential future developments of electronic commerce in grocery industry.

1. Marketing Channel

In addition to the mere web-presence as such, the EGSs have established some new ways of communicating with their customers and delivering product information. All of the studied EGSs offer basic product information enabling the customers to make decisions and orders on-line. In 1998 over one third of the EGSs had less than 2.500 items in their assortment, but by 1999 the assortment of the EGSs have generally grown larger (Table III). This goes together with the observation that perishable goods, both fresh and frozen, together with non-food products, are being included increasingly in the selections of the EGSs.

Value adding services, such as recipes are also rather common way to offer customers relevant information on meals and required ingredients (Table IV). Frequent buyer support was offered often to help companies maintain close relationships with their customers. However, news groups and virtual newsletters were used only in few EGSs. A notable increase from 1998 to 1999 has been in special offers to EGS customers. This is a clear attempt to attract also the cost critical consumers to the electronic store in addition to the service critical ones.

TABLE III
SELECTION AND ASSORTMENT

	1998 (n=47)		1999 (n=51)	
Assortment				
Less than 2.500 items	18	38,3 %	12	23,5 %
2.500-5.000	4	8,5 %	8	15,7 %
5.000-10.000	10	21,3 %	9	17,6 %
Over 10.000 items	12	25,5 %	14	27,5 %
Selection includes:				
Fresh products	34	72,3 %	42	82,4 %
Frozen products	32	68,1 %	41	80,4 %
Non-food products	40	85,1 %	49	96,1 %

TABLE IV
SEARCH AND INFORMATION SERVICES

	1998 (n=47)		1999 (n=51)	
Search services				
Product lists	43	91,5 %	44	86,3 %
Catalogues	7	14,9 %	5	9,8 %
Value adding information services				
Search by product name	26	55,3 %	34	66,7 %
Search by product attributes	12	25,5 %	3	5,9 %
Product pictures//video clips	24	51,1 %	24	47,1 %
Nutritional information	10	21,3 %	11	21,6 %
Links to external information	9	19,1 %	7	13,7 %
Value adding services				
Recipes	25	53,2 %	25	49,0 %
Special offers	18	38,3 %	32	62,7 %
Feed-back channel	37	78,7 %	39	76,5 %
Chat rooms	6	12,8 %	2	3,9 %
Virtual customer magazines	5	10,6 %	2	3,9 %

Based on the findings it seems that marketing is not being changed radically among the studied EGSs. There are no signs of neither co-ordinated and specialised marketing efforts nor automated marketing channels offering assistance to the customers in searching, selecting and ordering daily groceries. It may be, however, that the customers come to the EGSs web-sites through portals or other services that work as marketing channels to the groceries.

2. Financing Channel

The accepted payment methods varied a lot, with credit cards, cash and checks as the most common ones. Also other arrangements, such as e-cash or billing based on an account, were used in some cases (Table V). Coupons have traditionally been important in US retail industry, and EGSs are increasingly also using printable or electronic coupons (used by 35% of the analysed US EGSs).

There is no need for any specific industry to develop its own specialised payment methods. Payments are standardised across industries and used as platform services common to all areas of retailing. For example, Merita Bank (http://www.merita.fi), part of the Finnish/Swedish banking group MeritaNordbanken offers an Internet based payment facility under the name Solo. This facility is available to all customers of Merita's electronic banking service without additional requirements. The service enables customers to shop and pay for purchases during a single Internet session. Customers are directly billed from their existing Merita accounts. The service is, however, currently limited to trade within Finland alone (expanded recently to some extent also to Sweden).

TABLE V
PAYMENT METHODS

	1998 (n=47)		1999 (n=51)	
Credit card	35	74,5 %	33	64,7 %
Cash	24	51,1 %	25	49,0 %
Check	22	46,8 %	19	37,3 %
Billing	8	17,0 %	12	23,5 %
Debit card	6	12,8 %	16	31,4 %
Electronic money	4	8,5 %	0	0,0 %
Direct payment from bank account	1	2,1 %	2	3,9 %
Other	1	2,1 %	5	9,8 %

3. *Ordering Channel*

In addition to the core business of selling groceries and other "daily consumer goods" [1] some of the EGSs have bundled some other services, also customised services, with the EGS. These services provided can include a large degree of customisation through the creation of customer profiles and can also be integrated with electronic payment methods. This type of virtual business model could enable closer integration of customer-facing applications with information management systems, which would result in a more efficient and demand-sensitive grocery industry across the entire value chain, with pricing benefits for customers.

Most commonly, about two thirds of the studied stores, the EGSs offer re-usable shopping lists for the convenience of the customers (Table VI). There has been a clear increase in the number of EGSs offering shopping history information to the customers (from 6,4% in 1998 to 21,6% in 1999). In addition to being a sign of technologies developing, this denotes that shopping history is a service found valuable also by the consumers. Collecting purchasing behaviour data has obvious benefits to the retailer, who can utilise the information for instance in replenishment and marketing. Whether the retailers use the information in these ways can not, however, be assessed from the Web sites alone.

Some EGSs also offer a possibility to make repeated orders and standard deliveries. This service frees the customer almost totally not only from visiting to the supermarket, but also from the effort of routinely ordering the daily groceries. This can be seen as a sign of the emergence of an automated ordering channel that is working within a standard electronic storefront.

TABLE VI
SHOPPING LIST SERVICES

	1998 (n=47)		1999 (n=51)	
Electronic shopping list	22	46,8 %	33	64,7 %
Shopping history	3	6,4 %	11	21,6 %
Frequent customer support	17	36,2 %	11	21,6 %
Standard delivery	4	8,5 %	3	5,9 %

TABLE VII
OTHER SERVICES AVAILABLE

	1998 (n=47)		1999 (n=51)	
Recycling services	7	14,9 %	10	19,6 %
Laundry services	2	4,3 %	3	5,9 %
Film development	2	4,3 %	3	5,9 %
Other (e.g. video rental, parcel delivery, shoe repairs)	3	6,4 %	12	23,5 %
Open channel for other services	5	10,6 %	4	7,8 %

MANY EGSS ARE INCREASINGLY BUNDLING SERVICES SUCH AS RECYCLING SERVICES, VIDEO RENTAL, FILM DEVELOPMENT AND LAUNDRY WITH THEIR OWN SERVICE (

Table VII). Interestingly some, although only a few, of the studied EGSs have announced their willingness to serve as an open channel for any other services making them portals to wider range of electronic services. These EGSs can be interpreted to have started to operate as specialised marketing and ordering channels for their customers.

4. *Transferring Channel*

Almost all of the EGSs deliver the goods to the customer's home and about 78% offer also office deliveries (Table VIII). We were surprised, however, that only a minority of EGSs has any pick-up points for their customers. Only some specialised concepts are offered for the customers living in houses with a garage (see e.g. http://www.streamline.com). The garage is equipped with a special box keeping the groceries in a right temperature till the customer takes them into her possession. Other type of examples can be found in the experiments in the social care sector in Finland: In home help services for elderly and disabled one delivery service provider takes care of delivering two (or more) services, for instance groceries ordered electronically and warm meals [6]. These concepts are signs of emerging specialised delivery channels.

[1] Daily consumer goods are defined to be groceries or products with reasonably low unit prices that consumers are accustomed to buy in the same shop. Groceries can be roughly divided into perishables and non-perishables; nowadays they include also non-food commodities. [11]

TABLE VIII
DELIVERY OR PICK-UP ALTERNATIVES

	1998 (n=47)		1999 (n=51)	
Home delivery	43	91,5 %	46	90,2 %
Office delivery	31	66,0 %	40	78,4 %
Pickup from the store	14	29,8 %	14	27,5 %
Pickup from some other place	2	4,3 %	3	5,9 %
Other	1	2,1 %	3	5,9 %

IV. DISCUSSION AND CONCLUSIONS

EC is an emerging field in grocery retailing business. Most current EGSs still rely largely on existing infrastructures and have based their electronic storefronts on traditional business models. Special possibilities and built-in capabilities of the Web are not fully utilised when processes and practices are simply transferred from physical to digital world. The purpose of this study was to use the Customer Channel Model to describe and analyse the current practices in EGS, as well as to use it to evaluate alternative future EGS business models. First signs of the future development are apparent as our empirical data denotes. The current problems in the supplier side relate largely not so much to technology, but rather to reliance on old infrastructure and business practices not designed and developed for trading in electronic environment. The business model where the EGS is built on the top of the existing infrastructure will dominate as long as the main players of the industry, particularly the large chain masters, are not easily willing to risk a channel conflict. Therefore, in many cases the current EGS businesses are started by the owners of small retail outlets or new entrepreneurs entering the industry.

Dedicated EGS models will not become common until large investments are made in the distribution infrastructure. New warehouses and cross docking terminals but also home delivery and picking systems need to be developed. One key question is if any single company has capabilities and resources to build this infrastructure alone. The Customer Channel model presents an alternative solution to reorganise the supply chain structure. Separate organisations will start to specialise into taking care of the four main processes of the distribution i.e. marketing, financing, ordering and transferring the purchases to the customers.

This kind of development is hard to see but evident in EGS related industries: some companies have opened their ordering channels to other service providers; automated replenishment will be possible if repeated order and the shopping history data is properly used; some new payment systems are under development; and new alternative solutions to the home delivery are under construction. Technical development in EGS solutions, as well as developments in other technologies such as digital television and mobile phones, will facilitate changes in value chains, logistic structures and delivery services and emergence of third party data agencies and managers providing basis for customer behaviour analysis. In terms of the Customer Channel model, the most prevalent trend seems to be to develop dedicated or specialised solutions.

The magnitude and level of services on the Internet is constantly increasing in practically all industries. These services are, however, still largely underdeveloped. The consumers have found Internet useful for searching and gathering information on different types of services and products. But, as long as using EC means combining electronic means with some traditional ones, e.g. electronic store fronts supported by existing supply chain infrastructures and processes, it means extra effort instead of increased convenience and additional costs instead of lower prices for the consumer. As long as the traditional way of conducting transactions is both more convenient and cheaper, the EC retailers cannot expect large volumes of business.

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