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26th Annual IFAMA World Conference & 12th Wageningen International Conference on Chain and Network Management (WICANEM)

Aarhus, Denmark June 19 – 23, 2016

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Value creation and appropriation through the Hungarian SME's food chain

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Abstract

Value creation is the result of the continuous innovation activity of the entrepreneur, which is carried out mainly in form of open innovation among the agri-food SMEs. However value creation is not the ultimate goal of the enterprises. They are more interested in increased appropriation of the created value.

*Although the value **creation** (innovation) is very well explored and cultivated area of research, there are some voids in the field of agriculture and food industry: the behavioural aspect of open innovation is very rare. The value **capturing** is even much less studied, therefor our research approach is largely explorative one.*

Data are drawn from a survey carried out in Hungary among the agri-food SMEs in 2014. We use Structural Equation Modelling as well as ordered probit and semi-non parametric ordered probit models for analysing the data.

Our results show that there is positive relationship between the knowledge sharing with chain partners and the innovativeness. We could explore that size of the firm, absorptive capacity and openness to foreign trade ambiguously affects value capturing. However trust in chain partners, reciprocity in knowledge sharing with chain partners and willingness to cooperate with buyers positively influence the appropriation of the created value.

Keywords: value creation, value capturing, agri-food SMEs, structural modelling, behavioural economics

1 Motivation and Research Questions

Value creation can take several forms at the various stages and at the numerous players of the food chain. The forms are related to actual or perceived value to the customers for a superior product or service. Value creation is the result of the continuous innovation activity of the entrepreneur: in Schumpeterian sense the "new combination" of factors will always be targeting at new innovative solutions which in turn will result in higher quality, lower cost, better services, etc.

However value creation is not the ultimate goal of the enterprises. They are much more interested in the increased appropriation of the created value. Capturing of the created value can be classified into five categories: trade-, technological-, organisational-, relational and branding rents (Kaplinsky, 2000a). For the agri-food sector each of them is suitable, though the branding rent is very rare at the upstream (agricultural production) phase.

From innovation (value creation) point of view the agri-food industry is seen as matured branch of the economy, where revolutionary new products and processes are very uncommon. At the same time the firms are increasingly exposed to global competition and food safety requirements. Especially the SMEs are in squeezing situation: they have to fit very sharp prerequisites and demands on one side and greatly constrained resources in order to give them power in formulating appropriate answers on the other side (Fertő – Tóth, 2013). Meanwhile there is an increasing trend in firms' practice that they carry out innovation with their network partners instead of in-house R&D. They are looking for partners beyond the boundaries of their organization, mainly with other firms, universities, research organisations and government

agencies. Besides the market threatening and safety regulations there are several factors behind this process, including exploding R&D costs and risks, shifting public R&D funding incentives towards multi-institutional research, the influence of new technologies (biotechnology and nanotechnology), which have dissolved boundaries between industries (Rampersad et al., 2010).

Although the value creation (innovation) of the SMEs theoretically and empirically is very well explored and cultivated area of research (c.f. Chesbrough, 2003, 2006, Enkel, Gassmann & Chesbrough, 2009), there are some voids in the field of agriculture and food industry in this respect. Especially the behavioural aspect of open innovation stands very rarely in the focus of the investigations. Our first question is therefor: "Is there any symmetric behavioural expectation of SMEs to each other during the innovation process in Hungary?"

The value capturing is much less studied than value creation. We hardly can find neither theoretical nor empirical research on it. Consequently, our approach is largely explorative one. We would like to determine the influencing factors of value appropriation.

2 Theoretical consideration

The agro-food SMEs need to face global challenges in all fields of value creation. This continuous pressure strives them in their value creation activities. However, value creation is always the result of some kind of innovative solutions. Innovation in Schumpeterian sense is the "new combination" of factors which in turn will result in higher quality, lower cost, better services, etc. Value is captured partly by the firms (producer surplus), partly by the consumers (consumer surplus). Our main concern here is the producer surplus. Therefor the "value creation – value capturing" dichotomy can be characterized as the relationship between the innovation (in the broadest sense) and the firm's value appropriation.

Value creation through the food chain is always targeting at the final consumer: for a superior product or service value is created when new combination of factors is getting in effect and is captured when the costumer – after having purchased the product/service – acquires or perceives it. The objective is to generate something which has got value. New products, enhanced product characteristics, services, brand names or unique customer experiences may create additional value for food products. A number of factors affect how much value may be added to products. The amount of value a producer augments can be related to whether the value in question can greatly influence the profit potential or success of the enterprise.

The value creation process is very much linked to the Resource Based View (RBV) of enterprises (Fischer, 2011). In line with microeconomic theory the created value equals the use value of a product less its opportunity cost, therefore firms apply such resources which are able to produce more use value and/or result in less opportunity cost. The innovation extends the complementarity of assets, thus providing the ability of enterprises in creating more use value. Another consequence of innovation might be the less opportunity cost of resource use. Therefore, innovation is seen as one of the most important tools of value creation.

In (Kaplinsky, 2000b)'s explanation the captured value appears in the form of economic rent. Endogenous rents are the result of the purposeful actions by a firm or a group of firms operating within a value-chain. These types of rent arise from the command over the production process, which are mostly the private domain of an individual or group of firms. Exogenous rents are generated outside the firm. The capacity to capture the generated rents through purposeful activity needs to get complemented by the capacity to protect and appropriate rents, and it is

why intellectual property rights (patents, copyright and brand names) play such an important role in a world of intensive global competition.

Rents are distributed through the chain and the core imperative is to focus on areas of high rent which should be protected from competition. Due to the competition – especially in global environment – the surplus of the entrepreneur in question and of his immediate followers gradually disappears – due to the Scumpeterian creative destruction.

Rent can be something which is owned by the entrepreneur, but the competitor does not have and which can generate additional income. In default sense rents seem to be natural resources, but the most important feature of rent is that it can be created by innovative solutions in Scumpeterian sense: his entrepreneurial, producer surplus can be seen as a form of economic rent.

The ways of value creation guide us also to the innovation: value (or in this sense rent) is created whenever the socio-economic result of an economic action or the prevention of such an action is positively balanced. This approach needs the decision maker to become innovative: he/she should be able to recognize the situation which gives the chance for value creation and necessarily should also be able to utilize this possibility via new combination of economic resources.

Innovation through creation, diffusion and use of knowledge has been recognised as a key driver of economic growth. Trends in the agro-food systems are challenging farmers, produce traders, processors and other stakeholders to improve the efficiency of their operations and to become more responsive to consumer demands as well as regulatory frameworks. It is assumed widely in both the neoclassical and the evolutionary economic theory that market selection rewards the most innovative firms: ensures more markets and/or increase the market shares of innovators. However, this approach is not unambiguously supported by empirical research: empirical evidence on whether innovative firms perform better than non-innovative ones remains inconclusive. (Demirel, P. and Mazzucato, M., 2009).

It is argued that competitive pressures sharpen incentives to innovate, but this is likely only to a certain degree. Extreme adversity and competition, on the other hand, may be a deterrent to a firm's ability to innovate successfully (Thompson, N. A. and Stam, E. 2010).

The empirical evidence on the impact of innovation on profits is mostly diverse. Several studies find persistent differences in determinants of profitability for innovators and non-innovators (Freel 2000, Leiponen 2000, Stoneman and Kwon 1996).

However, the empirical results with regard to the effect of innovation on firm growth are more mixed. According to Adamou and Sasidharan (2007) firms with higher R&D intensity ratios (R&D/sales) grow faster. In contrary from Del Monte and Papagni (2003) we could learn that R&D has a positive impact on firm growth but this is more pronounced in traditional industries than in the most 'high-tech' ones. On a Swedish sample Heshmati and Lööf (2006) did not find significant impact of R&D expenditures on firm growth. Oliveira and Fortunato (2005) found that physical investments have a much higher impact compared to R&D investments, especially for 'high-tech' firms.

While innovation as value creation and performance as value capturing characterize the agro-food chain in various ways, there is a recent trend which is quite common at each level of the industry: the origin of innovation derives more and more frequently outside the boundaries of the firms. This leads to the differentiation between the closed and open modes of innovation.

Chesbrough (2003) has been the first to introduce the concept of 'open innovation'. The idea of open innovation indicates that a company is increasingly using inflows and outflows of knowledge to speed up the internal innovation process, and expand the markets for external use of innovation.

Van de Vrande et al. (2009) measure open innovation by identifying technology exploration and exploitation practices. As pointed out by Huizingh (2011) using external ties as a proxy of openness is potentially misleading because it only captures one of the components of the concept, such as the inbound/outbound dynamics. Thus being engaged in a partnership with someone (i.e. a research organization) does not necessarily mean that you are internally making use of your partner's knowledge (inbound innovation), nor that you are using internal knowledge to exploit resources provided by your partner (outbound innovation). In effect it merely highlights the underpinning mechanisms and trends leading to an open innovation process (Gassman et al., 2010; Huizingh, 2011). Parida et al. (2012) point out that inbound open innovation refers more to exploring and integrating external knowledge to develop and exploit technology. Outbound open innovation is the practice of exploiting technological capabilities, combining internal with also external paths of commercialization (Chesbrough 2003; Chesbrough and Crowther 2006).

The open way of innovation articulates a certain behavioural aspect of activity: of those who communicate openly with business partners about new business ideas we can state that they share their knowledge with these partners. Naturally they expect from these people the same behaviour. They do it because they perceive that the outcome from performing that behaviour is positive, therefore they will have a positive attitude towards performing that behaviour. And this is the core of Theory of Reasoned Action (Fishbein & Ajzen 1975, Aizen 1991), which underlies the use of structural equation modelling in our empirical investigation.

3 Hypotheses

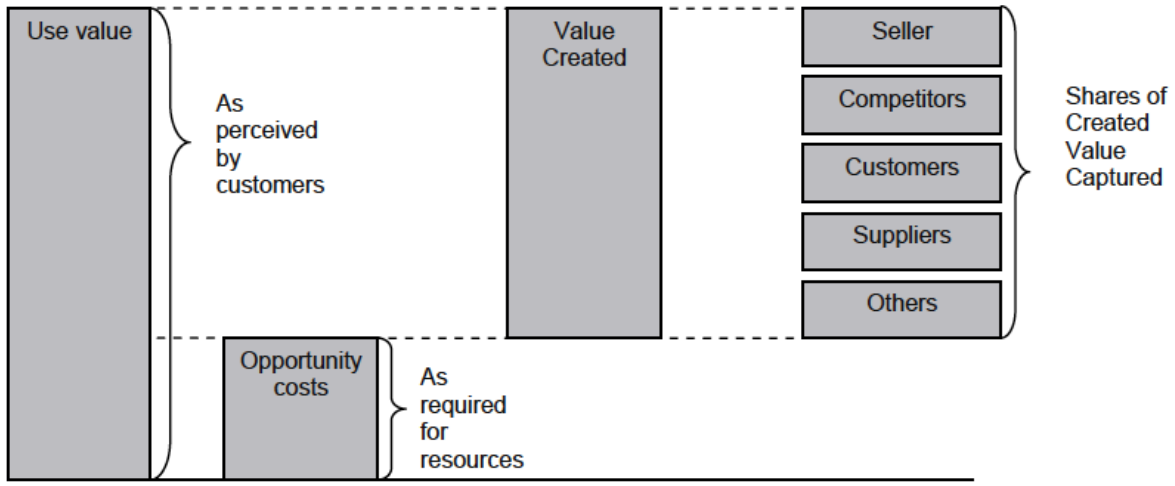
TRA suggest that knowledge sharing among business partners through the food supply chain leads to positive consequences (therefor desirable) and motivate people to act accordingly. This might be true especially within SMEs, where the everyday personnel contact with the other representatives of SMEs is obvious. Therefore our first hypothesis:

> **H1**: *Reciprocity in Knowledge Sharing (RKS) positively influences all type of innovation which in turn helps in increasing competitiveness*

The created value will be distributed along the chain and among producers, competitors and consumers as seen on Figure 1.

Value creation and capture

Figure 1



(Source: Fischer, 2011)

The level the producers can appropriate the created value depends basically on firm attributes mainly related to absorptive capacities and openness. Our second hypotheis:

> **H2**: *Firm-specific attributes (size, absorptive capabilities) as well as openness characters (RKS, willingness to cooperate and openness to trade contribute positively to business value appropriation*

4 Data and Methods

Data are drawn from a survey carried out in Hungary among the agri-food SMEs in 2014. In the panel we have agricultural producers (100), food processors (101) and retailers (101) from all the country.

For testing the first research question we use Structural Equation Modelling, which is adequate for analysing behavioural assumptions. For exploring our knowledge about the influencing factors of value capturing we use ordered probit and semi-non parametric ordered probit models because of the ordered scaling of our data. For identifying consumer- and producer type of rents we used factor analysis.

5 Results

The results will be presented in the following order. First we introduce the descriptive statistics (Table 1) of variables which have been used in our models. As second we describe our behavioural model about knowledge sharing and innovativeness. In the third part we show the summary of value capturing analysis.

Descriptive statistics

Table 1

Variable	N	Mean	SD	Min	Max
Total turnover (in increasing categories) of the enterprise in 2013	290	5,75	1,41	1	7
How many % of employees speak at least one foreign language?[1]	257	1,97	0,79	1	3
How many % of employees are able to use computer?[2]	260	2,89	1,08	1	4
Absorptive capacity[3]	265	2,43	0,87	1	4
Trust in chain partners[4]	282	2,56	0,74	1	4,5
Openness to international trade[5]	298	1,79	0,37	1	2
Do you buy regularly directly from abroad? (1=yes 2=no)	297	1,80	0,40	1	2
Do you sell directly abroad? (1=yes 2=no)	291	1,79	0,41	1	2
Future goals: importance of cooperation with our most important buyer	247	3,27	0,90	1	5
How much do you trust in your suppliers	280	2,59	0,76	1	5
How much do you trust in your buyers	278	2,54	0,77	1	5
How much do you trust in your competitors	274	1,97	0,70	1	4
Reciprocity in knowledge sharing: COMPETITORS	167	2,56	0,72	1	5
Reciprocity in knowledge sharing: SUPPLIERS and BUYERS	164	3,71	0,73	1	5
When did you change last time your technology in your most important activity? [6]	234	2,71	0,97	1	4
When did you change last time your product? [6]	226	1,72	1,16	1	4
When di you change last time your organisation? [6]	231	3,30	0,95	1	4
When did you change last time your market relations? [6]	230	1,97	1,24	1	4
Capturing: new business partner connections have been created	192	2,13	0,93	1	5
Capturing: market share has increased	191	2,20	0,92	1	5
Capturing: turnover has increased	189	2,67	1,02	1	5

[1] 1=0 - 10%; 2=10 - 30%; 3=above 30%

[2] 1=0 - 10%; 2=10 - 30%; 3=30 - 50%; 4= above 50%

[3] Mean of "How many % of employees speak at least one foreign language?" and "How many % of employees are able to use computer?"

[4] Mean of "How much do you trust in your suppliers" and "How much do you trust in your buyers"

[5] Mean of „Do you buy regularly directly from abroad?" and „Do you sell directly abroad?"

[6] 1=within 1 year; 2=within 2-3years; 3=within 4-5 years; 4=more than 5 years

Capturing: profitability has increased	189	3,54	0,77	1	5
Capturing: productivity has increased	189	3,42	0,83	1	5
Capturing: competitiveness has increased	189	3,52	0,76	1	5
Capturing: costs have decreased	188	3,01	0,83	1	5

Behavioural model

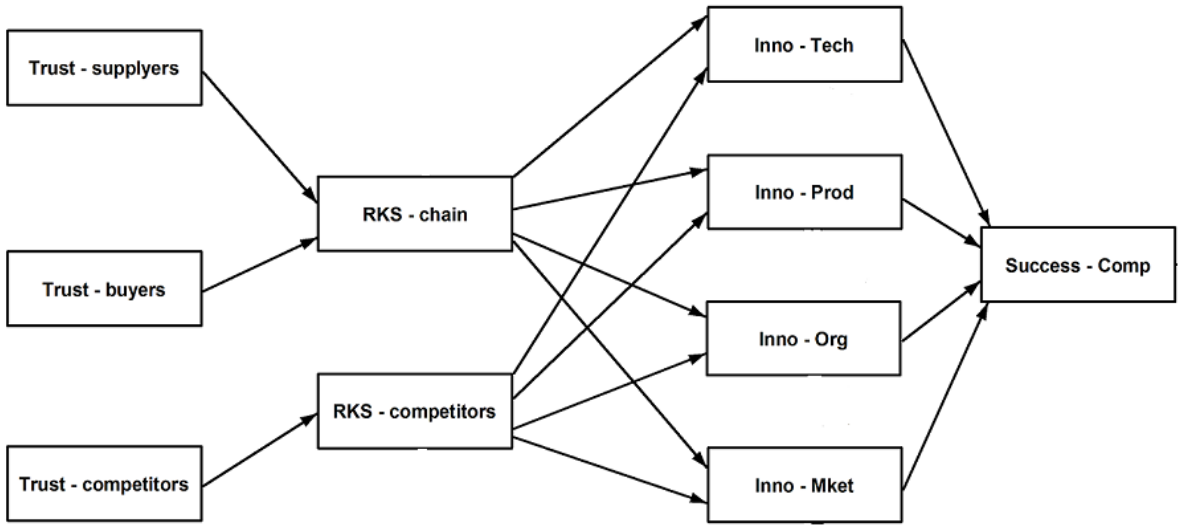
In this model we postulate that trust in business partners helps in sharing new ideas and knowledge with them. The shared and generated knowledge supports the introduction of new innovative solutions. The third level of this structure is that innovative behaviour will be awarded by the market.

In our questionnaire we have data about trust in suppliers, buyers and competitors as well. We also have information on knowledge sharing with chain partners and competitors. We have data on introduction of new solutions in different area of innovation: technology, product, organisation and market. In our model we assume that increase in competition as result of innovation expresses both sides of the market: (*a*) if the consumers get more and/or improved goods, they will purchase more from these products/services (*b*) if the producers are able to produce with less cost and/or improved productivity, they will be able to supply more. If both conditions will get fulfilled at the same time, the enterprise will increase its competitiveness. Therefor we have used in our behavioural model the *increased competitiveness* as indicator of market award.

Based on the above thoughts the theoretical behavioural model looks like follows (Figure 2).

Theoretical behavioural model

Figure 2



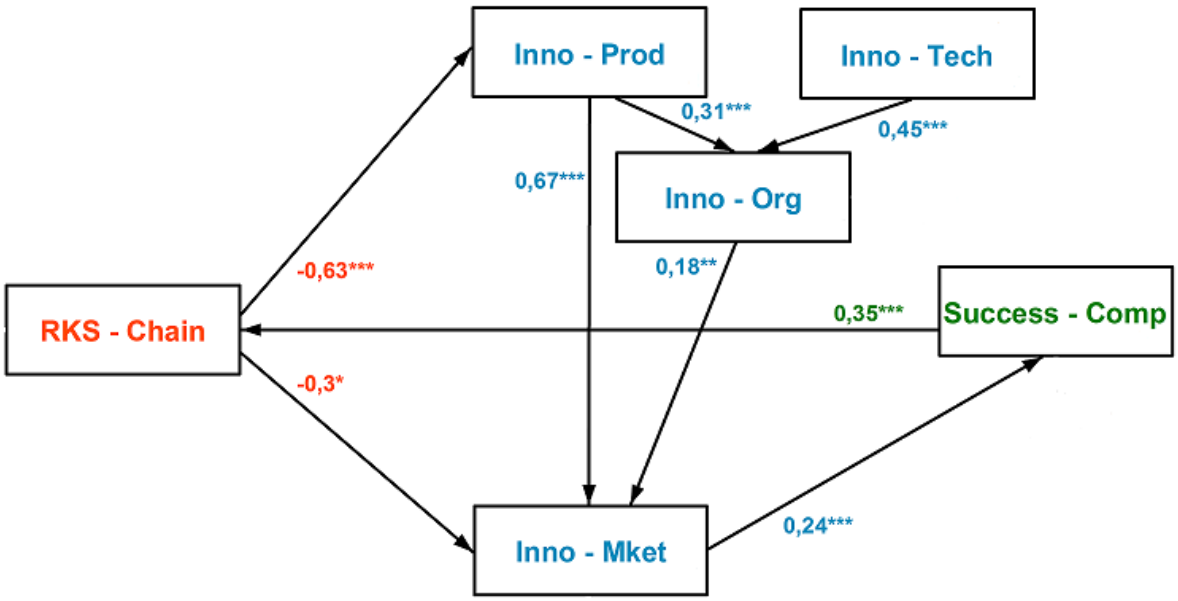
RKS: Reciprocity in knowledge sharing

Source: own construction

After several iterations and concerns we arrived to a model which describes the reality more correctly and meaningfully. At the same time it is a more complicated model in the sense that it has got positive feedback. The model looks like follows in Figure 3.

The behavioural model in the reality

Figure 3



Legend: * p<.1; ** p<.05; *** p<.01
RKS: Reciprocity in knowledge sharing

Source: own calculation

In Table 2. we provide the fit statistics of our final SEM model.

Table 2

	Recommended value[7]	Behavioral model	Degree of model fit
Chi-square	$p \geq 0.05$	0,223	Fit
Chi-square / d.f.	≤ 5	1,348	Fit
Tucker-Lewis Index	≥ 0.9	0,981	Fit
Comparative Fit Index	≥ 0.9	0,991	Fit
RMSEA	≤ 0.07	0,038	Fit
pclose	$p \geq 0.05$	0,577	Fit
Coefficient of determination (like R-square in OLS)		0,136	

Source: own calculation

All indicators prove that our model fits the data very good.

[7] Based on Carmines and McIver 1981, Hu and Bentler 1995 and 1999, Kenny 2010, Marsh, Balla and McDonald 1988, MacCallum et al. 1996 and Steiger 2007

Value capturing analysis

Value is captured through different types of rent (Kaplinsky, 2000a). Our questionnaire contains seven questions related to this topic (they are listed in the last part of descriptive statistics). We suggest that "New business partners", "Increased market share" and "Increased turnover" commonly can be regarded as rents belonging to consumers and the remaining four variables as rents belonging to producers. We carried out factor analysis which clearly show the differentiation between these two categories.

First we summarize the results of the individual rent creation. As we have stated in **H2**, we advise that the influencing factors might include firm specific attributes and openness characters. We assume that bigger firms with higher absorptive capacity, accompanied with more trust to business partners, higher reciprocity in knowledge sharing and higher willingness to cooperate tend to capture more from the created value. Table 3. shows the outcomes.

Capturing the value created by innovation

Table 3

	New partners	**Increased market share**	**Increased turnover**	**Increased profitability**	**Increased productivity**	**Increased competitiveness**	**Decreased costs**
Managerial experience, year	0,04	-0,05	-0,00	0,15	0,13	0,13***	0,19***
Size - Turnover	-0,28***	-0,09*	-0,16***	-0,08	-0,37***	-0,03	-0,11
Absorptive capacity	0,58***	0,20*	0,26***	-1,03***	-1,30***	-0,08	-0,37**
Trust in chain partners	0,69***	0,48***	0,38***	0,98***	0,84**	0,16	0,24
Trust in competitors	0,35*	-0,08	0,04	0,39*	0,57**	-0,03	0,27
Reciprocity of knowledge sharing - chain	0,15	0,27***	0,34***	1,50***	1,73***	0,54***	0,64***
Openness to foreign trade	-0,21	-0,67***	-0,33*	-0,06	0,55	-0,17	-0,52*
Willingness to cooperate - Buyers	0,28**	0,04	-0,01	0,57***	0,89***	0,35***	0,09
Number of obs.	137	136	136	135	136	136	135
Pseudo R^2	0,2034						0,1563
Chi^2 p-value		0,0195	0,0299	0,0004	0,0014	0,0001	
specification*	oprobit	sneop	sneop	sneop	sneop	sneop	oprobit

* Specification was chosen according to Chi^2 p-value

Legend: * p<.1; ** p<.05; *** p<.01

Source: own calculation

Next we demonstrate the results of factor analysis. Table 4. shows the factor loadings and uniqueness values.

Factor loadings of producer- and consumer surplus

Table 4

Variable	Producer surplus	Consumer surplus	Uniqueness
New partners		0,7132	0,4899
Increased market share		0,7858	0,3814
Increased turnover		0,8022	0,3526
Increased profitability	0,8769		0,2277
Increased productivity	0,914		0,1644
Increased competitiveness	0,7719		0,3853
Decreased costs	0,6629		0,5605

As last analysing step we used these factors for characterizing the value appropriation process in general. Therefore, we used the factors as dependent variables and regressed them against the variables which were used in the oprobit/sneop analysis in order to get comprehensive knowledge about rent capturing (Table 5.). We applied OLS regression.

Determinants of producer- and consumer surplus

Table 5

	Producer surplus	Consumer surplus
Managerial experience, year	0,11**	-0,01
Size - Turnover	-0,02	-0,13***
Absorptive capacity	-0,30***	0,30***
Trust in chain partners	0,26*	0,46***
Trust in competitors	0,08	-0,02
Reciprocity of knowledge sharing - chain	0,55***	0,16**
Openness to foreign trade	0,04	-0,42**
Willingness to cooperate - Buyers	0,36***	0,04
Number of obs.	134	134
Adjusted R^2	0,45	0,31

6 Discussion

We can state that the behavioural model (**Figure 3.**) can be useful in detecting unusual interdependencies. The theoretical model did not become true. Instead we could learn that reciprocity of knowledge sharing with chain partners leads to earlier introduction of new solutions in two fields: in product- and market innovation. The direct effect is more pronounced

in the direction of product development. Product innovation has got two direct positive impact: one on organisation- and the other on market innovation. This latter one is more prominent, however both of them are highly significant. The technological innovation comes outside this domain and plays exogenous role in configuring the innovation process. It has got significant positive direct effect on organisational innovation. The market innovation is influenced by three other endogenous variables and has got significant positive direct effect on competitiveness. Competitiveness in turn has got significant increasing feedback effect on reciprocity of knowledge sharing with chain partners.

Table 3. explores a detailed picture about the nature of value capturing due to innovation. We could learn that managerial experiences may help in increasing competitiveness and decreasing production cost. The other way around, bigger size (measured in turnover) might be disadvantageous in almost all type of rent capturing. Absorptive capacity ambiguously affects value appropriation. Trust in chain partners and interestingly trust in competitors (in some cases) positively influences this process. Reciprocity in knowledge sharing with chain partners with one exception plays very positive and highly significant role. The exposure to foreign trade has got negative impact if any. Willingness to cooperate plays mainly positive role albeit not in all cases.

We can learn from **Table 4.** and **5**. that SMEs need to share the value which was created during the innovation process with their clients. The surplus which appears in different form of rent will be going partly to producers and partly to consumers. The influencing factors of these two types of value appropriation behave differently. Managerial experience helps to producers and not significant for consumers. The size plays consequently negative role, however not significant in producer surplus. At the same time it means that smaller firms are more flexible in following consumer needs. The absorptive capacity shows totally adverse picture in these two directions. Trust in chain partners significantly and positively affect value capturing in both cases. Trust in competitors is not significant, although the signs are opposite. Reciprocity of knowledge sharing with chain partners plays unavoidable positive role in formulating both surplus. Openness to foreign trade hinders consumer surplus. Willingness to cooperate is beneficial first of all for producer value capturing.

7 Conclusions

The complexity of innovation process can utilize the flexibility of Structural Equation Modelling and the theoretical background of Theory of Reasoned Action. This type of analysis is extremely rare. Our investigation shows that this special, behavioural approach is very useful if we would like to understand the nature of open innovation process among the agri-food SMEs. Our analysis revealed that the fundamental starting point is the reciprocity in knowledge sharing with chain partners which influences directly two types of innovation. Contrary to the theoretical model, technological innovation is exogenous at this domain. Organisational innovation is subordinated to product- and technological ones and has got direct positive impact on market innovation. Frequent change of market partners is obvious sign of concentrating on business therefore being innovative. This way of behaviour helps in achieving more competitive market positions, which feeds back when helps in stimulating knowledge sharing with chain partners.

We can conclude from the various types of rent investigation that several influencing factors are present when – due to innovation – created value is captured. These elements represent partly firm specific characters (managerial experiences, size- and absorptive capacity of firm), partly behavioural specificities (trust in different business partners, reciprocity in knowledge sharing, etc.). The behavioural feature is much more pronounced and rather unidirectional. It shows that the fundament of market success is very deeply rooted in human behaviour.

Our factor analysis has revealed that rents are distributed among producers and consumers. The two set of rents highlights different characters with respect to their influencing factors. In case of producer surplus, the cooperative strategy seems to have advantages, while in consumer surplus the efficiency concept (utilizing the absorptive capacity) is the better option.

Based on these considerations we can state that our **first hypothesis is** mainly **supported**: directly or indirectly the majority of innovation is positively influenced by knowledge sharing and innovation is awarded by the market.

Our **second hypothesis** is partly supported because some firm specific attributes ambiguously influences the capturing of created value. However, trust in chain partners, reciprocity of knowledge sharing and willingness to cooperate with downstream partners seem to play unavoidably positive role in this respect.

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