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The capability of personal values and *guanxi* to reduce negative external effects of Chinese agriculture

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Abstract: *China is the world's largest producer and consumer of agricultural products, but the intensive agriculture contributes in a remarkable manner to environmental problems. Since environmental protection has recently become a popular issue in China, the government attaches great importance to the formulation of laws and regulations. Accordingly, China faces serious challenges inter alia in the accomplishment of effective agricultural trainings, environmentally sensitive farming and especially in the farmers' willingness to adopt optimized farming approaches. In order to promote a sustainable adaption of reduced input techniques, farmers' behaviour and their production decisions are crucial. Based on a social-psychological approach of individual behaviour, this contribution likes to close a considerable gap in analysing the Chinese farmers' personal value positions and their social fallback system, namely personal relationship networks called *guānxi*. Next to the theoretical framework, this paper reports key results from a farmer survey in two intensive agricultural counties of Shandong Province on the capability of *guānxi* and personal values to reduce negative effects of agricultural inputs.*

Keywords: China, environmental attitudes, farmers' decision-making, *guānxi*, values

Introduction

China is the world's largest producer and consumer of agricultural products (MacDonald and Iyer 2009). But although agriculture is still the predominant sector of the Chinese economy and the government remains with its policy of grain self-sufficiency, the outcome is relatively low. Among others this is due to the fact that the majority of the Chinese farmers do small-scale farming, the agricultural trainings are exiguous and not comprehensive, which means that the farmers do not apply adjusted agro technologies. Regardless of that, development policies of the last 20 years have successfully increased food production through advertising good outputs and an intensive use of external inputs such as fertilizers, pesticides as well as irrigation at significant negative external impacts and therefore environmental costs. Nowadays, depletion and pollution of water resources, land degradation, soil erosion, loss of biodiversity, desertification and deforestation are sufficiently widespread and constrain further economic growth in the primary sector especially in the North China Plain, which is the food-grain production base of the country (Zhen and Zoebisch 2006).

The challenge at present and future is to enhance a sustainable agricultural production – both in terms of quantity and quality – to feed the growing population without degradation of the production resources and the environment (Brklacich et al. 1991). Since sustainable environmental optimising projects in different cultural contexts often run the risk of failing during the implementation period or with regard to the adoption by the local population, the conducted research focused in particular the social and cognitive aspects of the farmers' decision making. Not often, scientists concentrate on their research programme without having a closer look at the social system, the contextual conditions as well as the personal background of the decision-makers. Often very sensitive determinants, which are related to the decision-makers, are highly responsible for the adaption process of optimised ideas. Hence relevant farmers' behaviour determinants are analysed based on a quantitative household survey (n=394) in typical intensive agricultural areas of Shandong Province, so that their impact is definable for further investigations regarding successful implementation approaches. In particular, this paper focuses on the Chinese concept of personalized relationships networks, called *guānxi*, and on value positions having an impact on the farmers' agri-environmental decision-making, especially in intensive used regions of China.

Theoretical Background

In standard neoclassical economic theory it is assumed that decision-making is guided by extrinsic motivation. But farmers' decisions are not always only profit guided (Anosike and Coughenour 1990; Gartrell and Gartrell 1985; Herath et al. 1982; Turvey 1991). More than in other businesses there are external pressures on farmers, influencing their decision-making (Errington 1991; Napier 1991; Potter 1995). Therefore, farmers do not behave accordingly to the restricted profit maximisation model of

“homo oeconomicus” that neither takes into account external influences from environmental and social structures nor non-economic interests or value based behaviours. In recent years, the influence of intrinsic factors (e.g. social and cognitive aspects as well as surrounding conditions) has been recognised. A range of economic studies have shown that agricultural decisions are not only linked to monetary incentives but also to a wide range of other inherent determinants (Simon 1959; Becker 1976; Gasson 1973; Deci and Ryan 1985; Kahneman and Tversky 2000). From a social-psychological point of view, especially values are regarded as fundamental cognitions. They are not related to particular objects or situations but to positions in general. Values are deemed to be the basis of universal beliefs, specific attitudes and social norms that in turn influence the preference of a particular behaviour (Fulton et al 1996).

Despite considerable efforts to understand and represent decision-making by farmers, there has been little attempt to integrate social and psychological variables within a comprehensive framework and only a few literature is available about specific inherent determinants of Chinese farmers. At this, in the following personal values and *guānxi* is focussed as supplementary aspects in Chinese farmers’ agricultural decision-making. Both, the psychological and social approach combined, establish a basis especially for the development of concepts and multilayer models to guide culturally adapted development projects.

Personal values

Behaviour is systematically and foreseeable influenced by fundamental values, that are of great importance in a person’s life. The numerous values (e.g., achievement, security, benevolence) vary in their degree of significance (Schwartz 2006). At the individual level, values or value positions predict attitudes and choices, they tell us something about preferences and even, attributed to others, about a particular behaviour (Strack et al. 2008). As such, a value system should be able to “unify the apparently diverse interests of all the sciences concerned with human behavior” (Rokeach 1973). In this tradition, they are considered important, also in farming activities (Gasson 1973).

Groundbreaking research on a conception of basic values was inter alia done by Feather (1995), Inglehart (1997), Kluckhohn (1951), Morris (1956) and Rokeach (1973) and in particular Schwartz (2005) who pointed out the main features of a common value theory: Based on the concept that values are abstract emotional directed beliefs that do not refer to specific situations, Schwartz (2005) sees values as a motivational construct for desirable goals that are ordered by importance relative to one another. Moreover, this hierarchical attribute distinguishes values from norms and attitudes (Schwartz 2005). Whereas past researchers only focused on single values, Schwartz derived a comprehensive set of different motivational types of values (recognized across cultures) in order to distinguish and coordinate the basic values with each other. In that way, the full set of value priorities can be related to other variables in an organized, coherent manner (Schwartz 1996). Hence, the Schwartz’ universal value cycle (1992) can be used as a general model of content for the farmers’ value positions that provides a basis for detailed analysis and serves as a tool to visualize, that values act as conditions for behaviour-related attitudes and for social relations (Strack et al. 2008). The cycle itself identifies ten motivationally distinct universal values types that are organized into a system of four types of higher-order values. Hence, it is assumed that every social group faces those values and that they exist on an individual as well as a national level (see Fig. 1).

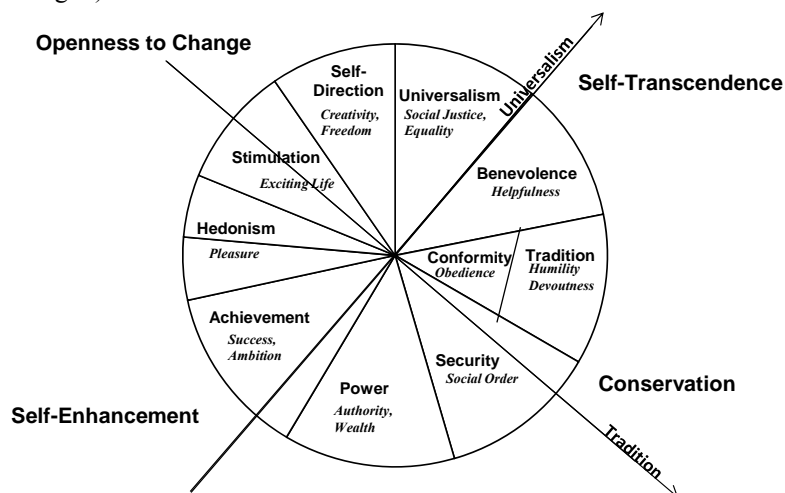


Fig. 1: Schwartz’ universal value cycle (modified, Schwartz 1992)

Openness-to-change values relate to the importance of personal autonomy and independence, variety, excitement and challenge. Conservation values relate to the importance of self-control, safety and stability in societal and personal relationships and respecting cultural traditions. Self-enhancement values relate to achieving personal success through demonstrated competence, attaining social status and prestige, and control over others. Self-transcendence values relate to protecting and enhancing the well-being of those with whom one has close contact, as well as the welfare of all people and nature (Schwartz 1992).

The circular arrangement of the values represents a motivational continuum. The closer any two values are in either direction around the cycle, the more similar are their underlying motivations. The more distant any two values, the more antagonistic their underlying motivations. Hence, two dimensions structure the value system according to the major value conflicts. Each is a polar opposition between two higher value types: Openness to Change to Conservation (“Traditional-Axis”) reflects a conflict between traditional stability to independent action and Self-Transcendence to Self-Enhancement (“Universalism-Axis”) reflects a conflict between the concerns for universal welfare versus pursuit of one’s own dominance over others (Schwartz 1996).

Especially the two dimensions of value positions facilitates in turn theory building regarding the relations of the full set of value priorities to other variables (e.g. behaviours) (Schwartz 1996).

To sum it up, Schwartz’ motivational value system is applicable for the Chinese context, since the extracted values could be found in every cultural context. The cycle serves furthermore for bivariate correlations with particular behavioural intentions and attitudes as they are the basis for a persons beliefs and hence, attitudes and intentions, so that the impact of personal values for a decision-making process becomes visible.

Guānxi – a Chinese social norm concept

Next to the fundamental influence of basic values and beliefs – social norms have a direct impact on behaviour intentions. Social norms are established behavioural expectations and cues within a society or group. They are defined by the customary rules that a group uses for appropriate and inappropriate behaviours. These rules may be explicit or implicit. Failure to follow the rules can result in severe punishments, including exclusion from the group. As such, social norms coordinate our interactions with others (Durlauf and Blume 2007).

In Chinese culture, *guānxi* can be regarded as social norm. It is inherent to Chinese social life since it is defined by personalized networks of influence and relationships. At this, it is focussed here as one aspect assumed to have an influence on the agri-environmental decision-making of Chinese farmers.

The term *guānxi* itself consists of two Chinese words, *guān* and *xi*. *Guān* means “a door” and its extended meaning is “to close up” (Luo 1997: 44). *Xi* means “to tie up” and extend into “relationships” (Luo 1997: 44). *Guānxi* therefore means “pass the gate and get connected” (Lee and Dawes 2005: 29). A person inside the door is regarded as “one of us” who can be trusted, whereas a person outside the door is regarded as a stranger and not to be trusted (Luo 1997). In literature, *guānxi* has been translated into “connection”, “social networking” or special interpersonal relationship. But there is no specific English definition (Hackley and Dong 2001). Therefore different sociologists (see Bian 1994; Hwang 1987; King 1991; Bell 2000) see *guānxi* as a particular Chinese relation-focussed concept, which is different from relationships in general. Relationships are more visible and open than *guānxi* and especially Western relationships emphasize equality, while *guānxi* often come with the obligation of more reciprocity (Hackley and Dong 2001). From a universal moral principles perspective, *guānxi* is against the principles of fairness and violates the “arm’s length”-principle (Fan 2002) and the fiduciary duties rule (Dunfee and Warren 2001). Its consequences are “personal gains at social costs” (Fan 2002: 371). It also reduces social wealth and benefits a few at the expense of the many (Dunfee and Warren 2001; Addison et al. 2008).

Next to several (already mentioned) descriptions of *guānxi*, a comprehensive study is offered by Luo (2000) and Dunning and Changsu (2007) who figured out the following important characteristics (Fig. 2):

<i>Traits</i>	<i>Description</i>
(1) Utilitarian	<i>Guānxi</i> is purposefully driven by personal interests.
(2) Reciprocal	An individual’s reputation is tied up with reciprocal obligations.
(3) Transferable	<i>Guānxi</i> is transferable through a third party as a referral.
(4) Personal	<i>Guānxi</i> is established between individuals.
(5) Long-term	<i>Guānxi</i> is reinforced through long-term cultivation.
(6) Intangible	<i>Guānxi</i> is maintained by an unspoken commitment.

Fig. 2: *Guānxi*-traits (Dunning and Changsu 2007)

According to them, *guānxi* is a utilitarian concept that bonds two persons through exchange of favours rather than through sentiments. It implies reciprocity and since obligations tend to be seen as perpetual *guānxi* is not necessarily equally reciprocal (Alston 1989). Indeed frequently the exchange relationships tend to favour the weaker partner. Furthermore, *guānxi* is transferable to third persons if the middleman feels satisfaction about his *guānxi* with both persons. *Guānxi* operates at the individual level. Interpersonal loyalty is given through trust, honesty, respect and social status (Davies et al. 1995) which is often more important than organisational affiliation or legal status in Chinese society. Due to its long-term orientation *guānxi* is therefore also regarded as a stock of relational capital which is to be conserved or augmented in times of abundance and plenty, but drawn upon in times of need. Lastly, *guānxi* is an intangible asset. People who share a *guānxi*-network are maintained by an unspoken commitment. Disregarding these devotion, respectability and social standings are seriously damaged (Dunning and Changsu 2007). In addition to Luo (2000) and the ordinary interpersonal focused *guānxi* concept, Dunning and Changsu (2007) furthermore draw attention to collectivism as the underlying cultural dimension behind the interpersonal *guānxi* (see also Hofstede 1991). Collectivism-orientations derive from the traditional Confucian concept, emphasizing that harmony and group taking precedence over the individual dimensions. Therefore it should also be linked to the concept of *guānxi*. Thus, Chinese social networks play a significant role within the structural change of the society. They compensate emerging demands in a changing environment. As such, *guānxi* has a functional meaning. Its allocation mechanisms of various resources within the network (*guānxi*xue) allow overcoming the consequences of economic shortages (Krauß 2010).

Research area

The underlying farmers survey (n=394) was conducted within a multidisciplinary Sino-German project¹ in two counties of Shandong Province, characteristic for the intensive agricultural area of the North China Plain. Since the overall study aims to reduce the nitrogen surplus in agriculture, farming in this area is characterized by intensive winter wheat/ summer maize crop rotation with high nitrogen application rates per crop (about 588 kg N/ha annually) (Zhang et al. 2004). Besides the disparity between regions and different crops (wheat, maize, cotton, vegetables), the nitrogen application rate also varies greatly among individual fields or households, reflecting farmers' lack of instruction and a certain recalcitrance when applying nitrogen fertilizer (Ju et al. 2004).

Due to the fact that agricultural policy is focused on food self-sufficiency, and mineral nitrogen manufacturing is heavily government subsidised since the 1970s, nitrogen fertilizer use increased a dramatic 271 percent and farmers experienced an increase of grain yield per acre of 98 percent. But, today high nitrogen balance surpluses and resulting N losses cause serious pollution of ground and surface waters with reactive nitrogen (Zhang et al. 2004).

At the farm level, recent studies in China estimate the loss of net farm income due to overuse of mineral fertilizers at as much as 15 percent and meanwhile as well decreasing yields (Buresh et al. 2004). Their studies also suggest that farmers could reduce nitrogen inputs by as much as 30 percent without yield loss and thus even with a higher income.

Moreover, a macroscopic snapshot of different surveys concerning the Chinese' environmental awareness and associated behaviours in general, conducted a limited environmental knowledge, being aware that more-educated, affluent, and urbanized people have more proenvironmental attitudes than the rural less-educated rural population (Harris 2006). In most cases, people only care about problems that affect them directly in their domestic home. Environment-related attitudes are mainly directed towards sanitation, drinking water, indoor pollution, etc., but not the surrounding area (ibid.). "The Chinese have a very instrumental view of the natural world: It exists for the benefit of people." (ibid: 8). With this anthropocentric-adjusted citation, Harris (ibid.) underscores the Chinese' seeking for satisfaction of immediate needs and short-term interests, which bases in their underlying value system. Furthermore, economic security is hence an aspired goal of a rural society that is seeking for more welfare and that is expecting social stability and protection of any kind from the government's priority (ibid.). Thus, it seems

¹ The project "Innovative nitrogen technologies to improve agricultural production and environmental protection in intensive agriculture" is funded by the German Federal Ministry of Education and Research (BMBF), project number 0330800A-F and the Chinese Ministry of Science and Technology (MOST), grant number 2007DFA30850. For further information related to the project see <http://www.nitrogen-management.org/>.

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indispensable to study the farmers' fundamental value priorities and *guānxi* networks. In order to solve the environmental problems in China, concealed beliefs and value motivations as well as decisive *guānxi* characteristics have to be uncovered to tackle environmental issues and the farmers' basic demands at the same time.

Methodology and statistical data analysis

Methodologically the conducted quantitative household survey of 394 farm household heads corresponds to various contents as basis for the measurement of the farmers' personal values and individual *guānxi* traits. Guided by the literature reviewed, a number of multi-sited items were selected for the questionnaire design to describe the farmers' varying agri-environmental attitudes (16 items), their embeddedness in social networks (13 items) and their personal value positions (21 items) (see Vogel 1996; Dunning and Changsu 2007; WVS 2007; Schwartz 2001; 2006). Between one and three items were each composed to identify the underlying behaviour generating approaches found in the literature.

The data are analysed by uni-, bi- and multivariate methods. Univariate statistics (frequency analyses) give a brief overview about the data in the sample, the respondents and household characteristics. Bivariate methods are especially used in order to combine the different characteristics and show relationships and dependencies with. Because of the suspected overlap of attitudinal areas, such structure discovering analyse methods facilitate a reduction of the initial large number of items for each of the determinants. Furthermore, literature findings, especially those describing *guānxi* via different traits and basic values, could be proven. In order to analyse the statistical relationships between either the factors of different determinants or between factors and selected meaningful single items of particular attitudes or statements of a concrete behaviour, the generated factors enable bivariate correlations. They are useful to identify the relationships between basic values and attitudinal statements and factors as well as between particular behaviour-related statements.

Sample description

The sample itself is divided up into the two Counties Shouguang (n=188) and Huimin (n=206). The following figure (Fig. 3) shows some of the respondent characteristics.

<i>Respondent characteristics</i>	Huimin	Shouguang
Gender [% male]	64.2	76.2
Age [years]	47	46
Education [years]	5.7	6.7
Full labour time on farm [%]	89.9	80.1
Member of village party [%]	6.5	8.8
<i>Farm characteristics</i>		
Household members	4.2	3.4
Household income [Yuan RMB year ⁻¹]	16,000 (13,800 EUR)	20,500 (17,800 EUR)
Agricultural crop income [% of total]	54.5	57.5
Farm size [mu]	8.4 (~0,6 ha)	6.4 (~0,4 ha)
Plot size (wheat/maize production) [mu]	2.5/ 2.4	3.2/ 2.0
Wheat yields [jin/mu]	802 (~6 t/ha)	970 (7,3 t/ha)
Maize yields [jin/mu]	864 (6,5 t/ha)	1017 (8 t/ha)

Fig. 3: Sample characteristics

As it was assumed to ask the head of the farm households, the sample survey showed that a remarkable part of the respondents were women, as such, they are also responsible for the agricultural production. Most of the respondents have neither a position in the village committee nor party functions. The average education is more than 5 years. Nevertheless, the standard deviations are high. A closer look at the univariate analysis shows that the 30 percent of the respondents in Huimin and nearly 18 percent in Shouguang went less than 5 years to school (no education at all: 16.9% Huimin; 6% Shouguang). The remarkable share of household heads with no education, the average age of 46/47 years and the fact that agricultural income is only just under 60 percent of the average household income points out that agricultural activities are to a great extent performed by the older generations who work to more than 80 per cent fulltime on the cultivated land. Young people migrate to seek a job in the manufacturing industry

or wholesale as the farm sizes of around 6 to 8 mu (which is about 0.5 ha) do not allow a suitable financial outcome. Land itself is contracted from the village committee to each *Hùkǒu*² registered inhabitant according to an officially defined size. It cannot be sold easily and serves as well as a retirement arrangement.

Regarding the average agricultural outputs from wheat and maize corn production, they are nearly comparable with outputs in Europe, although of course, the cultivated plots are quite small.

In total the two Counties have similar results; nevertheless, some differences in the sample description refer to the different local preconditions, already mentioned in the description of the research area. The big differences in the average household income derive from the bigger plot sizes for especially wheat crops and the better agricultural outputs reached in Shouguang. Furthermore, the farmers were a little bit younger and work in better paid off-farm domains than in Shouguang. These differences in sum may result from the fact that farmers in Huimin depend mainly on the double crop rotation system as there are only few possibilities for other income sources in that lower income region, whereas successful farmers from Shouguang earn their income either to a big extent from vegetables or they do concentrate on off-farm work.

Moreover, additional descriptive analyses give first insights on the farmers' decision-making on their annual production and show that beside the farmers' own farming experiences and the basic production conditions, extension services only have a neglecting influence (1.3%), whereas neighbours play a role in the farmers' decisions (11.8%). Especially concerning the environment sensitive decision-making on fertilization, 61.2 percent of the respondents stated that their Nitrogen management base on established habits and traditions. The remaining got their support from private providers (10.9%) and extension staff (7.9%), interestingly, 7.1 percent rely on relatives and friends and 5.9 percent on information from media. This shows clearly, that informal information systems and personal networks of decision-making support are widespread and need to be analysed in detail, under consideration that existing professional trainings are not available or were not accepted by the local population.

Analysis of the farmers' *Guānxi*-traits

In order to analyse the personal networks that were stated to be relevant for the farmers' decision-making (Fig. 4), a factor analysis is used to extract the underlying *guānxi* traits identified by the farmers.

First of all, Cronbach Alpha was checked to test for reliability of the items included. The overall Cronbach's Alpha for 13 *guānxi* items was 0.55. However, the reliability test of the extracted single factors produced acceptable values. Furthermore the Kaiser-Meyer-Olkin measure of sampling adequacy gave evidence that a factor analysis is reasonable according to its correlation matrix (KMO=0.68). Given the multidimensional nature of the *guānxi* construct, the assumption of non-correlation among the items is unlikely. As a result, a varimax rotation method was used to identify the underlying factors that best explained the traits of *guānxi*. The results are set out in the following figure (Fig. 4):

Rotated factors	<i>guānxi</i> items	1	2	3	4	Cronbach's Alpha
Collectivism	Group harmony	,891				,739
	Group interests over individual interests	,883				
	Comfortable in a group	,541				
Personal ties	Personal commitment		,734			,607
	Interdependence in a web of relationships		,714			
	Long-term personal relationships		,641			
	Personal relationship in daily life		,545			
Utilitarian	Gaining favours/ benefits			,883		,704
	Exchange of favours			,844		
Navigating relationships	Navigating relationships in a social network				,871	,623
	Social network consisting of contacts' contacts				,789	

Fig. 4: Results of the factor analysis of *guānxi* items

Eleven items load into four factors, which are able to explain 56.8 percent of the variance. Factor 1 is named "Collectivism", as all items were identical with the cultural dimension of collectivism from

² The *Hùkǒu* system is the officially system of residency permits in China that rules the public administration. The registered status is also used to control the movement of people between rural and urban areas. People who live and work outside their *Hùkǒu* registration (regional boundary) do not qualify for fixed social services, education, health care, employer-provide housing, etc.

Dunning and Changsu (2007). The other three factors are also particularly notable characteristics of *guānxi* (ibid.). In other words, the results showed that the 13 traits identified can be collapsed into four factors or attributes. As perceived in this way, *guānxi* resembles on the one hand the Confucian social norm concept, which refers to a strong collectivism trait with the individuals' will to reside in a group. Within the group, harmony is defined in that way that group interests prevail over individual interests. The other extracted factors are similar to the characteristics of *guānxi* (ibid.): Long-term intangible relationship networks are created by nurturing and managing good contacts through personal commitment ("Personal ties"), exchange of favours and benefits ("Utilitarian") and "Navigating relationships" within the social networks. Interestingly, reciprocity was not directly extracted from the factor analysis. As such, the respondents' *guānxi* is not primarily dominated by the reciprocal obligation which refers to the assumption that *guānxi* has not exclusively an instrumental character anymore since the traditional positive meaning of gaining favours got a negative smack in current China and is hence treated with caution in a concept that is still positively denoted.

Before the background that behaviour is fundamentally influenced by personal value positions, which in turn affect as well the individual weithening of the different *guānxi* traits, the following analyses focus on value related investigations.

Analysis of the Chinese farmers' personal value position

According to Schwartz' universal value system, the multivariate ordination analysis of the farmers' personal values showed where the Chinese farmers were located in the cycle. Ordination itself is a kind of data clustering to figure out relationships in a coordinate system of several axes (one for each variable). Similar objects are close to each other and dissimilar objects are further from each other.

But instead of using the multidimensional scaling that Schwartz used as ordination technique, (Schwartz 1992; Schwartz et al. 2001), Strack's formular (2010) is better applicable for further analyses. With this formular, the generation of two axes in the value cycle ("tradition"-axis; "universalism"-axis) enables direct correlations. The formula itself was determined factor analytical from the four rounds of the European Social Survey (ESS 2002-2008/9) and includes weights for each of the 21 ipsated value items³ (Strack 2010).

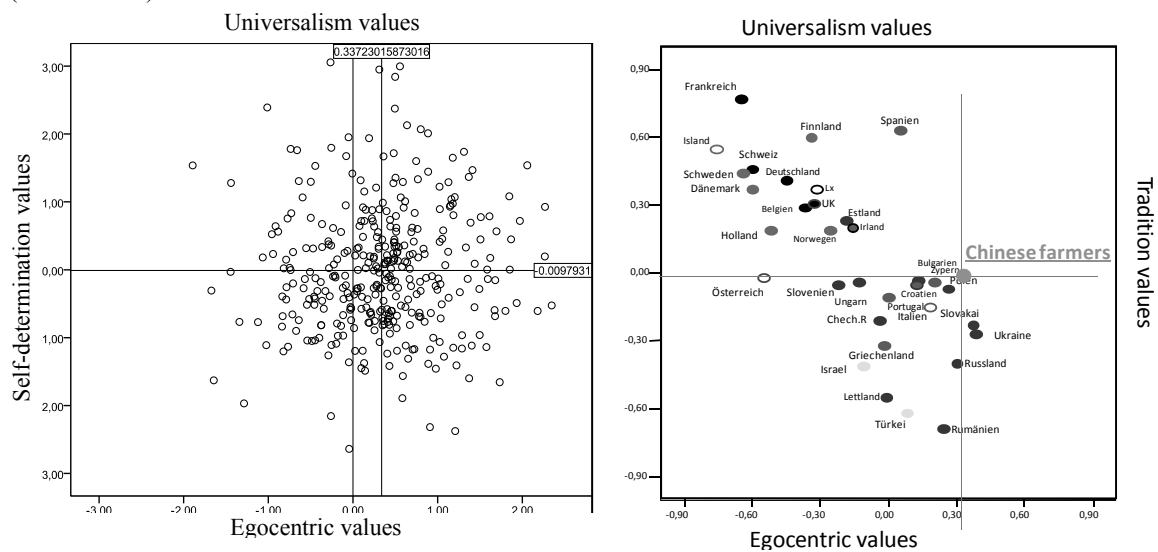


Fig. 5: Results of the factor analysis of *guānxi* items

³ Ipsation is defined through the subtraction of the mean personal agreement from each item. The ipsation of ratings is necessary to eliminate the high percentage of acquiescence, generally existing for importance rankings. Furthermore ipsated scores give Eigenvalues which show an impressive elbow according to the Scree-Test, the base to extract exactly two factors (see also Strack et al. 2008)

As a result, the meanings of the value items from the European Social survey (33 countries)⁴ were transmitted to the meanings of the value items of the Chinese farmers (Fig. 5), which is possible because of the multiple proven replicability of the Schwartz' universal value structure in different cultures and the high quality of the questionnaire translations, referring to the cultural sensitive issues (Schwartz 1992; Strack et al. 2008)⁵.

The results of the scatterplots show that Chinese farmers still focus on conformity values like most of the former communist countries of Middle and Eastern Europe as well. Nevertheless, Chinese farmers' tend to be more universal in their value positions although this seems also be related to their traditional social order and family security, politeness and their concept of face saving that emphasis on benevolent and universal behaviours. But, in contrast to the Northern and Western European Countries, the Chinese farmers focus less on universal and altruistic prosocial value positions, because their benevolence concept is restricted to people belonging to their *guānxi* network. Nevertheless, since they are not yet thinking too much in egocentric categories of self-achievement and power, it is assumed that they still count on the traditional Confucian based values like group harmony and collective values. In spite of that, the tendency of a value change towards more success and influential achievement oriented values is supposable, regarding the values' mean of the "universalism-axis" (-0.01). Possible reasons for such a change were the new arising possibilities in a state that opens the society for new developments and hence open-up an emerging success-oriented and capitalistic thinking.

Based on the *guānxi* traits and the two dimensions extracted for the Chinese farmers' value positions correlation- and location plots were possible with other variables in order to demonstrate the influence of values and *guānxi* on the farmers' agri-environmental decision behaviour.

Correlation analysis of *guānxi* and personal values

In the following, linear relationships between *guānxi* and values are identified based on the assumption that value systems and the social network concept are related to each other and that each *guānxi* trait as well as the whole concept could be traced back to motivational values.

	<i>Universalism Values</i>	<i>Tradition Values</i>
Collectivism	,154**	-,091 ⁺
Personal ties	,136**	,145**
Utilitarian	-,051	,089 ⁺
Navigating relationships	-,200**	,035
Guanxi	,257**	,019

**p<0.01; *p<0.05; ⁺p<0.1

Fig. 2: Results of the correlation matrix (Pearson, t-tailed)

Fig. 6 shows a matrix with two-tailed significant correlations for most of the *guānxi*-trait factors and an overall "*guānxi*" factor generated, from all 13 items together. The overall factor significantly correlates with universalism values, but is not influenced by traditional values, so there is evidence that *guānxi* is not anymore only guided by traditional and conservative value perspectives alone. In fact the concept has been extended to more modern stimulating and inspiring self-directive value positions. Nevertheless, the breakdown to single factors is important to highlight the different weights in the Chinese farmers' *guānxi* forming. Moreover, the factors' relationship to single value orientations is interesting for detailed interpretation: The factor "Collectivism" correlates significantly positive with universalism value orientation and slightly negative with traditional values; convenient to the intended assumption that collectivism-orientations are rooted in Confucian, emphasizing inner harmony and equality such as group taking precedence over the individual dimensions. Having a closer look at the scatter plot (Fig. 7), "Collectivism" is situated in the quarter that expresses as well open-minded, self-directive and creative value motivations. Thus, farmers with strong focus on collectivity in their personalised relationships might use their focus on group interests and harmony for more generalised benevolent issues, like for example environment related aims.

⁴ The European Social Survey (ESS) is a biennial multicountry survey that covers more than 30 nations and is designed to evaluate the interaction between Europe's changing institutions and the attitudes, beliefs and behaviour patterns of its diverse populations. The first round was fielded in 2002/2003, the fourth in 2008/2009. For further information see www.europeansocialsurvey.org/.

⁵ Inglehart' World Value Map is also compatible to the universal value cycle: In his map the axis "traditional versus secular-rational values" and a "survival versus self-expression values" constitute the main-diagonals (Strack 2008). For further information on the survey see www.worldvaluessurvey.org/.

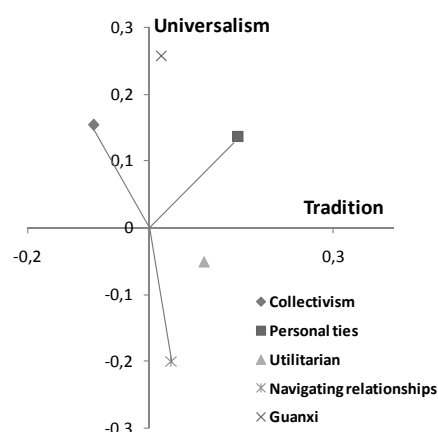


Fig. 3: Scatter plot of *guānxi* factors in the value system

to a better understanding due to derivations out of the farmers' cognitive positions. Finally, the analysis of the overall *guānxi* factor in relation to basic values confirmed again the tendency, that the concept is not anymore restricted to traditional valued positions, but also to open-minded and universal ideas.

Furthermore the results confirm the theoretical position that underlying values are closely related to behaviour norms in the social environment. *Guānxi* relationships rule social life on the basis of fundamental values. As such they act as component in the daily decision-making, especially in a surrounding where farmers' do not trust external consultants. To what extent values frame environmental attitudes, is demonstrated in the following.

Correlation analysis of agri-environmental attitudes and personal values

Prior to the correlation analysis two deduced independent variables were extracted via factor analysis from 6 items regarding the Eigenvalue and Screeplot criteria and give evidence about the nature of a group of environmental items belonging together: (1) attitudes towards high input agriculture and (2) attitudes focusing economic security.⁶ While one factor emphasises the amenity of high input agriculture more than the environmental harm resulting from this practice and expresses neither a critical nor a differentiated diperception related to the behaviour, the other factor is more concerned about economic security. Farmers that tend to agree with this are more concerned about the risks resulting out of a behaviour change. They are of the opinion that the use of mineral nitrogen has positive influences on their yields and thus their income. Hence, they are not familiar with environmentally and economically effective strategies on nitrogen application. And auxiliary, they are risk averse towards changes.

The afterwards conducted bivariate Pearson correlation of the two factors and one further meaningful statement describing the importance of environmental-friendly activities, measures significant relationships with the Chinese farmers' value orientations (see Fig. 8). The results show that the more farmers' agree on thinking on environmental issues, the more their value position is universal and the less, it is traditional. Opposite, farmers that agree to the factors "agricultural inputs prior environmental attitudes" and "economic security prior environmental issues" have less concern on universalism values and give priority to traditional values.

	Universalism Values	Tradition Values	High input agriculture prior environmental issues	Economic security prior environmental issues
"It is important to think upon environmental issues."	,261**	-,119*	-,295**	-,164**
High input agriculture prior environmental issues	-,176**	,166**	1	-,007
Economic security prior environmental issues	-0,185**	,148**	-,007	1

** p < 0.01; * p < 0.05

Fig. 8: Results of the correlation matrix (Pearson, 2-tailed)

⁶ The generated factors were rotated according to Varimax method that maximizes the variances of the squared loadings. Factor reliability was conducted by the Cronbach's Alpha test and produced acceptable values. The Kaiser-Meyer-Olkin-measure gave evidence for the sampling adequacy, with a KMO of 0.68.

For a better illustration of the statistical relationships and a more precise localisation of the attitudinal factors on the universal value cycle, the following scatterplot (Fig. 9) enables specified interpretations. The statement “It is important to think upon environmental issues” is, like expected, located opposite of the other two factors. The negative correlations between the single statement and the two contrarily factors verify the opposed attitudes with negative correlations. Due to Schwartz’ theory (1996), the more distant any two values are, the more antagonistic are their underlying motivations. Hence, on the one hand, farmers that agree to the statement have tolerant and open values. They like to live in harmony with nature. A tendency towards more self-directive values is supposed and traditional subordinating values, in order to yield to the social order, weight less in contrast to more enhanced and stimulative value orientations. On the other hand, farmers that agreed to high input agriculture and economic security without regarding its negative environmental impacts are located in the motivational value area of power and security. There, mainly conservative and egocentric values of the social order, of control and public reputation as well as family safeguarding play an important role. Thus, the graph shows that the attitudes towards unquestioned high input agriculture and economic security are determined by traditional and security oriented values. Only open-minded farmers think upon more general issues. They are pioneers in environment focussing attitudes and hence they are interesting for participatory processes towards an environmental behaviour change in the society.

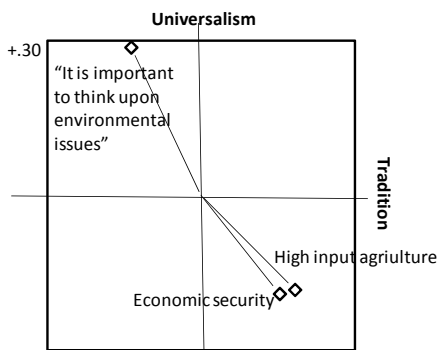


Fig. 9: Results of the scatter plot correlations

conservative and egocentric values of the social order, of control and public reputation as well as family safeguarding play an important role. Thus, the graph shows that the attitudes towards unquestioned high input agriculture and economic security are determined by traditional and security oriented values. Only open-minded farmers think upon more general issues. They are pioneers in environment focussing attitudes and hence they are interesting for participatory processes towards an environmental behaviour change in the society.

Conclusion

In order to enhance a sustainable production in Chinese agriculture adjusted agricultural technology is obviously indispensable. But the Chinese farmers still practise small-scale farming, their agricultural knowledge is limited. Most of them belong to the older generation, are less educated and have a lower disposition for behaviour changes in their agricultural practise, based on traditional habits. A similar situation is set by the agricultural extension staffs that do not have any future perspectives in their work as most of the younger generations try to find some off-farm work with regard to a higher income. Hence, ways have to be found to meet that challenge and to convince the main performers in the agricultural setting of more environmentally adapted technologies and resource saving agricultural practises.

Of course, agri-environmental knowledge and better adapted trainings are obvious key factors; furthermore financial incentives may also lead to an assumed behaviour change. Nevertheless several studies as well as a bulk of theoretical approaches, presented in that paper, gave evidence that individual behaviour in general and especially that of traditional and conservative oriented farmers is not only driven by rational assumptions. Thus, intrinsic motivations are inter alia leading reasons why people act different from logical conclusions. Social aspects and cognitive values and beliefs belong to the guiding principals in the people’s life and decision-making cannot be regarded without its “soft” inherent determinants. Hence, evidence was given within this study. The analysis revealed that *guānxi* and personal values influence agri-environmental attitudes and also in a broader sense the decision-making on agricultural inputs via established habitual and social behaviours on the basis of inherent underlying personal value positions:

Findings on *guānxi* focussed on its different characteristics and showed that it is very present in daily life situations. Nevertheless its traits have slightly been modified towards a more open and less categorical consideration, which could be traced back to the changes in the farmers’ underlying value system. Although *guānxi* is a very traditional concept, based on Confucian doctrines and a very strong social order, correlations with traditional values were not significant and hence very weak, except regarding the single trait factor describing “personal ties”. This might be due to the fact that long-term relationship networks created by nurturing and managing good contacts through personal commitment remains of traditional conservative importance. Hence, trust seems still to be the central point in *guānxi*-networks as it is the precondition for getting connected. Whereas the utilitarian trait is traditionally assumed as universal benefit for the whole social group, this survey showed, in concordancy with literature that gaining and exchange of favours already takes traits of egocentric nature, thus of “personal gains at social costs” (Fan 2002: 371). Moreover Harris (2006) has already stated the Chinese’ very instrumental view of

the natural environment, that is of exclusively domestic interests. Nevertheless, the findings of the farmers' value positions revealed some universal and benevolent value based *guānxi* traits, like the emphasis on the Confucian based collective interests and on harmony within a group. This in turn reflects the farmers' location in the Schwartz' universal value cycle; their mean value position is still conformative oriented but also not very universalistic. Chinese farmers have a strong focus on the traditional social order that emphasise inter alia the security of each own's family and social group and excludes issues that are not directly related to them. Furthermore, the findings did not reveal strong amplitudes towards, neither universal, nor egocentric extremes, although an assumed value change towards both directions might be possible in future since China is nowadays a fast developing country.

According to the agri-environmental attitudes as intermedia precondition for environmentally related behaviours the factor analysis showed clearly the extraction of two central attitudinal factors describing the farmers' traditional and security orientation. As such, high input agriculture and economic security gain more importance than environmental issues. Against the background of the farmers' socio-economic situation, financial security is very important for low-income households. Farmers cannot afford income penalties for the sake of the environment. Reaching the best yields by all means is aspired, and they experienced yield increases in the last years in applying agricultural inputs without knowing that an adapted application technology would be economically and environmentally more effective and hence sustainable.

Only a small group of self-directive and nature bound farmers have a broader view on environmental issues. They will be the most interesting group for the implementation process of optimized management technologies for a more environmentally adapted agriculture. As such, the characteristics of this group had to be examined in detail. Especially their relationship networks (*guānxi*) might be pivotal for sustainable effective farmers training approaches. The underlying idea is that *guānxi* enables better information fluxes and allows, accordingly to Krauß (2010), overcoming the consequences of economic and information shortages during the period of change. Hence, for an effective adoption of adjusted in-put farming systems, policy-makers need to consider both, the impact of social and cognitive determinants as pivotal points and the economic safeguarding.

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