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Determinants of social capital formation among organic and conventional smallholder producers in Karnataka, India

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Abstract The organic farming aims to create a sustainable agricultural production system. The notion of organic farming extends beyond particular agronomic practices to encompass cooperation and networking among stakeholders. This paper describes findings from a survey conducted with 200 smallholder producers in Indian state of Karnataka with an objective to examine social capital formation in different networks of organic and conventional farming systems. First, we determine the factors that motivate social capital (cognitive and structural) formation among organic and conventional farmers; and then analyze their social capital levels focusing on micro-level cognitive and structural capital. The results reveal a significant difference between both the two communities in respect of social trust, collective action, associated-ness and satisfaction, and these make us to conclude that the organic farmers have a higher level of participation in different formal, informal and social organizations than do the conventional farmers. Overall, the organic farming community is at a higher level of social capital compared to the conventional farming community. Further, within the organic farming community those having higher social capital have effective market linkages than the farmers with lower social capital.

Keywords Social capital, Organic farming, Multivariate analysis, India

JEL classification Q10, Q13 and Q19

1 Introduction

The conventional farming system is becoming unsustainable as is evidenced in the declining productivities, damages to the environment and chemical contamination (Bellarby et al. 2008; Nwaiwu et al. 2013; Znaor et al. 2005). Furthermore, it is increasingly realized that the growth path that agriculture has followed in the recent past is neither sustainable nor can it feed the growing population without harming the planet (IAASTD 2008). This necessitates looking for alternative development pathways that can function in an eco-friendly manner while sustaining and increasing agricultural productivity. Organic farming is one of such pathways to meet the goals of sustainable agricultural development (Roychowdhury et al. 2013).

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The notion of organic farming does not confine only to particular practices it also focuses on cooperation and networking among stakeholders on the value chains. Thus, it is considered to generate trust, cooperation and networking among smallholder producers and in turn leads to the development of social capital among the farming community. In many studies, social capital is acknowledged as an essential factor behind economic development. Further, social networks have been proven to positively or negatively influence the economic performance (Solow 2000). The empirical work done by Putnam (1994) in Italy showed that strong horizontal relationship in northern Italy created higher economic growth whereas a strong vertical relationship in southern Italy explained relatively slower growth. He suggested that trust, norms and networks have potential to boost economic and institutional development. Voluntary cooperation is necessary to facilitate contracting and monitoring

among the members. Further, it can be drawn from the trust that develops from the reciprocity and networks of civic engagement. Social capital can be linked to other forms of capital in the sense that, it is a resource into which additional resources can be invested in anticipation of future benefits. Increasing social capital by investing in worthy relationships with other people in the community can make individual or collective participants to gain access to knowledge, power, encourage collective behaviour and strengthen collective identity. Further, repeated interactions may lead to discovering whom to trust and how their actions affect each other. Shared norms and pattern of behavior in the localized setting will build up social capital over time. Later, this can be drawn to resolve conflicts at the community level (Milagrosa 2007; Ostrom & Ahn 2001).

Furthermore, social capital has a significant impact on the economic success of collective marketing initiatives by deploying financial, physical and human capital assets. Mainly collective activities, relationships, attitudes and trust-based interactions contribute to economic and social development. Due to effective cooperation and equitable sharing of resources, both cognitive and structural capital produce substantial material benefits to farmers who are connected with farmer organizations.

With this background this study aims to determine the social capital of farming communities in Indian state of Karnataka and evaluate the factors that influence it. Following are the specific objectives: (i) determine the factors that motivate social capital formation among both organic and conventional farmers, (ii) analyze social capital levels of organic and conventional farmers by assessing their micro-level cognitive and structural capital, (iii) compare and discuss how the respondents' attributes influence formation of social capital, and (iv) discuss how the social capital levels influence the present and future of organic farming. These objectives are relevant based on the existing literature, industry reports and experts opinions. However, there no empirical work has been undertaken on these in the case of smallholder organic fruit and vegetable farming systems in the Indian context.

2 Theoretical background

2.1 Social capital theory

The term social capital captures the idea of social bonds and social norms that are comprise an important part of the livelihoods (Bourdieu 1984). In general, social capital is defined as an individual's willingness to make short-term endure for the long-term benefit of the local community, as well as for the individual himself or herself, by setting common goals and interacting to meet these goals. The most common definition of social capital is given by Putnam et al. (1994) where they stress more on a feature of social organization that facilitates coordination and cooperation for mutual benefit. Further, the concept has been greatly stimulated by the writings of different scholars (Coleman 1988; Grootaert & van Bastelaer 2002; Portes 2000; Woolcock & Narayan 2000), who have attempted to define social capital rigorously and to identify conceptually sound and practically useful bounds of the concept. According to Grootaert & van Bastelaer (2002), social capital of a society includes *"Institutions, relationships, attitudes and values that govern interactions among people and contribute to economic and social development"*. Although social capital is derived from social relations, the social capital theory is considered as a branch of New Institutional Economics (Molina 2010).

Applying both the definition and theory the term 'social capital' is widely used in social sciences. As a concept, it represents an investment in certain types of resources of a value in a given society. As a theory it describes the process by which resources embedded in social networks are captured and reproduced for returns (Lin 2008). This social capital theory has been applied to a diversified field of studies. The credit of introducing the concept of social capital to the theoretical debate goes to Bourdieu (1984), Coleman (1988), Putnam et al. (1994) and Schuller et al. (2000).

2.2 Social capital: theoretical framework for analysis

Social capital is not restricted to particular networks of one or another type. Stone and Hughes (2002) have proposed a framework for understanding social capital that illustrates social capital within different kinds of networks existing at different social scales. It ranges from household or family level ties to community-based societal ties and also to the ties of individuals and families with institutions. Further, these sets of social relations have been described as belonging to the informal realm, generalized realm and institutional realm (Stone & Hughes 2002). Grootaert and van

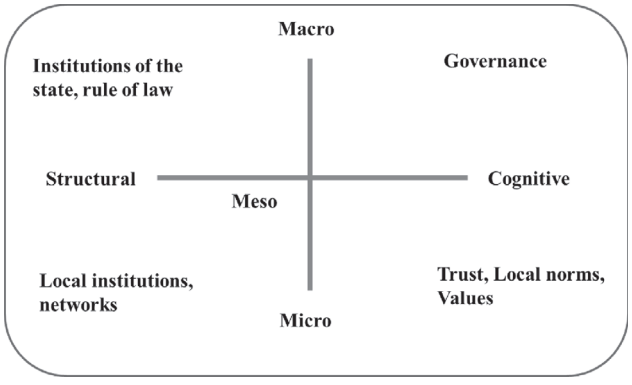

Figure 1. Forms and scope of social capital
Source: Grootaert & Van Bastelaer (2002)

Bastelaer (2002) developed some methodologies to measure social capital. In addition, Krishna and Shrader (2000) suggest aggregating and analyzing indicators of structural and cognitive social capital.

After assessing different frameworks, we finally adopted Grootaert and van Bastelaer methodologies (figure 1) to measure social capital shared in the organic farming communities compared to conventional farming communities in Karnataka, India. Particularly we examine, whether group certification based organic farming practices can facilitate creation of social capital in the practicing groups or communities. According to Grootaert and van Bastelaer (2002) social capital measurement occurs from micro to macro dimension, where the micro-social capital captures horizontal networks and norms that motivate associations. Meso-social capital defines the vertical and horizontal interaction. Macro-level social capital referes to the wider institutional and political sphere. However, in our analysis, we focus on micro-level social capital.

3. Methodology

3.1 Data

The research was conducted in Karnataka state in India, the pioneer in implementing an organic farming policy. The information used in this study came mainly from the personal interviews based on the structured questionnaires, carried out on a sample of 200 respondents including both organic and conventional farmers. A purposive random sample was drawn from an official list of certified organic farmers in February 2012. Farmers selected for the survey were smallholders (having less than 2 hectares of agricultural land) cultivating fruits and vegetables (F&V). The validity of the questionnaires was assessed by a panel of experts from the Department of Agriculture, experts from the NGOs and industry. Reliability of the scales of questionnaire was computed using Cronbach's Alpha method.

3.2 Statistical analysis

Factor analysis was used to analyze the data using SPSS software. Prior to this, univariate analysis was performed on all the variables to check for the presence of outliers, if any. The factor analysis, a technique utilized to reduce and summarize information, has been performed on groups of variables related to smallholders' attitudes towards adoption of organic F&V farming and social capital formation. The responses from the farmers were collected in the form of Likert scale, 1 being strongly disagreed to 5 being strongly agreed. In these set of questions that included the ordinal scale for variables, a factor analysis has been used to reduce the variables. From a statistical point of view, in this technique, the assumptions of normality and linearity in the variables can be eliminated. At the same time, the technique further assists keeping in mind that a minimum of approximately 50 observations is needed for its adequate performance (Hair et al. 2009).

Despite the availability of other data reducing techniques like non-linear principle component analysis we preferred to use factor analysis because of its relative ease in identification of relationships between variables and the components to be retained (Saegusa et al. 2004). Although given the differences that exist among attitudes and objectives (Willock et al. 1999), the factor analysis was carried out separately between groups of questions, as conceptually this would be of little validity otherwise.

The Principle Component Analysis (PCA) method was used to extract factors, and the KMO[1] and Bartlett's test of sphericity was applied to measure the correlation between the variables. Those variables with a lower communality, $h<0.5$, were not considered in the

[1] Kaiser–Meyer–Olkin index= http://www.utexas.edu/courses/schwab/sw388r7/Tutorials/PrincipalComponentsAnalysisinthe Literature_doc_html/027_Measures_of_Appropriateness_of_Factor_Analysis.html

analysis. The factors corresponding to the eigen values ≥ 1 were selected and further, an orthogonal rotation was carried out by the varimax method to gain a better understanding of these factors.

Further, there is no standard measure of social capital since its measurements are entirely dependent on the definition used by the researchers (World Bank 2011). Amongst several approaches, we follow that developed by Grootaertand and van Bastelaer (2002). The first concept observed is the structural social capital. It is tangible and deals with formal institutions. This includes membership in formal networks, particularly in local organizations and local governments. The second concept observed is cognitive social capital. It is perceived as embedded within the people and thus, intangible. Further, it is in the form of trust, local ethics, traditions, and morals. Social capital measurement occurs from micro to macro dimension (see figure 1). In this study, we are more focused on micro-level social capital. To resolve, which of the cognitive and structural indicators drive social capital, again principal component analysis was performed on aggregated statements from organic and conventional farmers. Later, we constructed a social capital index as:

$$CSCij = \left[\frac{\left(\sum_{j=1}^{J} Collectiveactionij\right)-1}{4} * WGW\right] + \left[\frac{\left(\sum_{j=1}^{J} Trustij\right)-1}{4} * WGW\right] + \left[\frac{\left(\sum_{j=1}^{J} Satisfactionij\right)-1}{4} * WGW\right] + \left[\frac{\left(\sum_{j=1}^{J} associatednessij\right)-1}{4} * WGW\right] \quad \ldots(1)$$

I=1……., I and j=1……,J

$$SSC_{ij} = \sum_{j=1}^{7} membership_{ij} \quad \ldots(2)$$

$$SCI_j = CSC_{ij} + SSC_{ij} \quad \ldots(3)$$

Except for membership, all items were obtained using 5-point Likert scale. First, we normalized[2] the Likert scale values and then the values were multiplied by a factor representing within-group weight (WGW) of the variables. The within-group weight depends on the number of items measuring the indicator. The cognitive social capital was calculated using Eq.(1). Later, the resulting indicator cognitive values were weighted equally and standardized to 50. Thus, 0 means no cognitive social capital and 50 means full cognitive social capital. Since active membership in local organizations was provided using forthright answers, structural social capital values are calculated by obtaining the percentage equivalent and then responses were standardized to 50. The results reflect actual memberships in specific organizations. This means for each farmer a value of 0 for no membership at all, and a value of 50 for membership in all formal organizations enumerated. Finally, to achieve a social capital index, the cognitive and structural values were added.

4 Results and discussion

4.1 Social capital formation

The potential benefits of organic farming depend on some context-specific factors. From our research results, we find that various capitals positively changed after the shift to organic farming occurred, mainly social capital improvements which took the form of more and stronger social development at local level.

Factor analysis was performed on aggregated statements of organic and conventional small farmers to identify which of the cognitive and structural social capital indicators drives social capital. For this purpose, 25 social capital related statements were formulated based on the aspects found in previous studies (World Bank 2011). For each statement, respondents mentioned their level of agreement on a 5-point scale wherein 1 meant strongly disagree and 5 meant strongly agree. Some of the statements did not load, hence we removed these, and considered only those statements that were loaded. A total of four components were loaded and these together explain 69.9% of the variance before and after varimax rotation. To determine which factors are relevant, the Kaiser Normalization criteria

[2] Normalization: the individual value for cognitive social capital indicators = (SC Indicator – 1) / 4 were used.

Table 1. Rotated component matrix for aggregated organic and conventional farmers statements

Statements	Mean		Components			
	Conventional farmers	Organic farmers	1	2	3	4
Group formation influence on livelihood	2.16	4.17	**0.84**	0.09	0.15	0.14
Group formation influence on market linkage	3.28	4.78	**0.81**	0.20	0.28	0.06
Collective management of resources	2.69	4.19	**0.79**	0.11	0.32	0.09
Clear and fair rules in decision	2.62	4.06	**0.78**	0.18	0.26	0.11
People from the group often get together to address a particular issue	3.24	4.75	**0.77**	0.21	0.31	0.13
Equal access to services	3.24	3.99	**0.71**	0.07	-0.11	0.06
Spirit of participation in the development activities	2.75	4.29	**0.65**	0.21	0.62	0.07
Trust in family members, fellow farmers, neighbors	2.84	3.04	-0.08	**0.76**	0.17	0.06
Level of trust for last three years among the members	2.82	3.44	0.40	**0.75**	-0.01	-0.11
Trust on local Govt officials, service providers	2.74	3.5	0.45	**0.72**	0.01	-0.07
Trust on trade partners	2.89	3.19	0.10	**0.59**	0.06	0.30
Satisfaction with the farming practices	3.73	4.25	0.13	-0.01	**0.83**	-0.12
Satisfaction with group formation and certification	3.49	4.28	0.32	0.19	**0.79**	0.12
I mingle with people in the group	3.35	3.44	-0.06	0.10	-0.08	**0.83**
I participate actively in community and volunteer for community work	3.08	3.49	0.23	-0.01	0.00	**0.76**
Group with linkages often have better access to resources	2.68	3.46	0.47	0.05	0.24	**0.54**
% of total variance explained			30.80	14.17	13.80	11.21
Cumulative % of the variance explained			30.80	44.97	58.77	69.99

Source: Field survey
Note: Extraction method: Principal Component Analysis. Rotation method: Varimax with Kaiser Normalisation

where eigen value less than one are excluded[3]. Coefficients in the final rotated component matrix were sorted by size (table 1). Bartlett's sphericity statistical test suggests that factor analysis would be useful for the data as it contains significant inter-variable relationships. Depending on the factor loadings, the variables were grouped and were renamed according to their collective representation.

The statements that are loaded highly on factor 1 relate to the sense of belongingness and of working together. This factor is labelled as collective action. The statements in this component show a strong, positive correlation between farmers working together to improve livelihood of the people in the community (factor loading 0.83). The members of the community also come together to address particular issues and to access the services from different sources, and these are also loaded higher. The representative variables together in the first factor explain 31% of the variance. The second set of statements relates highly to the trust within the community environment as well with the institutions and with service providers. The factor is named as a trust and explains 14% of the variance. The respondents assign the highest importance to families and neighbours. This type of trust is a bonding element within the social capital. The trust between government officials, service providers and with trade partners loaded positively. This type of social capital refers to the bridging social capital (Ferlander 2007; Narayan-Parker 1999; Pretty & Smith 2004). Factor 3 loads 14% on statements related to satisfaction with farming practices and group formation and certification. Finally, factor 4 loads the statement

[3] Factor loading significance depends on sample size. The study follows, Multivariate Data Analysis by Hair, et al 7th edition. We considered loading greater than 0.5 to be significant for the sample size of 200.

related to relations within the community and between other communities.

The farmers who mingle with the people both within his community and externally too, and have good connections and networks find it highly important to access the resources. This factor explains 11% of the variance (table 1). All four factors representing four different groups (collective action, trust, satisfaction and associatedness) of social capital to improve well-being are in line with the results reported in Cooke et al. (2005) , Isham et al. (2002), and Megyesi et al. (2010). Collective activities, relationships, attitudes and trust-based interactions among farmers group contribute significantly to economic and social development.

4.2 Cognitive and structural social capital

The value of cognitive social capital (CSC) indicators ranges from 0 to 50; 0 means no CSC and 50 means maximum CSC. As a reference, the mean value for all the farmers' CSC is 30.55 (table 2). CSC of organic and conventional farmers differ significantly with reference to the overall mean; organic farmers have total CSC scores of 37.35, compared with conventional farmers who score 23.75. This may be due to cooperative behavior among organic smallholder groups. The results are in line with the findings of Uphoff (2000) from Sri Lanka, that reveal that due to effective cooperation and equitable sharing of scarce water, both cognitive and structural capital produce substantial material benefits to the farmers who are connected with farmer organizations.

Overall, the maximum CSC score comes from collective action (16.44) followed by trust (7.54), satisfaction (6.96) and associatedness (6.39) in the case of organic farmers. All these indicator scores are higher than the aggregated average scores. For conventional farmers, the CSC scores are less than the aggregated average scores, the highest score, however, is for collective action (9.26), but this is significantly less than the scores for the organic farmers. The lowest score for the conventional farmers is for the associatedness (4.63). The individual community CSC values compared against the overall mean using a t-test show a significant departure from the mean.

Table 2. Cognitive social capital of organic and conventional farmers

Social indicators	Organic farmers	Conventional farmers	Total mean
Collective action	16.44	9.26	12.85
Trust	7.54	5.14	6.34
Satisfaction	6.96	4.71	5.83
Associatedness	6.39	4.63	5.51
Cognitive social capital	37.35	23.75	30.55

Source: Field survey

Structural social capital (SSC) values are obtained from the actual memberships of the organic and conventional farmers informal organizations (table 3). The highest membership in formal organization enumerated is in the case of organic farmers for the organic certification group with a mean value of 6.25, and followed by farmers' cooperative (4.19), and membership in government organizations like regional rural banks or the state government department that rural societies come under the jurisdiction of (4.12). In the case of organic farmers, the least membership value obtained if for self-help groups.

Table 3. Structural social capital of organic and conventional producers

Social indicators	Organic farmers	Conventional farmers	Total mean
Organic certification group	6.25	0.0	3.12
Farmer cooperative	4.19	4.06	4.12
SHGs	3.25	1.62	2.43
State government	4.12	3.87	4.00
Structural social capital	4.45	2.39	3.42

Source: Field survey

To compare SSC for organic and conventional farmers, the aggregated mean of 3.42 from both groups of farmers was used (table 3). On organic farmers, the SSC values are higher than that of the mean values. For conventional farmers, SSC regarding individual formal organizations membership is less than mean values. The highest membership is that of the farmer cooperative (4.06) followed by state government organizations (3.87) and SHG's (1.62).

Separate organic and conventional membership of SSC values were compared against the mean using a t-test, and the results reveal a significant difference from the

Table 4. Mean values of social capital of organic and conventional farmers

Social capital	Organic farmers	Conventional farmers	Mean
Cognitive, social capital	37.35	23.75	30.55
Structural social capital	4.45	2.39	3.42
Total social capital	41.80	26.14	33.97

Source: Field survey

mean. Table 4 presents a social capital index for both organic and conventional farmer communities. Index was computed by adding cognitive and structural capital values. Both of the communities are below the 50 mid-points on which calculations have been benchmarked. The organic farming community is found to have a significantly higher score of 41.80, whereas the conventional community has a score of 26.14. This may be due to the community of organic smallholders having trust based collective activities in production, marketing, and developmental work. Also, the levels of interaction and intervention has been found higher in the organic farming community, which also leads to the higher social capital formation.

Education plays a significant role in the formation of social capital. The frequency counts (65%), confirm that respondents with higher education have higher satisfaction levels with the adoption of organic farming. This is because educated people are more proactive in the participation of group activities and training, also in initiating formation of organic smallholder groups to avail of group certification schemes. Even, their involvement in *krishi melas* (agricultural fairs), model farm visits, and agricultural trade fairs to collect information and new techniques relate to the production and marketing the produce.

A lack of education is a significant hindrance for smallholders and discourages them from seeking out information and adopting new techniques. Furthermore, it is often argued that due to the lower levels of formal education, farmers may face difficulties, particularly when they shift from conventional to organic farming, for example, record keeping of organic farming practices necessary for certification and using various sources of information related to farming and marketing, such as booklets.

Higher education plays an important role in the formation of both cognitive and structural social capital for the organic smallholder farmers. The age of the household-head has also considerable influence in the formation of social capital. Younger farmers (below 40 years of age) tend to have a greater number of social ties with both the formal and informal groups. This indicates that younger farmers have better relationships with other farmers and are more active in formal organizations, all of which are helpful in the creating more social capital.

Affiliation with formal and informal institutions also plays an important role in the formation of social capital. Therefore, providing more education and training and recognizing and rewarding the efforts of younger farmers in particular for organic farming will foster adoption of organic farming and be conducive to creating higher levels of social capital shortly. This will also convert further areas of land to organic farming methods, which in turn that will help to improve the livelihoods of smallholder farmers on an even larger scale.

5 Conclusions and policy implications

This study has examined determining factors, and potential for social capital formation to make a positive impact on smallholder organic farmers in Karnataka. The organic farming does not confine only to particular practices it also considers cooperation and networking among stakeholders on the value chains, which, in turn, lead to the development of social capital among the farming community. Social capital significantly impacts the economic success of collective marketing initiatives by deploying of human, financial and physical capital assets. Mainly collective activities, relationships, attitudes and trust-based interactions among farmers group contribute to socio-economic development. Collective farm activities range from the joint investment in inputs to land pooling, joint cultivation and organic group certification. This type of cooperation is based on their active connections, reciprocal trust, mutual understanding, and shared values.

In this study, we have observed the potential of social capital towards improving smallholders livelihood; but also highlighted the difficulties in translating the potential into an action tool for sustainable agricultural development policies. Social capital measurement is a

difficult task as it has different characteristics in different contexts, especailly in the highly complex and socially diffrentiated settings as in India. This study is one of the firsts to measure social capital considering different indicators of cognitive and structural indicators. However, the social capital building at the grassroots level needs the connections with other levels of governance to be sustained and to flourish. In this study, we have shown how sustainable value chain governance systems promoted through farmer groups (group marketing and organic group certification mechanisms) can be used to enhance smallholder market participation.

Here the challenge for policy makers is to identify the conditions under which different social groups can harness the positive aspects of fostering its bonding and bridging social capital. Policy can also aid improving effectiveness of social capital by contributing to the resources available within networks. Further, synergies between organic farming communities and government can enhance each other's developmental efforts, creating long-lasting and mutually beneficial collaborative relationships. Therefore, it is crucial to find out the actual needs and aspirations that social capital building is supposed to fulfil for each organic farming community and adjust accordingly with their objectives. Here comes the importance of developing farmer's inclusive local institutions like Farmer Producer Organisations (FPOs) where farmers themselves can build, design, control and scale up new inititatives to build social capital. It eventually suggests strategies for forging further participative sustainable agriculture policy actions inspired by effective bottom-up community models.

Furthermore, the context-specific nature of social capital makes it a powerful tool for agriculture and rural development. Policy makers and development planners can also facilitate social capital built up by providing an adequate framework for its development and by sustaining mutually beneficial relations among the organic farming groups and between the groups and external institutions. These efforts will not only increase the productive efficiency and economic viability of farms, but also contribute to reducing poverty and improving livelihoods of the smallholder farmers. Furthermore, the social capital formation is influenced by education, age and extension contacts. Also, affiliation with (formal and informal) institutions plays a significant role in the formation of higher-level social capital. Providing higher education, capacity building training, recognition and rewarding the efforts of younger aged farmers on organic farming activities will help foster organic farming adoption and higher level social capital formation in the near future. Further, it will help boost organic conversion which, in turn, will help improve the livelihood of smallholder farmers in large scales. Overall, for the holistic development of organic agriculture and social capital formation, attention must be paid to other support systems besides organic conversion and production. Greater focus and institutional support is needed for undertaking interdisciplinary and participatory research and development. Further, capacity building of organic farming communities and various stakeholders, providing adequate extension services, create awareness and benefits of social capital formation among farmer associations and producer groups is the need of the hour.

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