Creating Farming Practices for Social Innovation: The Case of *Kohnotori-hagukumu Nouhou* (Farming formula nurturing oriental storks)

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This paper analyzes the process of social innovation through creation of *Kohnotori-hagukumu Nouhou* (KHN), or "Farming formula nurturing oriental storks," which has been widely adopted by local farmers in Toyooka, Japan. Special analytical focus is on different roles and motivations of actors involved in the initial technical creation process to establish the farming formula. Results of the case study indicate that "key actor's passion and commitments," "lowering risks associated with introducing KHN," and "selection of growers enthusiastic about protection of oriental storks" were some of the key factors determining the winning of collaborators to the social innovation process.

Key words: social innovation, technical creation process, stork, family farms, rice farming, Japan

1. Introduction - Background and Research Question

Faced with falling rice prices, many Japanese farmers are in search for viable strategies to keep their farming competitive. In that current, recently value-added rice products associated with ecological protection are attracting enormous attention. For example, a farmer pursuing better prices may want to introduce organic farming. Thus, to date, at least 40 value-added rice products with environmental premiums are marketed in Japan.

These premium products are intended to not only increase farmer's income but also tackle social challenges, such as conservation of the environment in specific geographic areas. It therefore can be said that producing rice with an ecological premium relates to social innovation (SI), which according to Mulgan (2006, p.146) is defined as "innovative activities and services that were motivated by the goal of meeting a social need and that were predominantly diffused through organizations whose primary purposes are social." Likewise, Tanimoto et al (2013) defined SI as innovation that will create new social values for economy and society. The idea of SI is comparable to that of social enterprises, which have emerged and proliferated at the global scale since the 1990s and have tackled a variety of contemporary issues, such as environmental degradation, poverty, homelessness, public education, welfare and community development through business activities.

While production of value-added products, such as ecological premium rice, could be a viable alternative for farmers, this strategy oftentimes requires farmers to adopt new farming practices

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to create special values for a product. Adoption of new practices can pose risks on farmers. Hence, diffusion of innovation or new technologies among farmers has been one of focal topics for research in social sciences related to agriculture. Nonetheless, Rogers (2003) has pointed out that past technical diffusion research tended to pay more attention to the process of diffusion of farming practices and less to the way the practices were created, which according to him would greatly affect whether the diffusion of farming practices will succeed or not.

All the notable contours surrounding rice production in Japan described above lead us to ask how new farming practices for production of eco-premium rice are created, adopted and diffused among farmers. In particular, the existing technical diffusion research raises an especially pertinent question as to the creation process of ecological farming practices as a SI. Given Rogers' (2003) observation on the relevance of the initial technical creation process to the following diffusion, this study sheds light on how a particular farming formula for rice product with ecological premium, which is considered a SI, was created.

More specifically, using the case of *Kohnoto-ri-hagukumu Nouhou* (farming formula nurturing oriental storks; "KHN" hereafter), which has been widely adopted by farmers in Toyooka City, Hyogo Prefecture located in west-central Japan, the study illuminates the roles and motivations of actors involved in the initial technical development process to establish the farming formula.

Potential merits of this study are twofold. First, this study can fill the lack of knowledge about the technical creation process preceding diffusion, since few past studies on technical diffusion processes have dealt with the creation process of farming practices in Japan. Second, results of this study can provide promoters of SI with practical information to help farmers introduce new practices to conserve ecological values and/or selling products at better prices.

2. Literature review

As mentioned earlier, literature in agricultural technical diffusion has rarely analyzed initial technical development preceding diffusion. In six main stages Rogers (2003) specified as innovation development processes (Figure 1), past researches have tended to focus on the fifth and sixth stages although "decisions and events occurring previous to this point often have a strong influence on the diffusion process" (p136). This recognition led this study to focus on the pre-diffusion process, that is,

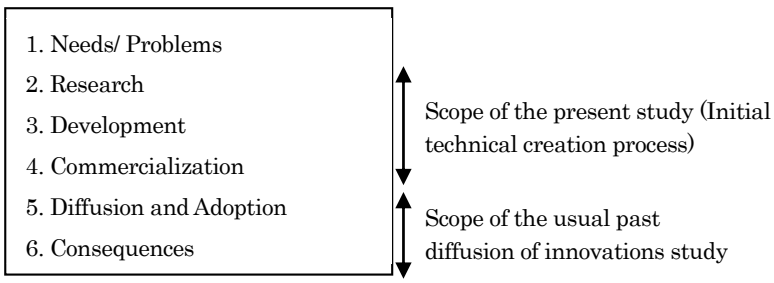

Fig 1. Six main stages in the innovation development process
Source: Rogers (2003, p.138) with addition by the authors

the creation process of innovation.

In addition, KHN as SI necessitates a special consideration. In emphasizing the importance of SI, Mulgan (2006) has anticipated that SI's pace of diffusion will accelerate; nevertheless, the general pattern of innovation will be unique rather than following that of the past major domains of innovation, such as information technology. One of our questions has to address, therefore, what constitutes the uniqueness of SI, especially in its creation stage, which could steer later diffusion processes.

Indeed, in theorizing the emerging SI, there have been attempts to capture processes of SI with an emphasis on the technical creation phase as well. Mulgan (2006), for instance, has put forward four stages in SI processes as follows:

1) Generating ideas by understanding needs and identifying potential solutions
2) Developing, prototyping, and piloting ideas
3) Assessing, scaling up, and diffusing good ideas
4) Learning and evolving

In a very similar vein, Murray et al (2008) have theorized SI processes as consisting of diagnosis, design, development, systemic innovation, scaling, diffusing and connecting, and sustaining innovations. In these works, it is posited that while the different stages entail feedback loops and leaps, the initial phase of innovation significantly affects the later processes.

Furthermore, with the works cited above along with Tanimoto (2006), Komura et al (2011) have proposed to recapitulate these stages into two major phases: creation process and diffusion process. Based on these studies, Tanimoto et al (2013) have proposed a theoretical framework to analyze the creation process and diffusion process in SI, which will be explained in the following section to be employed in the present paper.

3. What is Kohnotori-hagukumu Nouhou?

The principal focus of this study, KHN, or farming practices nurturing oriental storks, is a farm system structured to increase the availability of feed for oriental storks in paddy fields. In fact, wild oriental storks in Japan disappeared in 1971. After the extinction, stakeholders including the Hyogo Prefectural Government started breeding storks, and in 1989 finally succeeded in artificial reproduction. With the number of storks under the breeding program exceeding one hundred, the stakeholders decided to reintroduce the birds to the field in 2005.

To help the storks survive successfully in the wild fields, new farming practices that used simultaneously decreased agricultural chemicals but increased feed for storks were to be created, because the past extensive use of farming chemicals was considered a significant factor in the extinction (Kikuchi 2006). Thus, KHN is designed to use only a minimal amount of agricultural chemicals and entails flooding of paddies in winter and/or early flooding before rice planting so that feed for storks grow. Arising from this, two types of KHN were created, depending on the degree of chemical usage: "non-chemical" and "reduced-chemical." Prototypes of KHN were tested in 2003 and 2004, and the final versions were established in 2005.

As to the commercialization of rice grown by KHN, one of the stakeholders, Japan Agricultural Cooperative (JA) Tajima collects all KHN rice and markets it under a special label at premium prices (Table 1). According to an employee selling KHN rice in JA Tajima, "as KHN rice involves the image of nurturing storks in the paddy field, it has sold well," which means that farmers can obtain better incomes by introducing KHN.

Taking into account the discussion above that the formula contributes not only economically to farmer's income but also environmentally to the region's

Table 1　Production summary of non-chemical and reduced-chemical KHN in 2014

	Conventional farming practice	Non-Chemical KHN	Reduced-chemical KHN
Sales price(yen/30kg)	5,900	11,000	7,900
Yield (kg/10a)	514	418	490
Sales (yen/10a, A)	101,258	153,406	128,870
Cost (yen/10a, B)	110,868	93,906	94,481
Difference (A − B)	− 9,610	59,500	34,389
Labor hour	22	34	30

Source: Interviews by Uenishi, the principal author, with the Toyooka City Government in 2015

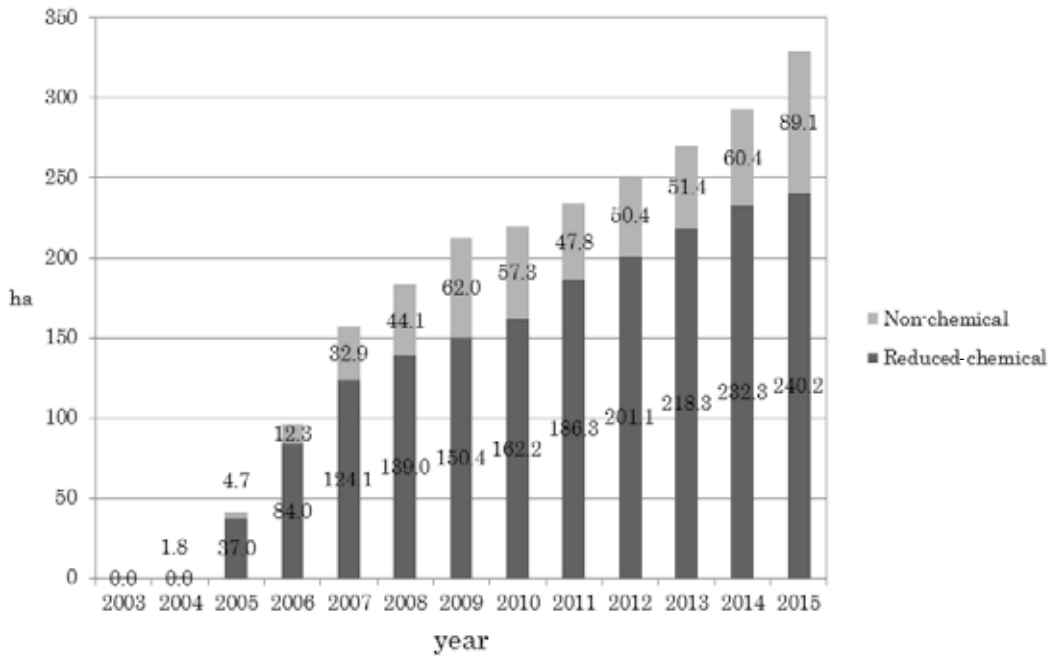

Fig 2. Growth of farmlands that adopted KHN in Toyooka City

Source: Interviews by Uenishi, the principal author, with the Hyogo Prefecture in 2015
1) In 2003, non-chemical is 0.7ha and reduced-chemical is zero.

ecosystem, KHN can be considered a SI, one which is spreading in the area. The number of farmlands employing KHN has consistently increased (Figure 2). In 2015, 330 hectares in Toyooka applied KHN, accounting for approximately 10 percent of all the farmlands in the city (3,500ha).

Table 1 summarizes key production figures of the non-chemical and the reduced-chemical KHN. Farmers introducing KHN can save production costs and while selling rice at better prices than conventionally grown rice. Differences between sales and costs in both non-chemical and reduced-chemical KHN are significantly higher than that in conventional practice. However, KHN can help growers reduce the amount of agricultural chemicals and thereby save costs, although labor hours relative to conventional practice are more due to the necessity for weed suppression.

4. Theoretical framework

To unpack the creation process of KHN as a SI that could steer latter diffusion processes, we examine Tanimoto et al (2013) who have suggested four analytical questions, which are employed as our theoretical framework as follows. In this examination, we also consider how these questions relate to the question posed previously as to what constitutes the uniqueness of SI processes.

1) Which actors were involved in creation process?

Following Tanimoto et al's (2013) focus, this study specifies main actors involved in the creation process of KHN, such as supporters and risk takers in the technical development process.

2) How was the social challenge acknowledged?

Tanimoto et al (2013) advise to ask how the main actors have acknowledged focal social challenges and why they decided to try to solve them. Obviously, this aspect is especially relevant to the question regarding the uniqueness of SI, which has to entail social aspects.

3) How has the network of the actors developed?

Tanimoto et al (2013) also pay attention to networks of the actors with specific roles in it by asking how each actor with different roles collectively contributes to the creation process.

4) How was the SI created?

Tanimoto et al (2013) suggest analyzing a series of diverse events that characterize specific aspects of SI. This question is also relevant to the question regarding the uniqueness of SI. In our understanding, SI's unique aspects, among many, include non-economic or social-oriented motivations of actors to which we pay special attention in the analysis.

5. Methodology

The research area for this study is Toyooka City in Hyogo Prefecture, Japan, in which the initial attempt to create KHN began in 2003, and the formula was finally established in 2005. In Toyooka, we conducted interviews with some of the key organizations involved in the creation process of KHN, including the Hyogo Prefectural Extension Center (HPEC), Toyooka City Government, and JA Tajima. In addition, growers who committed to the initial technical creation were interviewed, including three community farm enterprises (CFEs) and two family farms (FFs) (Table 2).

The two FFs belong to an eco-farmers group, which was established in 2003 and consists of five organic FFs in Toyooka. In 2003, at the beginning of the technical creation process, all of the five farms introduced the prototype reduced-chemical KHN and three of them introduced the prototype

Table 2. Overviews of the interviewed growers who introduced KHN in 2015

	CFE-A	CFE-B	CFE-C	FF-A	FF-B
Year of establishment	2001	2001	1988	–	–
Year of introducing reduced-chem KHN	2003	2004	2004	2003	2003
Year of introducing non-chem KHN	2003	2004	N/A	2003	2005
The number of participating households	20	39	33	–	–
Average age	67	67	N/A	45	58

Source: Interviews by Uenishi, the principal author, with farmers in 2015

non-chemical KHN. They provided HPEC with information regarding the performance of the non-chemical prototype practices. Through this, two interviewed FFs became involved in the creation of the non-chemical KHN.

6. Findings and Discussions

(1) Findings

First, from the interviews we derived responses to the analytical questions suggested by Tanimoto et al (2013) to analyze the creation of SI.

1) Which actors were involved in creation process?

The interviews revealed that HPEC was one of the most significant actors in the technical creation process. HPEC requested farmers and other key organizations to help create KHN and actively promoted dissemination of the new farming practices. Identified as supporters were also Toyooka City, JA Tajima, and a local supermarket. The farmers, including the FFs and CFEs, were identified as the risk takers.

When HPEC asked some of the farmers to cooperate in the technical creation process, organic (non-chemical) or reduced-chemical farming practices were so rare in Toyooka that few farmers were applying them. Therefore, the farmers who cooperated with HPEC in the creation process had to take greater risks. They had to risk the usual yield level and had only poor information as to how to manage the new farming practices to produce rice.

2) How was the social challenge acknowledged?

The element that symbolizes the social challenge is the extinct oriental stork. The challenge of recovering the stork population was increasingly recognized in the process. People in Toyooka would see oriental storks in their daily life. The population of storks, however, had been decreasing since the WWII period, and eventually storks died out in 1971 due to the excessive use of agricultural chemicals. After the extinction, as mentioned earlier, the Hyogo Prefectural Government and Toyooka City Government bred artificially storks and reintroduced them to the fields. They succeeded in breeding artificially and finally the number of storks under breeding exceeded one hundred. It was through these processes that HPEC and the other stakeholders became aware of the symbolic social challenge, that is, the recovery of oriental storks and of the environment in which they can thrive, particularly the availability of uncontaminated feed.

3) How has the network of the actors developed?

Figure 3 shows the networks and roles of the actors. HPEC played a critical role in the creation process of KHN. One of its extension agents worked actively to develop KHN by involving the farmers, the local supermarket and JA Tajima toward cooperation in the creation process. In the hope that different types of farmers, including part-time farmers, full-time farmers and CFEs would introduce KHN in the future, she persuaded CFEs and full-time FFs to cooperate with the creation process. She thought that involvement of diverse farmers in the creation of new farming practices would definitely facilitate introduction of KHN by many farmers.

At first, however, most farmers refused to introduce KHN not least because of lack of information about KHN. She repeatedly visited farmers to convince them of the significance of KHN. Then finally, they decided to introduce KHN. Farmers tried KHN and provided their observations of the performance of the prototype KHN to HPEC, which will be detailed in the next section.

She also developed the new market for KHN rice by herself by convincing the local supermarket to buy the KHN rice at a premium price. Sales of KHN rice would, as she was aware even in the creation process, be one of the key factors of success.

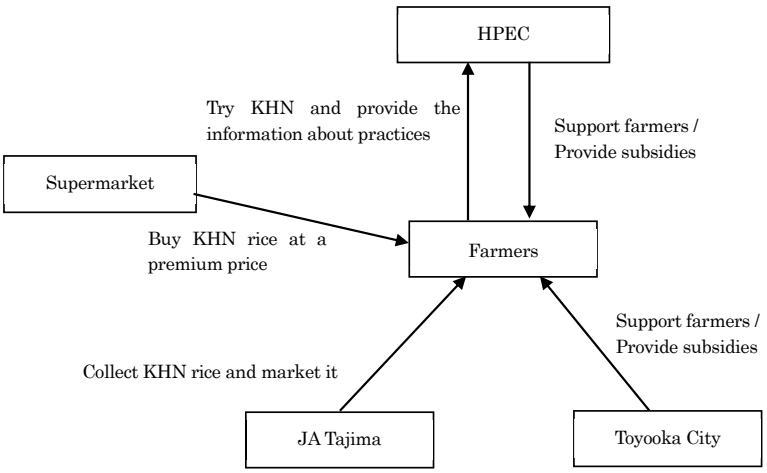

Fig 3. Networks and roles of each actor

Source: Prepared by the authors

Table 3. The creation process of KHN

Year	HPEC	Farmers	Other actors
1999	The establishment of Hyogo Park of the Oriental White Stork		
2000			(Toyooka City) The establishment of Toyooka Municipal Museum for Oriental White Stork
2002	Decide to reintroduce storks in 2005		
2003	Begin to create KHN / Provide subsidies with farmers who involved in the creation process	CFE-A, FF-A, FF-B	(JA Tajima) Collect rice at a premium price
2004		CFE-B, CFE-C	
2005	Create KHN		

Source: Interviews by Uenishi, the principal author, with key informants in 2015

Finally, one local supermarket understood the importance of KHN rice and decided to buy it from JA Tajima at a premium price. She also asked JA Tajima to collect KHN rice from farmers. As almost all the farmers were JA members, she thought JA Tajima, which had been collecting rice since 2003, was the best to collect KHN rice.

Furthermore, HPEC and the Toyooka City Government provided the information about farming practices and subsidies.

4) How was the SI created?

The creation process of KHN is chronicled in Table 3 with key actions or events of the major actors. As mentioned before, motivations beyond mere economic interests would characterize SI processes. When scrutinizing the motivations of the farmers, four varying motivations for involvement in the creation process were identified.

i) Storks (CFE-A, CFE-B)

CFE-A was established in 2002 and consisted of mostly retirees/part-time farmers. The community of CFE-A is located in the center of the reintroduction site for storks. CFE-A introduced reduced-chemical KHN and non-chemical KHN in 2003. The leader

of CFE-A said, "as this area is greatly relevant to storks, we should cooperate with the creation process of new practices and contribute to storks." For CFE-A, 'storks' constituted the main motivation to cooperate with the creation process.

The community containing CFE-B, established in 2001 and consisting of mostly retirees/part-time farmers, used to be one of breeding sites for storks before the extinction. The current leader of CFE-B said, "Our community was relevant to storks, so we thought that we had to contribute to storks. As the members of CFE had been attracted to storks, we were able to decide to cooperate," implying that 'storks' was the main motivation for this CFE as well.

ii) Human relationship (FF-A)

Through the interview, FF-A said, "Other members of the eco-farmer group recommended me to adopt, and I thought that there was no reason to decline. Thus, I decided to introduce non-chemical KHN and reduced-chemical KHN." In this case, 'human relationship' was the main motivation leading this farmer to cooperate.

iii) Lowering risk and promoter's passion (FF-B)

In 2003, though asked to cooperate with the creation process of the non-chemical KHN, FF-B declined the request. As he rented the land, he was afraid of damage from weeds that would become problematic under non-chemical usage. In 2005, however, the other member of the eco-farmers group told him that as he cultivated 10 hectares, there would be no problem even if one unit of paddy field (about 0.3 hectares) was damaged by weed. Furthermore, he happened to witness the extension agent passionately help CFE-A by weeding all day by herself in their paddy although that was not her responsibility. This experience moved him to decide to begin non-chemical KHN with 0.3 hectares. In his case, 'lowering risk' and 'the promoter's passion' were the main factors motivating him to cooperate.

iv) Accumulation of experiences (CFE-C)

CFE-C, originally established in 1987, became incorporated in 1998 as the first corporate farming entity in Toyooka. All the farmers in the community where CFE-C was established joined CFE-C. As it has been producing a branded premium rice grown by organic farming since 1993, the members were already accustomed to organic farming, which barely differed from KHN. The leader of CFE-C said, "We did not have any hesitation in introducing KHN." Furthermore, CFE-C willingly shared knowledge and skills from the experiences accumulated through organic farming with the agents of HPEC. In this case, 'the accumulation of experiences can be deemed as the motivating factor to engage in the technical creation process of KHN.

These findings are summarized in Table 4.

Table 4. Summary of findings

Questions	Findings
1) Actors	Main actor: HPEC Supporter: Toyooka City, JA Tajima, Supermarket Risk taker: Farmers
2) Acknowledgement of the social problem	The schedule of reintroduction of storks was decided One of the biggest reason of extinction is agricultural chemicals The feed for storks were needed
3) Networks	(See Figure 3)
4) Motivations of farmers	Storks / Human relationship / Lowering risk / Promoter's passion / Accumulation of experiences

Source: Interviews by Uenishi, the principal author, with key informants in 2015

(2) Discussions

In this study, we identified actors involved in the creation process of KHN, who were connected as a network. In this process, as detailed below, HPEC played the central role in mobilizing the other actors, who were motivated for various reasons. Of the various motivations, some seemed to concern economic factors, such as lowering risks in FF-B, but most of the actors engaged in the creation process of KHN embraced non-economic motivations. This would demonstrate the distinctive attribute of KHN as a SI.

One of these non-economic, social motivations was the wish to contribute to oriental storks, which symbolically represents a social challenge. Thus, it can be argued that actors who feel strong attachment to what symbolically represents a social challenge, or in this specific case an environmental icon such as the oriental stork, are more likely to adopt SIs such as KHN and willingly engage in its creation process.

Furthermore, we can point out that the key actor is the HPEC agent whose commitments and passion mobilized the other actors at critical moments during the creation process of KHN. She worked very actively to connect with different actors and convince them to get involved in creating KHN. Her motivations of course carried economic ones, namely, contributing to increasing farmers' income through creating the new premium rice product; yet that is obviously not for her own economic interest. It seems reasonable to posit that a few actors highly motivated with non-economic interests could be a critical element facilitating the initial creation process of a SI.

7. Conclusion

In conclusion, employing Tanimoto et al's (2013) questions to analyze the creation process of KHN as SI, from the findings we can point out some of the significant factors relevant to the creation process of KHN that affect later diffusion processes. They include 1) the actor's passion and commitments, 2) lowering risks associated with introducing KHN, and 3) selection of growers enthusiastic about protection of oriental storks as a symbol representing the social challenge for the area. Our analysis proves the usefulness of Tanimoto et al's (2013) framework to analyze the creation process in that identifying major actors, and how they construct the network with other actors, allows us to easily delineate each actor's role and motivations, which in turn helps to characterize the uniqueness of a SI.

Furthermore, while this study has analyzed KHN as a SI through its creation process, we should pay close attention to which aspects of the creation process might affect the diffusion process more significantly. There might be two factors that affect the diffusion process positively.

First, securing sales channels and realizing the higher price might affect the diffusion process positively where more economic, rather than social, motivations seem to be dominant as Uenishi's (2016) observation that all CFEs introduced KHN in later diffusion stages with the wish to improve profitability in their farming. As the HPEC agent asked the supermarket to buy KHN rice in the creation process, farmers observed that they could indeed sell KHN rice at higher prices; thus securing sales channels proves the viability of the final product and is an essential element even in the creation process.

Second, the HPEC agent asked both FFs and CFEs to cooperate with the creation of KHN. In the latter diffusion process, different types of farmers, such as FFs, CFEs and part-time farmers introduced KHN. Thus, later diffusion processes might be

facilitated if accessibility for different types and scales of farmers is considered in the creation process.

Finally, we raise questions for future research. First, while this study mainly focused on the creation process of a SI while speculating about the effects on later processes, future research should articulate the relationship between the creation process and diffusion process in detail. Second, KHN is a pioneer case of eco-branded rice. Recently in Japan, there appear to be more and more cases of eco-branded rice products. Thus, it is worthwhile to examine other cases of eco-branded rice in Japan in the future.

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