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Digital and traditional media advertising and business performance of agribusiness firms – Empirical evidence in Japan

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Abstract: Can digital media advertising strategies benefit agribusiness farms? This study addresses this issue by investigating the extent to which digital and traditional media advertising strategies affect agribusiness performance and the underlying factors associated with agribusiness farms' adoption decisions. We estimate a non-linear simultaneous equation system and use a population-based survey data of agricultural processing farms in Japan. We find that female and younger farm operators', as well as incorporated agribusiness farms, are more likely to adopt digital media advertising. The sales value of digital media advertising users is higher by 51% than that of non-users. Moreover, the effect of digital advertising is not equally distributed among farms. Family farms and farms located in rural areas benefit more from the adoption of digital media advertising.

Keywords: advertising strategy; agricultural processing farm; digital technology; Japanese farm

Internet-induced digitalization has disruptively changed business operations since the 1990s. Numerous studies have documented the contribution of internet to different aspects of business performance, including innovation (Bertschek 2012), labor productivity (Deming et al. 2018), and financing (Chen et al. 2018). In tandem with the imperative role of internet in business operation, companies have shifted their marketing strategies from traditional media such as newspaper or magazine to digital advertisings (Goldfarb and Tucker 2011; Chandra and Kaiser 2014). Digital advertising is defined as the marketing strategy of a firm through internet access, including web banners and mobile advertisments (Cheng et al. 2009). With technology improving, the effectiveness of digital advertising has become measurable and traceable, which can favor one-to-one marketing (Barnes 2002). It has been shown that digital advertising is superior to other advertising media in terms of lower advertisement costs (Chiou et al. 2019), higher targeting ability to match customers and products (Bergemann and Bonatti 2011), and convenient offline orders and payments.

Business and finance literature has documented a positive effect of digital advertising on business performance. For example, Manchanda et al. (2006) found that digital advertising with a customer targeting strategy increases business sales in the healthcare and

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beauty industries. Pozzi (2013) found that online shopping service increases a supermarket chain's revenue. Some studies evidenced influence of internet marketing on a firm's market position. For example, Hamill and Gregory (1997) confirmed that a firm's internet marketing capability leverages market penetration of the firm. However, none of these studies nudged into agribusiness firms.

Some mainstream literature on agricultural farms has focused on the role of internet access for farm well-being. For example, Hübler and Hartje (2016) documented a positive and significant relationship between farmers' use of smartphones/mobile phones and their income in the rural area of Southeast Asia. Khanal and Mishra (2016) found that small farms with internet connections were better off in the U.S. In China, Ma et al. (2018) found a positive relationship between smartphone use and farm household income. Although there is an enormous amount of evidence on links between internet use and farm household income, none of these studies is focused on digital advertising strategies used by agribusiness farms.

This paper bridges two different streams of literature on agribusiness farms and on advertising strategies of non-farm corporations. Can the consensus finding drawn from the non-farm corporations be directly applied to agribusiness farms? The answer to this question is not trivial. This paper provides an empirical investigation into this issue using the case of agricultural processing farms in Japan. We first investigate the factors that are associated with the decision of the farm on adoption of digital and traditional media advertising. We then quantify the effects of these two advertising strategies on the sales value of the agribusiness farm. Finally, we investigate whether the effects observed are distributed disproportionally to farms with different characteristics.

This study contributes to the literature on agribusiness farms and digital advertising on several fronts. First, no study so far has examined the agricultural farms' adoption decision on digital media advertising. This study compares the impacts between digital and traditional media advertisings on agribusiness performance. Second, we use a unique sample of agricultural processing farms drawn from the census survey of agribusiness farms in Japan. Using this population-based farm data allows us to conduct a heterogeneity analysis of the advertising effect on farms' sales value. To the best of our knowledge, this is the first paper that uses this survey for agribusiness analysis in Japan. Third, we address endogeneity bias between advertising adoption and farm sales by estimating a non-linear equation system to accommodate the interrelationship among advertising strategy adoption and sales value of an agribusiness farm.

DATA AND METHODS

Data. This study uses a dataset drawn from the latest version of the Survey of Agricultural Industrialization in 2010 in Japan, conducted by the Ministry of Agriculture, Forestry, and Fisheries (MAFF) in Japan. This survey interviewed all agribusiness farms in Japan. We use the latest version of the census survey from 2010. Our dataset consists of all registered farms that engaged in agro-processing production with total areas of farms and facilities larger than 3 000 m^2 in 2010, across the 47 prefectures of Japan. Since internet connection is the crucial facility to conduct digital promotion, we exclude farms that are located in the prefectures where the overall internet use rate in the census data is less than 5%. Eight prefectures (Fukushima, Ibaraki, Kyoto, Wakayama, Yamaguchi, Kagawa, Ehime, and Nagasaki) were thus removed from the sample. The final sample includes 8 000 agro-processing farms in Japan. This survey contains rich information on characteristics of agribusiness operation, geographical location of the farms, and socio-demographic characteristics of the principal decision-maker. In particular, the adoption of marketing strategy of the agro-processing farm to sell their products was documented. Using this dataset allowed us to understand not only agribusiness revenues but also the advertising strategies used by agribusiness farms.

We specify several variables that capture farm characteristics. First, we define a dummy variable to indicate if the agro-processing farm used digital advertising to sell their products in 2010. We define another dummy variable for adoption of traditional media marketing that uses mass media such as magazines and TV ads to sell farm products. With respect to the performance of the agribusiness operation, we specify a continuous variable to capture the total sales value of the farm. This value is normalized to the area of the agribusiness farm, as some agribusiness farms did not operate throughout the year.

The sample distribution of the sales value of a farm in the full sample and the subsamples by status of the two advertising strategies are presented in Table 1. The average sales value of the farm in the full sample is USD 1 111 per m^2. The total sample is further classified into four subgroups of farms by advertising strate-

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Table 1. Sample statistics of the sales value by advertising strategy

Group	*n*	Mean	SD
Full sample	8 000	1 111	7 731
Digital and traditional media users	494	2 702	18 933
Digital media users only	704	1 542	4 062
Traditional media users only	317	1 117	2 828
Non-advertising users	6 485	943	6 637

The unit of sales value is USD/m^2

Source: Authors' own calculations based on the Census Survey of Agricultural Industrialization (2010)

gies; named digital and traditional media users, users of digital media only, users of traditional media only, and non-advertising users (users of neither digital nor traditional media). The average sales values of the four subsamples are USD 2 702, USD 1 542, USD 1 117, and USD 943 per m^2, respectively. This result indicates that users of digital advertising have better performance than users of traditional media advertising and non-advertising users.

In line with the specification used in previous studies (Mishra et al. 2009; Taragola and Van Lierde 2010), we define several dummy variables for the age of the principal farm manager and a dummy variable for the gender of the principal manager. In addition, the ownership of an agribusiness farm and a dummy variable whose value is equal to one if the agribusiness farm is family-based business was included. Five categorical variables for agribusiness status itemized as unincorporated (serves as the baseline group), cooperative, enterprise, JA (Japanese agricultural cooperative), and others are also specified. Since family agribusiness is mostly unincorporated in Japan, and the correlation among the dummy variable for ownership and the dummy variables for status may affect the estimation results, we check the correlation coefficient between two variables. The value is 0.595 which indicates moderate correlation between these two variables and suggests that the multi-collinearity issue is not serious in our analyses. We include a variable that indicates the number of employees to capture the scale of the effect of the agribusiness farm. To accommodate the spatial heterogeneity of deploying the internet on the performance (Buys et al. 2009; Mishra et al. 2009), we include categorical variables that represent the effects of omitted variables correlated with regional location. The specified regional variables include the urban (baseline group), flatland rural, middle rural, and mountainous rural, denoting the area in which the farm is located. We defined two variables to reflect the internet penetration and the rates of media use in the local area (Del Barrio-García et al. 2019). These two variables are extracted from The Communications Usage Trend Survey (2010) and the Survey on Time Use and Leisure Activities (2011), respectively, at the prefecture-level. Since it is likely that the local internet penetration and time spending on traditional mass media are expected to have a direct influence on the digitalization of agribusiness firms but not directly related to agribusiness performance, we use these variables as the exclusion variables in model estimation to increase the statistical power of model identification. Table 2 reports the definitions and sample statistics of the selected variables.

Method. Before we introduce the econometric model, one important econometric issue has to be addressed. The decision to adopt digital or traditional advertising or both is made by the agribusiness farm. Therefore, the use of the advertising strategy can be corrected with a farm's sales value due to some unobserved common factors. For example, a more risk-averse farm manager may be less likely to adopt new technology, such as digital advertising. On the other hand, he/she may be less likely to generate a higher sales value. In this case, the unobserved risk preference of the farm manager would lead to an endogenous bias problem. Failure to cope with the endogenous bias can lead to biased estimates (Zaefarian et al. 2017).

We estimate a three-equation system to cope with the potential endogenous bias. The first two equations are the choice equations, representing the decision of the farm manager to engage in the digital and traditional advertising strategy, respectively. The third equation is the outcome equation of the farm. Suppose *i* represents each farm; the simultaneous equation system is specified as:

$$\begin{aligned} D_{1i}^{*} &= \alpha_1 + \beta_1^{'} X_i + \gamma_1^{'} Z_{1i} + \varepsilon_{1i} \\ D_{2i}^{*} &= \alpha_2 + \beta_2^{'} X_i + \gamma_2^{'} Z_{2i} + \varepsilon_{2i} \\ y_i &= \alpha_3 + \beta_3^{'} X_i + \pi_1 \times D_{1i} + \pi_2 \times D_{2i} + \varepsilon_{3i} \\ D_{1i} &= 1 \text{ iff } D_{1i}^{*} > 0 \text{ and } D_{1i} = 0 \text{ iff } D_{1i}^{*} \le 0 \\ D_{2i} &= 1 \text{ iff } D_{2i}^{*} > 0 \text{ and } D_{2i} = 0 \text{ iff } D_{2i}^{*} \le 0 \end{aligned} \quad (1)$$

where: D_{1i}^{*}, D_{2i}^{*} – unobserved latent variables that represent the propensity of the farm manager to adopt digital and traditional advertising, respectively; D_{1i}, D_{2i} – ob-

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Table 2. Sample statistics of the selected variables (n = 8 000)

Variable	Definition	Mean	SD
Performance			
Ln sales	Sales value per factory area measured in m^2 (USD/m^2) in log	5.82	1.51
Advertising strategy			
Digital	If use internet for advertising (= 1)	0.15	0.36
Traditional	If use magazine, television and radio media for adverting (= 1)	0.10	0.30
Manager's characteristics			
Male	If a male manager (= 1)	0.91	0.29
Age < 40	If manager is younger than 40 years old (= 1)	0.04	0.19
Age 40–49	If manager's age is 40–49 (= 1)	0.12	0.33
Age 50–59	If manager's age is 50–59 (= 1)	0.26	0.44
Age 60–69	If manager's age is 60–69 (= 1)	0.34	0.48
Age ≥ 70	If manager's age is 70 or older (= 1)	0.24	0.42
Agribusiness characteristics			
Family	If a family business (= 1)	0.88	0.33
Unincorporated	If an unincorporated body (= 1)	0.83	0.37
Cooperative	If a cooperative (= 1)	0.03	0.17
Enterprise	If an enterprise (= 1)	0.11	0.31
JA	If owned by Japan agricultural cooperative (= 1)	0.01	0.11
Others	If owned by other corporation bodies (= 1)	0.02	0.13
Employees	Total number of employees in factory (person)	2.42	19.69
Geographical locations and internet use rate in the local area			
Urban	If located in urban area (= 1)	0.22	0.42
Flatland rural	If located in flatland agricultural area (= 1)	0.25	0.43
Middle rural	If located in middle agricultural area (= 1)	0.32	0.47
Mountainous rural	If located in mountainous agricultural area (= 1)	0.21	0.41
Farmers' market	Number of farmers' market in the local area	470.03	282.73
Internet rate (%)	Internet use coverage rate in the local area	75.26	4.66
Media time	Average time spent on media reading in the local area (minutes)	114.36	10.22

JA – Japanese agricultural cooperative

Source: Authors' own calculations based on the Census Survey of Agricultural Industrialization (2010)

served decisions of the farm to use these two marketing strategies, respectively; y_i – observed sales value of the farm; X_i – vector that contains common exogenous factors that are associated with agribusiness performance and the choice of advertising strategies. Z_{1i} and Z_{2i} – exclusion variables that are directly associated with an agribusiness firm's choice of advertising strategy but not its agribusiness performance; $\alpha_1,\alpha_2,\alpha_3,\beta_1,\beta_2,\beta_3,\gamma_1,\gamma_2,\pi_1,\pi_2$ – parameters of interests (vectors). In particular, π_1 and π_2 capture the effect of the use of the two advertising strategies on a farm's sales value. $\varepsilon_{1i},\varepsilon_{2i},\varepsilon_{3i}$ – random errors, assumed to follow a multivariate normal distribution $\varphi(0,\Sigma)$ with zero mean and constant covariance (vectors). Consistent parameters can be obtained by using the maximum log-likelihood method. The following log-likelihood function is employed to estimate our results (Greene 2018).

$$\log L = \sum_{i=1}^{n} \log \Pr(D_{1i}, D_{2i}, y_i) \times d_i \quad (2)$$

where: d_i – specific regime that each individual may fall into (dummy indicator).

It should be noted that the use of exclusion variables Z_{1i} and Z_{2i} specified in Equation (1) differs from the conventional instrumental variable model. While ex-

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clusion restrictions are required in linear instrumental variable models, the non-linear identification criteria in Equation (2) is met due to non-linearity in the functional form inherent in the distributional assumption for the error terms (Greene 2010). In the advertising strategy equations, we include the variables reflecting the media advertising availability in the local area. We do so to increase the statistical power in model estimation. The direct impact of regional economic conditions on media use has been documented in previous studies (Del Barrio-García et al. 2019). These variables provide direct incentives to agribusiness firms to deploy advertising media, but they are not directly associated with agribusiness performance.

RESULTS AND DISCUSSION

The empirical results of the simultaneous equation system are presented in Table 3. First, we justify the specification of the simultaneous equation system by conducting a Likelihood Ration (LR) test to detect whether the three error terms are statistically correlated. The chi-squared test value under the null hypothesis is 744 which shows that all the error terms are statistically uncorrelated, which is rejected under the 5% significance level. Concerning the error correlations between advertising strategy and agribusiness performance, we find a significant and negative error correlation with a *P*-value of 0.072 between the digital

Table 3. Maximum-likelihood estimation of the simultaneous system (n = 8 000)

Variables	Advertising strategy				Performance	
	digital	SE	traditional	SE	ln sales	SE
Digital	–	–	–	–	0.509**	0.227
Traditional	–	–	–	–	0.265	0.263
Internet rate	0.007*	0.004	–	–	–	–
Media time	–	–	0.002	0.002	–	–
Male	–0.206***	0.056	–0.163***	0.060	0.093	0.058
Age 40–49	–0.026	0.087	–0.096	0.093	0.063	0.095
Age 50–59	–0.291***	0.083	–0.238***	0.088	–0.091	0.091
Age 60–69	–0.616***	0.083	–0.484***	0.089	–0.140	0.094
Age ≥ 70	–1.005***	0.092	–0.795***	0.098	–0.295***	0.099
Family	–0.369***	0.061	–0.395***	0.066	–0.396***	0.068
Cooperative	0.383***	0.100	–0.065	0.117	0.059	0.109
Enterprise	0.613***	0.060	0.332***	0.066	0.487***	0.073
JA	0.084	0.179	–0.474*	0.262	0.059	0.150
Others	0.078	0.137	0.359***	0.134	–0.113	0.131
Employees	0.000	0.001	–0.001	0.001	0.004***	0.001
Flatland rural	0.042	0.055	–0.024	0.059	–0.070	0.048
Middle rural	0.065	0.052	0.070	0.055	–0.131***	0.045
Mountainous rural	0.056	0.057	0.077	0.060	–0.261***	0.050
Farmer's market	0.122*	0.066	0.150**	0.069	–0.07	0.059
Constant	–0.831**	0.337	–0.855***	0.263	3.722***	0.144
Scale (σ_i)	–	–	–	–	0.376***	0.009
Error correlations (ρ_{ij})						
Traditional	0.799***	0.033	–	–	–	–
Sales	–0.143**	0.072	–0.112	0.079	–	–
Log likelihood	–19 285					

*, **, ***Denote 10, 5, and 1% significance levels, respectively; JA – Japanese agricultural cooperative; ln sales – sales value per factory area measured in m^2 (USD/m^2) in log

Source: Authors' own calculations based on the Census Survey of Agricultural Industrialization (2010)

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advertising adoption and farms' sales value. Similarly, endogeneity is found in the error term (*P*-value = 0.033) between digital advertising and traditional advertising. We find that the adoptions of digital and traditional advertising in an agribusiness farm are correlated.

Results reported in Table 3 show that agribusiness farms that used digital media advertising have their sales value higher by 50.9% than their counterparts of non-users, *ceteris paribus*. On the contrary, insignificant result of the association between traditional advertising and sales value is found. This result may reflect the fact that local internet penetration rate can affect both supply and demand sides of agriproducts. On the supply side, agribusiness farms located in a higher local internet penetration rate area can be familiar with information technology, which directly enhances their performance. On the demand side, residents living in such an area can access agriproducts across geographical borders easily, which can result in a negative impact on local agribusiness performance. Therefore a higher local internet penetration rate can impact agribusiness farms' sales values positively or negatively. To examine this, we replicated model with local internet penetration and time spending on media in all equations. We also re-examined sales equation by including prefectural dummies as suggested by anonymous reviewers. As a result, the coefficients on digital and traditional advertising in the additional specifications are qualitatively consistent with our main results reported in Table 3.

One possible explanation of the superiority of digital advertising over traditional advertising as reported in Table 3 is as follows. First, unlike traditional advertising that delivers a message to the general public including unintended audiences, digital advertising has a superior ability to target prospective customers who are receptive and intending to purchase products (Bergemann and Bonatti 2011). Take organic food as an example. Due to the higher price and product customization of organic food, its distribution channel is limited. Thus, digital advertising can be customized to respond to consumers' preferences and promote sales, while traditional advertising can be an unsolicited sales practice. Second, digital advertising is ideal for the promotion of specific products that may encounter legal restrictions in traditional advertising media (Goldfarb and Tucker 2011). Therefore, digital advertising provides a good platform for producers to promote agricultural or food products with significant characteristics of local areas. Third, digital advertising has impacts on offline to online sale. This is likely to infer the case of agribusiness farms, considering the heavy nature of agro-foods. Agro-foods consumers may purchase preferred products at brick-and-mortar and turn into a loyal online purchaser.

Other factors are also significantly associated with agribusiness performance, including the principal operator's age, ownership, status, and the number of employees of agribusiness farms, as well as geographical factors. The elderly principal farm operator whose age is greater than 70 performs worse than a younger operator in his/her 20s or 30s. This result reflects that younger farmers work more efficiently than older ones, whereas older farmers are more experienced and knowledgeable in managing farms (Thirtle and Holding 2003). Concerning the ownership variable, the result exhibited a lower performance in family-owned agribusiness farms than in non-family businesses. Moreover, the agribusiness enterprises performed better than unincorporated ones and the number of employees is positively related to agribusiness performance. These results are in line with previous studies (Welsch 1993; Astrachan and Kolenko 1994) and echo Japan's national agricultural policy to promote the incorporation of family farms. Lastly, the agribusiness location is crucial for performance as well. Disadvantaged location (reference group is an urban area) has impeditive effect on performance of 13.1% in the middle rural areas and 26.1% in mountainous rural areas. This is attributable to the problem of the environment affecting agribusiness management on the value chain from crop production to transportation of agriproducts to markets.

With respect to the factors associated with adoption of advertising strategies, results reveal that the gender and age of the principal farm manager, ownership, and status of agribusiness farms are significantly associated with the use of digital and traditional advertising. The significant and negative coefficients in case of male operators, in both scenarios, indicate that female operators are more salient in adopting advertising strategy than male operators. This can be attributed to the expressive trait of women (Palan et al. 1999). They value communication and relationships with customers via the internet more than male farmers. Age is identified as a crucial factor for advertising strategy. We find that younger operators are more likely to advocate digital advertising than elder operators. This is because they are exposed to digital gadgets and innovation during the early stage of their learning process, while the elderly did not have that opportunity. We also find that a family-operated agribusiness farm is a non-advertis-

https://doi.org/10.17221/393/2020-AGRICECON

ing user; it is less likely to use any advertising media. Lastly, the status of agribusiness farms reflects their financial capacity, and also their different choice of behavior in terms of advertising media.

The above findings provide insights into agribusiness farms in Japan. The principal operators in their 70s are resistant to any advertising media, which can result in lower performance. Similarities are shown in family-owned agribusiness farms; the farms are rarely exposed to any advertising media and thus hamper their development. These results highlight the plight of the majority of agribusiness farms in Japan: an ageing and unincorporated family-operated agribusiness farm lacks human capital to dissimilate into the digital era in which seller and buyer communicate via internet. Therefore, such agribusiness farms experience decline in sales value. We also find that the impact of advertising strategy can affect farms' sales value for farms with different characteristics. Thus, we conduct heterogeneity analysis by three business characteristics including the ownership, location, and legal status that have been well studied in the literature (Welsch 1993; Astrachan and Kolenko 1994; Tchakoute-Tchuigoua 2010; Ali 2016).

Table 4 presents the coefficients of the two advertising media on agribusiness farms with three differentiated attributes. Results show that the impact is not homogeneously distributed among agribusiness farms. The positive and significant coefficients of digital advertising on family-owned, unincorporated, and remotely located agribusiness farms indicate that digital advertising benefits these agribusiness farms. These results are consistent with previous studies which documented that the internet can reduce fixed and variable costs associated with geographic distance, such as the landline and utility costs of agribusiness farms and the transportation and communication costs from the production site to the urban area (Bell et al. 1998; Muto and Yamano 2009; Aker and Mbiti 2010; Martin and Abbott 2011).

Table 4. Heterogeneous effects of advertising choice on performance by agribusiness characteristics

Group	*n*	Digital advertising	Traditional advertising
Family	7 015	0.622**	0.135
Non-family	985	–1.225***	–0.172
Corporate	1 347	0.381	0.462
Not-corporate	6 653	1.212**	–1.366***
Urban	1 776	–0.972**	0.844**
Non-urban	6 224	0.551**	0.182

**, ***Denote 5% and 1% significance levels, respectively; the other variables are controlled in all sub-samples

Source: Authors' own calculations based on the Census Survey of Agricultural Industrialization (2010)

On the contrary, traditional advertising presents an insignificant increase in sales values for most of the agribusiness farms. In particular, it places a significant burden (137%) on the sales value of unincorporated agribusiness farms. Nevertheless, it imposed a distinguished impact on an increased sales value of 84% among urban agribusiness farms. Moreover, ownership as a whole is unassociated with the effect of traditional advertising.

Table 4 reveals intriguing results. Agribusiness farms should take into account idiosyncratic attributes on internal and external factors in their advertising strategy. For majority of agribusiness farms in Japan, digital advertising is a wiser choice, whereas non-family and urban agribusiness farms are the two exceptions. Urban agribusiness farms should solely opt for traditional advertising. On the other hand, family-operated and non-urban agribusiness farms should prioritize digital advertising if they have any constraints in financial and human resources on handling advertising activities.

CONCLUSION

This study evaluates the differential impact on agribusiness performance of the digital and traditional advertising among agribusiness farms. Using a unique sample of agricultural processing farms in Japan, we find a positive impact of digital advertising on farmers' sales value. Gender, age of the principal farm manager, and business characteristics of the farm are associated with farms' adoption of advertising strategies. Moreover, family-operated, unincorporated, and rural agribusiness farms benefit more if digital transformations are realized. Urban farms, on the contrary, should only use traditional advertising for product promotion.

Some policy implications can be inferred from this study. Transformation of family-operated, unincorporated, and remote agribusiness farms to e-companies remains a pressing issue, as they represent the ubiquity of agricultural operations in Japan who do not operate digitally. Given the fact that the agricultural sector is ageing but its manufacturing and commercial sectors are highly industrialized, affiliating agribusiness farms with industries or universities and subsequently integrating the agribusiness practices in digital operations could offer an efficient solution. In addition, corresponding complementing measures such as in-

https://doi.org/10.17221/393/2020-AGRICECON

troduction of computers and internet in extension educations toward agribusiness operators should be taken into consideration for the sustainable operation of agribusiness farms. Furthermore, female and younger operators are more willing to adopt internet in the farm business, and retaining the youth (or the next generation of the agribusiness farms) and empowering women labor force in the agriculture to rejuvenate rural areas is important. Lastly, the promotion of incorporation of farm management in Japan since 2013 can benefit the digitalization transformation of the agricultural industry in the long-run.

On the other hand, traditional advertising benefits urban agribusiness farms. Unlike rural agribusiness farms that need digital advertising to expand the geographical spectrum of customers, urban farms are in spatial proximity to tourism in the urban area, and thus allocating more resources on traditional advertising to approach urban customers could be a wiser alternative. Moreover, since traditional advertising has a longer lifespan than digital advertising, agribusiness farms are encouraged to develop their own brand and deliver directly a positive brand image to customers via traditional advertising.

Some caveats remain in this study. First, this study used the cross-sectional dataset of a 2010 census survey (Census Survey of Agricultural Industrialization 2010), which is unable to confirm the causal effect of digital advertising on agribusiness performance. Nor does it allow for observing the structural change in advertising choices of agribusiness firms. Second, the effect of word-of-mouth (WOM) and e-WOM on agriproducts deserves more attention in future studies. Third, we did not take into account the main ingredients of the agriproducts, which have different advertising initiatives. The data available, however, constraint the possibility of these further investigations.

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