EXAMINING THE SOURCES OF SMALLHOLDER HORTICULTURAL FARMERS EXCLUSION FROM FORMAL URBAN MARKETS IN ZIMBABWE: *THE CASE OF CHIHOTA COMMUNAL AREAS*

Bindu Samuel[1]
Chigusiwa Lloyd
Department of Economics, Bindura University of Science Education

Abstract
The study seeks to establish why some smallholder horticultural famers in Chihota communal areas market their produce in communal markets which are known to generate less revenue for any given quality and quantity of produce than urban formal markets. It uses primary data collected from 119 farming households randomly selected from four villages that were selected on the basis of horticultural intensity. MLE technique through logit analysis is used to establish the determinants of smallholder horticultural farmers' exclusion from formal urban markets. The results show that while diversification and household size reduces participation in urban markets, having own transport, input use, land size, age of the household head and access to information increase farmer participation in urban markets. Policy to improve SHFs participation should thus increase specialization, transport availability, input use and information access to SHFs.
Keywords
Smallholder horticulture farmers, communal markets, market exclusion

1 Introduction

At independence, in 1980, the new Zimbabwean majority government prioritized correction of developmental imbalances created by the colonial regime (GoZ, 1982). Chief among the priorities of the new government was black empowerment and rural development. Rural development was a priority since most of the black majority lived in reserve and tribal trust lands which are now known as communal areas[2]. Most of these communal areas had lagged behind in development due to the reserve status accorded to them. The new government prioritized eradication of rural poverty, famine and rural illiteracy (GoZ, ILO, 2007). This saw the initiation of government backed rural projects and establishment of cooperative societies to mitigate rural unemployment. At the time of their formation the government hoped that in the long run these projects will be viable and self sustaining. Projects initiated included cattle ranching cooperatives in communal areas further from Harare like the heifer project in Wedza and Chivhu.

In areas within 60km from Harare the government initiated smallholder horticultural farming (SHF) with market gardening being the prime activity in areas like Chihota, Domboshava and Musana. In the first decade of independence to 1990, there was increasing optimism on the part of policy analysts and researchers in the ability of SHFs to provide answers to rural poverty. This optimism was premised on the following reasoning. Firstly, the rate of growth of Harare and Chitungwiza in the early decade of independence meant that for areas closer to Harare there was going to be sufficient demand for the fresh horticultural produce since there was a large non-farm population. Secondly, there was less probability of competition from large scale horticulture farmers in the early decades. Given the dualistic nature of horticultural farming in Zimbabwe, large scale horticultural farmers were expected to supply restructured markets and export markets leaving adequate urban demand to SHFs. Thirdly, the rural focus by the new government ensured infrastructural development which improved road network thus improving

[1] Contact details: phone +263 773 973 585, email: tawandabindu@gmail.com P bag 1020, Bindura, Zimbabwe
[2] over 75% of the black Zimbabwean population lived in communal areas by 1980

access to markets and reducing transport cost. Above all, the establishment of rural extension services ensured timeous provision of production related advice to the SHFs.

With everything seemingly in place for SHFs to be viable and self sustaining and to provide answers to rural poverty in areas that it could be practiced, more than three decades after its inception the facts on the ground have not been very encouraging. Proctor *et al.,* (2000) noted that the success story of Zimbabwean SHFs seems very over exaggerated. He noted that there are sustainability and viability problems in areas that were thought to be having the highest potential. Infact, he observed high prevalence of rural poverty, famine and malnutrition in Musana and parts of Murewa. Made (2003) argued that the major problem that these SHFs are facing is unavailability of marketing channels. Poulton *et al.,* (2002) also argued that SHFs suffer significant losses due to poor marketing strategies and exclusion from some market which result in low produce price that cannot sustain horticultural activities.

Horticulture Information Centre[3] (2012) observed four different marketing channels (discussed below) available to horticultural farmers. They observed that SHFs, by their nature, are mainly limited to two marketing channels which are selling at urban market places and communal market places. They also observed that the former yields two to three times higher returns than the latter yet a significant and increasing number of SHF use the latter. Agbola *et al.,* (2010) argued that reliance communal markets pose major sustainability problems to SHF since the returns are generally low to sustain their projects. This study seeks to find out why some smallholder farmers in high potential areas like Chihota communal area remain excluded from urban market which yields higher returns.

The current study is important because even though urban market places are not the global maximum, SHFs are likely to get more rewards from urban markets than those that they can get from communal markets. This will give them financial resources to expand and transform their businesses which might provide answers to viability problems. It is only when we understand why these SHFs are excluded formal urban markets that we can advice policy on how they can be encouraged to sell at more rewarding formal urban markets.

1.1. Overview of SHF marketing channels in Zimbabwe

Smallholder horticulture farmers in Zimbabwean communal areas are faced with four possible channels to market their produce namely selling to restructured markets[4], formalized urban horticultural market places, selling to large scale farmers and selling at rural service centers and road side marketing (HIC, 2012). Bindu *et al.*, (forthcoming) observed that the two main channels exploited by SHFs in Zimbabwe are formalized urban horticultural market places and road side and rural service centre marketing. He argued that even though selling to restructured markets i.e. canners and food processors yield the highest average return to the farmer; most SHFs are too small to supply a constant homogeneous quality that canners usually require. The canners in most cases would want to concentrate on production and as such would prefer to contract large scale farmers (LSFs) and shun SHFs.

[3] HIC is a Bindura university of science education funded project that offers market and marketing information to smallholder farmers.

[4] Restructured markets refer to selling to markets were produce price is determined beforehand. Such markets include food processors, canners and supermarkets

SHFs could also make arrangements with LSFs to supply a certain quality and quantity of their produce to LSF who would then combine them with their own produce to meet their contractual agreements with canners or export markets. In this case SHFs have to synchronize their production schedules to those of the LSFs and accept quality monitoring otherwise they may fail to sell if the LSFs condemn the produce which would pose problems in sourcing alternative market especially if the LSF has an exporting contract. The loss of autonomy and the danger of failing to sell make this marketing channel less lucrative for SHFs who normally fear abuse at the hands of LSFs who would have monopoly power.

By their nature, the marketing channel that is likely to yield more returns to SHFs is selling to formalized urban marketplaces. As these market places are located in urban centers were the majority of buyers are in non farming activities and the growth of urban cities over the past decades SHFs are guaranteed at least a reasonable demand level. SHFs in most peri-urban areas like Chihota, Domboshava, Musana and Masembura target urban markets like Mbare Musika, Lusaka in Harare and Chikwana in Chitungwiza and also Dombotombo fresh produce market in Marondera as well as the Bindura fresh produce market. Poulton (2002) noted that even though these markets are generally large, returns to farmers are very volatile due to unpredictable supply and demand interactions such that these markets generate high return variance throughout the year. If we are interested in the average annual return, however, the excess volatility aspect will not be of much concern.

SHFs also sell at road sides (major bus stops) of major highways that pass through their areas. Similar to that they also sell to vendors[5] who come to their gardens in the communal areas and also at local rural service centers. We shall refer to these selling methods as selling at communal markets. This channel yields the least of average returns because of fierce competition that exist at most communal markets. Supply in these markets is extremely high due to seemingly low transaction costs. Above all, the markets are located in farming areas the bulk of the people around are themselves farmers and thus could not generate adequate demand. Thus there is a case of too many goods chasing too few dollars and thus price competition, with sellers getting desperate and competing themselves into losses. On the overall communal markets are not sustainable not only because of poor returns but also they chew up plenty of production time. Some members of the family should spend the whole day by the road side selling almost on a daily basis thus in families where the marginal productivity of labor is positive then production is likely to fall.

2. Methods

2.1 Study Area

The study will be carried out in Chihota communal areas. The choice of the area is necessitated by the fact that the area provides a significant quantity of horticultural produce. Above all, the areas are located within 60km of Harare and Chitungwiza, two of the largest cities in Zimbabwe, which have a combined population of over 2 million non-farming population (WB 2007). This gives the area a significant advantage of lower transportation cost compared to other areas like Murewa (90km) and Mutoko (140km) which are further from the major markets.

[5] The vendors who are referred to as Makoronyera buy produce from SHF and sell at urban market places, the difference between buy and sell price represent their profit.

Chihota communal area is under Marondera district located in Mashonaland east province, and it is generally flat and low lying. It has poor sandy soils and most of the area is water logged during the rainy season. The poor sandy soils were deemed not suitable for commercial agriculture by the white settlers during the colonial era so even though it was closer to Harare, it was turned into tribal trust land. Market gardening is the major source of livelihood in the area. Households own some gardens which are on average less than one hectare in size. Farmers dig some small dams (Matsime) in their area measuring on average five meters by three meter and two to four meters deep. In some cases a single garden may have more than one dam. Irrigation is done mainly using petrol and diesel water pumps and the small dams will see them throughout the year even though some households will run dry in late spring (late September and October). Crops mainly grown include vegetables (rape, covo, viscose), tomatoes and onions with some growing carrots, cucumbers and butternuts. The main target market for the produce is Mbare Musika and Lusaka horticultural markets in Harare, though some will also sell at Chikwana and Jambanja horticultural markets in Chitungwiza and Dombotombo fresh produce market in Marondera. Worringsomely, an increasing number of farmers market their produce in the communal market. These will sell to motorist driving along Landos-Chibwanda road, at Landos and Mahusekwa business centers. The Landos-Chibwanda road does not link any major cities as such most motorists in this road will be traveling to and around Chihota communal area and as such do not generate any meaningful demand since they will find horticultural produce at their final destinations. Likewise the majority of people at both Landos and Mahusekwa business centre are from the farming communities and neighboring villages and thus do not represent demand.

2.2 Data

Data was collected from a sample of 119 market gardeners in four villages that are the heart of market gardening in Chihota communal are namely Bindu-Nzvere, Mhizha, Rutsate and Chisadza villages. The four villages were chosen by considering the intensity of horticultural activities in the villages. We followed the leads of Omiti *et al.,* (2005); and determined the intensity of horticultural activities by conducting rapid random appraisal of the area. This involved an informative tour of the area and randomly asking traders their villages of origin. We then identified four key informants to assist us in selecting villages were horticulture was the major economic activity. Of the four key informants, two were village heads and two were AREX officers. The table below (Table 1) shows the composition of the respondents per village. Selection of the respondents was based on purposive random sampling since it could allow the researcher to have limited discretion over selection of respondents.

Table 1: Sample contribution per village

Village	Approximated population	Sample (n)
Bindu-Nzvere	170	47
Mhizha	110	36
Rutsate	70	17
Chisadza	90	19
Total	440	119

As shown in the table Bindu-Nzvere village is the largest of the villages included and having about 170 families provides the bulk of the respondents. Infact 39.4% of the final sample was drawn from this village. Likewise, Mhizha village has about 110 households and contributed 36 respondents. Rutsate and Chisadza village which is home to about 70 and 90 households provided 17 and 19 respondents respectively.

As mentioned earlier purposive random sampling was used to select the final respondents and structured researcher administered questionnaires were used to draw information from the respondents. Researcher administered questionnaires were preferred since they allow the researcher to get the all the information he would require. Moreover it enables the researcher to explain unclear areas to the respondents.

2.3 Modeling techniques

The study seeks to establish why some smallholder farmers in Chihota communal areas are excluded from formal urban markets. The dependent variable here is a measure of exclusion from urban market. Since the dependant variable is not numerical a binary variable is created which takes value of 1 when the farmer sells his produce in urban markets and value of 0 otherwise.

In cases where the dependent variable is discrete, Maximum Likelihood Estimation (MLE) techniques are preferred to Ordinary Least Squares (OLS) because the latter breaks down, thus causing serious inference problems (Gujarati, 2003; Cramer, 2001). MLE techniques allow estimation of the parameters in an equation which has a binary dependent variable, yielding estimates that are consistent and asymptotically efficient (Cramer, 2001).

2.4 The Empirical Model

We begin by assuming that the formal urban horticultural market participation function is stochastic and is of the form:

$$y_i = \mathbf{x_i}\boldsymbol{\beta} + \varepsilon_i \qquad (1)$$

where y_i is a binary outcome; (Awoyinka, 2003).

Logit models used for modeling binary outcomes are often expressed in terms of a latent variable specification. This assumes that there is some continuous variable y^* that determines urban horticultural market participation. This latent variable is modeled by a linear regression function of demographic, cultural and socioeconomic characteristics of the farmer and the market characteristics represented by vector x:

$$y_i^* = \mathbf{x_i}\boldsymbol{\beta} + \varepsilon_i \qquad (2)$$

This latent variable is not observable. What is observed is the binary variable y, that is, a farmer participating or not participating in urban markets. The binary variable is defined by

$$y_i = \begin{cases} 1 \; if \quad y_i^* > 0 \quad and \\ 0 \quad otherwise \end{cases} \qquad (3)$$

The probability that y = 1 given **x** vector of variables is thus given by:

$$P(y_i = 1 | \mathbf{x}_i) = P(y_i^* > 0 | \mathbf{x}_i) \quad (4)$$

Substituting equation (2) into equation (4) gives:

$$P(y_i = 1 | \mathbf{x}_i) = P(\mathbf{x}_i\boldsymbol{\beta} + \varepsilon_i > 0 | \mathbf{x}_i)$$

$$= F(\mathbf{x}_i\boldsymbol{\beta}) \quad (5)$$

By assuming that ε follows a logistic distribution, F becomes a cumulative distribution function for the logit model. To see the partial effects of each explanatory variable on y , marginal effects are computed by taking the partial derivatives of equation (5) with respect to each explanatory variable x (Gujarati, 2003).

By considering our study's objectives, theory and data we specified the following market participation model;

P (PART = 1|X) = F (DIVS, EDU, OWNTR, INPUT, AGE, FAMSIZ, GEN, HHSIZ, NFY, DIST, MIS) (6)

The equation says that the probability of a farmer participating in formal urban markets given observed characteristics X is given by a function F. F is a function of the observed characteristics X. By assuming that the stochastic term follows a cumulative logistic distribution, F becomes a cumulative distribution function for the logit model. Hence, equation (6) is a logit model. The maximum likelihood estimation technique is used to estimate the marginal effects of the independent variables in equation (6).

2.5 Exogenous variables

Diversification measures the number of horticultural crop lines that the SHFs grow in a particular family. Generally, economic theory postulates that diversification spreads risk associated with crop specific losses due to disease outbreak, bad weather or market price volatility. However for SHF, excessive crop lines will reduce viability of individual crop lines given their land size. The present study seeks to find out whether there is a difference in participation for diversifying and non diversifying farmers. For the purpose of current study a dummy variable DIVS is created that assumes a value of 1 if the farmer grow more than 2 crop lines and 0 otherwise. This therefore implies that for our purposes a farmer is said to be diversifying if he grows more than two crop lines.

Education of the household head is expected to increase participation. Makhura (2001) argues that education reduces transaction cost and improves quality of decisions made. Thus more educated household heads are expected to sell in formal urban markets and as such a positive sign is expected. For our purposes however education will be used as a dummy variable. We create a dummy variable EDU which will assume value 1 for completion of ordinary level and 0 otherwise.

Most market exclusion studies use either distance from the market place or transport cost. This is mainly because simultaneous use of the two variables poses multicolinearity problems which might inflate standard errors. In the current study respondents are clustered in the same area such that there will be no adequate variability in the explanatory variable[6]. We thus proxy transport cost, availability and reliability by ownership of own means of transport with the family. We created a binary variable OWNTR which takes a value of 1 if the household has its own transport and 0 otherwise.

It can also be argued that the commercialization mentality of the SHFs can be inferred from production techniques that the farmer adopts. In particular farmers that have more market orientation always seek to improve the quality and quantities that they produce and therefore always seek for modern production techniques. Generally it can be observed that farmers that have a strictly subsistence mentality will be reluctant to use pesticides and fertilizers in their production. This will result in poor quality produce and less output which will restrict them to communal markets if they are lucky to have any excess to sell. In this study a switch variable INPUT is created which refer to use or non use of inorganic fertilizers and pesticides. The variable assumes a value of 1 is the farmer reports that he uses fertilizers and pesticides and 0 otherwise.

AGE is age of the household head. Omiti, (2009) argues that age is a proxy for farming experience which may improve quality of decisions made and also output. In such a case we would expect a positive relationship with participation. Chigusiwa, (forthcoming) however argues that older household heads tend to be accustomed to traditional practices and might be rigid with regard to changing them or adapting to new changes. In such a case a negative relationship is expected.

Farmers with larger pieces of land are expected to produce more output in absolute terms. Given that rural market cannot sustain large output volumes such farmers will be forced to sell in urban markets. Makhura (2011) posits that transaction cost per unit falls as output increases and therefore farmers could find it cheaper to sell in urban markets. For those with small pieces of land output will be restricted and communal markets will be preferred.

Male household heads are expected to sell in urban markets. This is because they have less family responsibilities compared to their female counterparts. As selling in urban centre is normally done by the head, males are more prepared to take the perceived risk of urban markets. Since gender is not numerical a dummy will be created assuming value 1 if the family is male headed and 0 otherwise.

Bigger families are expected to produce more output especially if family members are the sole labor suppliers (Alene *et al.*, 2008). The higher output will thus compel the family to sell in markets that offer capacity and this will force the farmer to participate. Under such situations a positive sign is expected. If however the standard development models[7] assertion that MPL in rural areas is zero is true larger families are expected to sell in rural markets. This is because

[6] All the respondents are within a 20km radius. Transport cost per unit of produce to Harare and Chitungwiza is the same for all the respondents.

[7] Economic development model of dualistic nature such as those by Lewis, Fei-Ranis, etc argues that MPL in rural areas is zero. See Todaro

excess labor will be transferred to road side or growth points thus a negative sign will be expected.

Households that have some sources of income other than form gardening are expected to participate. Bindu (forthcoming) observes that rural markets provide stop gap cashing alternatives to fill the gap between successive urban marketing intervals. Under such circumstances a positive relationship between participation and non gardening income is expected. It should also be noted that if the non horticulture income reduces labor available to gardens the relationship could be negative. A variable NFY is created which takes a value of 1 if the family reports having about a third of their household income from non gardening sources and takes a value of zero otherwise

Most studies use distance to the city markets[8]. In the present study we shall use distance to rural markets such as major highways and shopping centers. Households further away from these rural markets are expected to incur more transaction cost and hence more inclined to supply urban markets.

Availability of information is expected to affect decision making. Since the variable is not numerical a dummy will be used which assume value of 1 if these farmers are affiliated to any MIS organization such as HIC and 0 otherwise

3. Results

Table 2: Descriptive summary of SHF household characteristics

Characteristic	Description
DIVS	About 46% of the respondents grow more than two crops at a single time and thus diversified. The maximum number of crops grown is six and the minimum is one.
OWNTR	Only 9 households have own transport to urban market representing just below 7.6%
INPUT	73% of the population use inorganic fertilizers and chemicals.
AGE	The average age of the respondents was 42.3 years, infact 63% of the respondents were aged between 38 and 45 years
EDU	Just over 84% of the respondents completed their ordinary level
GEN	73.2% of the households were male headed
HHSIZ	The average size is 5 inclusive of the parents. The maximum observed is 11 in an extended setup and the minimum is two
NFY	34% of the households reported that gardening contributes less than 50% of their monthly income. 22% reported that over 90% of their income come from gardening
DIST	The longest distance to a major highway or shopping centre is 6km. the average distance is 2,23 km

[8] For example Omiti et al, 2009, Alene et al., 2008, Zivenge et al., 2012

MIS	14% of the respondants reported to be belonging to horticultural related organization that offers information and advice
LNDSIZ	The average land size is about 0.52ha the maximum is 1.3ha and minimum is 0.1ha

We carried out multicolinearity and diagnostic test of equation 6 and found out that own transport and NGY has a correlation coefficient of 0.845 which presents multicolinearity. Multicolinearity will tend to inflate the standard error thus we shall drop NLY[9] . The model was checked for specification, goodness of fit and predictive power. The reset test was used to test for misspecification at the 1% significance the null hypothesis that the model is mis-specified is rejected. To interpret the results of the model meaningfully, it must be ascertained that the model estimated fits the data. The Hosmer–Lemeshow χ^2 statistic is used to ascertain that the model fits the data. The results show that it was insignificant. The marginal effects for the models are presented in table 3. A test for predictive power of each model was conducted using a STATA 10 command. The model has a predictive power of 58%.

Table 3: Results of logit regression

Characteristic	**coefficient**	**Standard error**	**Probability**
Diversification	-0.076036**	0.026925	0.0102
Education	0.156269	0.171771	0.4357
Own transport	0.108114***	0.014517	0.0000
Input use	0.003129**	0.001250	0.0211
Age	0.084356*	0.044158	0.0698
Gender	-0.13852	0.261490	0.6019
Hhldsiz	-0.05227**	0.024597	0.0436
Distance	-0.336208	0.236906	0.1693
MIS	0.274954**	0.101748	0.0127
Landsize	0.84356*	0.044153	0.0698
Diagnostics			
Reset χ^2		0.24	
Hosmer-Lemeshow χ^2		12.92	
Percent Correctly Predicted		58.21	

[9] See appendix B

3.2 Interpretation and discussion

The results of the logit regression model are presented in table 3 above. The results show that seven of the ten characteristics used in the model represent sources of exclusion from urban market. It show that for the area under study education, gender and distance to communal markets are not statistically significant at 10% significant level and thus do not affect SHFs participation.

Small holder farmers that diversify their production lines are 7.6% less likely to sell in urban market places as shown by the coefficient of -0.076 which is statistically significant at 5%. This implies that famers who do not specialize in certain crops are likely to sell their produce at communal marketplaces. This finding contradict the earlier finding by Agbola *et al.*, (2010) who found that farmer who have several production lines will participate more in urban market places in Nigeria. The probable reason for this result is that since SHF has small pieces of land such that growing a variety of crops will reduce individual crop output such that the output is too small to sustain urban markets.

The empirical results also suggest that farmers who have their own transport to ferry their produce are more likely to participate in urban markets. In particular the results indicate that having your own transport increases the probability of participation by 10.8%. This finding reinforces the results of Baloyi (2010) and Chakazunga (2009) that transport availability and cost is a major source of market exclusion for most SHFs. Specifically, most farmers in the current study reported delays in sourcing transport and mere unavailability of reliable transport for their perishable produce as the major reason for their communal market preference.

It is also interesting to observe that input use does significantly determine market choice. As discussed earlier input use proxy the commercialization preference of the farmer. The model results show that farmers who use artificial fertilizers and chemicals are 3.1% more likely to choose urban markets. The finding suggests that input use improves the farmers' productivity and thus force the farmers' preference towards urban markets that generate sufficient demand for their produce. The result also posits the smallness cycle were low revenue from communal markets incapacitates the farmers to get inputs and the cycle feeds on itself.

The results also show that age of the household head affect market choice of the household. Specifically, the elderly heads are likely to participate in urban markets. The result is line with Alene *et al.*, (2008) who argues that age proxies farming experience and the quality of decision made which improves productivity and force farmers to urban markets. The result also means that older households are more financially stable and this reduces incidences of quick cash demands which are the major reason for communal market preference.

Interestingly households' size negatively affects urban market participation. The model predicts that smaller families are likely to participate in urban market whilst larger families normally prefer communal market. Two probable reasons for this finding are suggested here. Firstly the development theories assertions are validated here i.e. MPL in larger communal families is zero such that their numbers do not translate to improved production. Secondly, larger families consume a significant part of their output in own subsistence leaving very little for marketing. More so, the temptation to market at road side is high given the availability of excess labor within the family to man road side merchandise all day.

MIS is also an important determinant of market choice. Apparently belonging to horticultural support organization increases the probability of the SHF participating in urban markets. This reinforces the view that efficient provision of MIS improves farmers' productivity.

4. Conclusions and recommendations

The study seeks to establish why some SHFs in Chihota communal areas are excluded from urban formal markets. As discussed earlier, though selling at formal urban markets is not the best in terms of horticultural revenue generation, given the nature of SHFs it shows greater commercialization than communal markets. As the results of the study shows, the major determinants of market choice for SHFs in Chihota are discussed above. This therefore implies that effort to improve SHFs participation in urban markets should address these determinants. In particular informative workshops should be conducted by AREX extension officers to improve specialization since results have indicated that farmers who grow a limited crop range are likely to participate in formal markets.

The government can also though ARDA provide cheaper and reliable transport services to the farmer. As indicated by our findings transport ownership which was used to proxy availability and reliability determines market choice. Thus organizations such as ARDA could fill the gap by providing cheap and reliable transport. Efforts should also target improved input use to increase commercialization. Government can initiate input credit schemes to improve input availability such that input use can be improved. As for commercialization mentality workshops could also be of assistance especially though extension services where farmers could were benefits from input use could be demonstrated.

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The views expressed in the paper, however, are solely those of the authors and do not reflect the opinions of the above mentioned groups.

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