

HOW SUGARCANE FARMERS CHOOSE TRACTORS: A QUALITATIVE APPROACH

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ABSTRACT

This paper assesses the criteria sugarcane farmers use when choosing tractors. Through a qualitative approach, this study exposes for what activities tractors are destined at the farm, what attributes farmers seek in the tractor/dealer and which attributes define their purchase, comparing farmers' and specialists' opinions to assess the gap between reality and expectation. The results show that specialists' expectations were usually aligned with farmers' buying behavior and also the importance of both tractor and dealer's attributes in winning farmers' purchase decision.

Keywords: farmer's buying behavior, tractor purchase, agricultural equipment purchase, attributes evaluation

1. INTRODUCTION

The complexity of the activities that sugarcane producers must perform on their farm business during the whole production process limits the time available to evaluate the best options regarding the purchasing of tractors, although this process is closely related with other business activities, influencing short and long term profitability.

Therefore, the study of the evaluating behavior of sugarcane producers is relevant especially for the agricultural machinery industry and its distributors, since they support producers on a regular basis, performing not only sales transactions of capital goods, spare parts and its related maintenance services, but also providing financial services and scientific expertise so farmers can manage the production process more effectively and efficiently (Burgert 2011).

Understanding these aspects is important to establish an optimal value offer of capital goods, services and other technological packages which are associated to many farm businesses. Therefore, this paper will also aim at comparing farmers and farm machinery industry specialists' views on how sugarcane farmers choose tractors, in order to investigate if the industry understands farmers' needs.

This paper's contribution to the related literature should also be highlighted, since there are no similar studies focusing sugarcane producers evaluation of tractor's attributes in the Brazilian scenario until the writing of this paper.

2. RESEARCH PROBLEM

The goal of this study is to understand what criteria sugarcane producers use to evaluate different brands of tractors, comprising three dimensions: the tractor, sales of spare parts and maintenance services offered by farm machinery dealers.

2.1. OBJECTIVES

Assessing how sugarcane farmers choose tractors is this paper's main objective, being the specific objectives the following: a) understand to which activities the tractors are designed at the farm; b) define the main sugarcane farmer's expected benefits regarding tractors and dealers; c) compare farmer's, dealer's and manufacturer's views upon the tractor buying process; d) decompose the tractor into a bundle of attributes.

3. PREVIOUS RESEARCH

This section intent is to provide the reader a background to understand farmer's and supplier's relationships, embracing concepts that are the foundations of this research, such as B2B commerce main characteristics and farmer's buying behavior.

Several researches focus on how farmers choose inputs, services and capital goods. Although this literature review can be extended we may mention Funk and Tarte (1978), Kool (1994 and 1997), Gloy and Akridge, (1999), Boehlje et al. (2005), Alexander et al. (2008), Feeney et al. (2011), Roucan-Kane et al. (2011), Borchers et al. (2012), Feeney and Berardi (2013), Scare and Antolini (2013).

In this article, the farmer buying behavior is viewed as one having both final and industrial consumer's characteristics, perspective also adopted by Kool (1994). Regarding the industrial characteristics, it's important to notice the close relationship between supplier and customer, because since the supplier has fewer clients and those clients have higher power than those in B2C, suppliers seek to deliver customized offers in order to satisfy specific needs of their clients, according to Kotler and Keller (2006). In fact, dealers play a critical role for complex product sales, creating consumer knowledge of the products and working with them to discover the best solution (Akdenis et al. 2010). Turnbull and Leek (2005) also note that industrial clients are not passive; they search and interact continuously with selected supplier, claiming for customized products.

Another aspect regarding industrial buying behavior that should be noticed is that in recession periods, there are few options for suppliers to stimulate the total environment demand, so they always have to be alert to the market conditions, according to Hutt and Speh (2002). In the tractor scenario, for instance, when the economic environment is not favorable farmer's willingness to buy tractors will decrease because of their concern with the farm's financial health, but dealers may still try to overcome this situation with spare parts and maintenance services, since farmers will need to keep their tractors running.

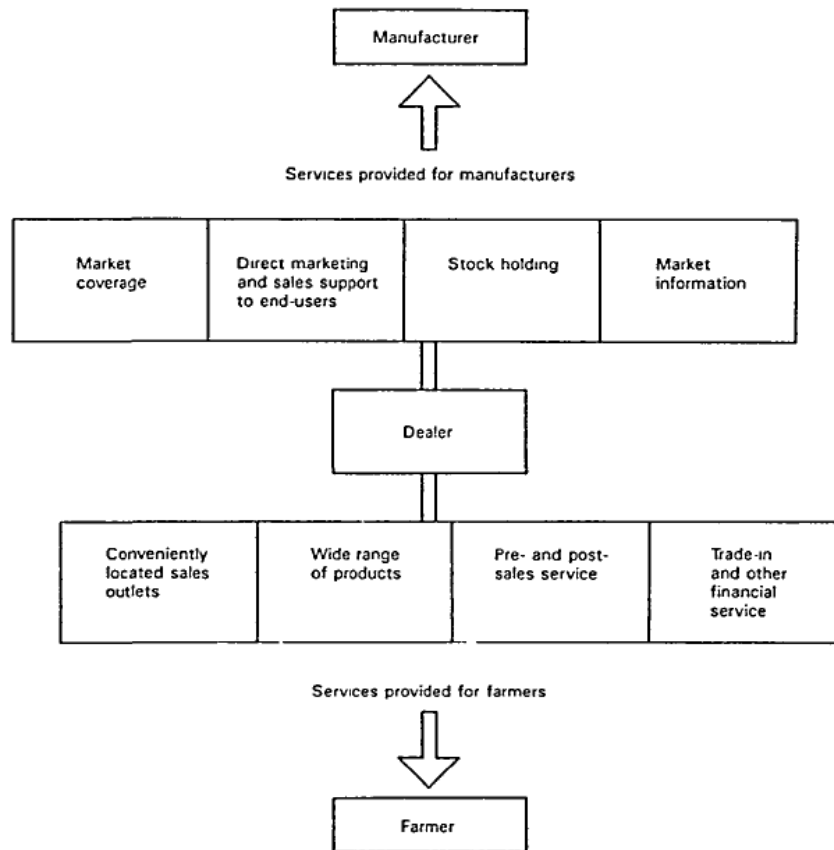
Concerning the final consumer's characteristics, Foxall (1979) discusses that farmers' purchase decisions are also strongly influenced by a range of social and psychological factors, and there is a clear expectation among economists and marketing managers about farmers' desire for social status and prestige, exerting a considerable influence on their buying decisions. Sivakumar and Kaliyamoorthy (2014) confirm this expectation in their study, stating that reference group influence is one of the most influencing factors when buying a tractor. Tractors' central role in many farm operations often gives this product the main status symbol of the agricultural enterprise (Cavallo et al. 2014).

Tractors are products with high aggregated value and cost, so this buying activity should require what Peter and Olson (1993) call an extensive problem solution approach, demanding extensive alternatives searching and high behavioral and cognitive efforts. The problem is that farmers seldom have the amount of time necessary to conduct an extensive research, because they are also responsible for many other different activities in the farm. Kool (1994) argues that the way they try to simplify their purchase tasks and reduce their perceived risk is successively buying from the same supplier.

Kirkup and Anderson (1987) highlight the dealer's importance in the farm machinery industry, arguing that almost all farm machinery is marketed by manufacturers via independent dealers; also, these products represent complex, multi-dimensional purchasing decisions, normally requiring the farmer to make trade-offs among product attributes and dimensions of dealers' customer service. These reasons give dealers a strong responsibility for industrial producers' marketing efforts success.

Dealer's vital role in this industry is dual, serving both the manufacturer and the farmer, providing them the services seen in figure 1.

Figure 1. Schematic View of Agricultural Machinery Dealer Role



Source: Kirkup and Anderson (1987)

Neves et al. (1998) believe there is a dealer tendency to get closer to farmers, in order to improve farmer's satisfaction by offering higher quality services, such as technical assistance, operator's training (basic maintenance and machinery operation), warranty, spare parts and mechanics availability. Dealer's performance is enhanced by competent salespeople and long-term relationships with customers, according to Akdeniz et al. (2008).

The building of long-term relationships involves commitments from both dealers and farmers, and farmer's loyalty towards the dealer occurs due to three main reasons according to Kool (1994): farm inputs usually have a fast technological development and the farmer is not able keep up with these evolutions, counting on the salesman technical knowledge and expertise; many other farm activities that make their purchase decision making time shorter; the convenience of not having to make new choices that demand time and other costs. Walley et al. (2007) found in their study of the UK tractor market that farmers are usually loyal to tractor brands, but Neves et al. (1998) state that farmers in the Brazilian machinery market show no loyalty and future purchase commitment.

The purchase of a tractor, as any other product's purchase, involves consumer's perception about the attributes of what they are about to buy. The final part of the research background addresses the concept of attributes, and its importance for the tractor market. A product's attributes are the characteristics of what is being used, consumed or bought, being the main stimuli that influence the consumer in his purchase decision (Veludo-de-Oliveira and Ikeda 2008; Joas 2002), and every product has more attributes than meet the eye (MacMillan and McGrath 1996).

Peter and Olson (1993) suggest viewing the product as a bundle of attributes, detailing every aspect of what constitutes the product, making it possible to take strategic marketing decisions, such as adding, removing or modifying product's attributes. MacMillan and McGrath (1996) assert that managers must continuously seek the best fit between consumer's needs and the product's bundle of attributes, because consumer's needs change and competitors innovate. Lambin and Schuiling (2012) consonantly state that the modification of current products and launching of new ones are decisions of extreme importance for the company's survival.

Many authors offer various attributes' classifications, like Peter and Olson and their concrete and abstract attributes, or Zeithaml (1988) and hers intrinsic and extrinsic attributes. The problem with these classifications is that they are not focused on the consumer reaction, but rather on the product itself. MacMillan and McGrath (1996), on the other hand, classify attributes according to the level of energy that it generates to the consumer, being more appropriate for a purchase behavior study. Their classification, which will be used in this research, is the following:

- Basic attributes: the ones that the target segment already expects from all competitors, rarely engendering much loyalty or antipathy;
- Discriminator attributes: those that differentiate a product from its competitors. If clients feel positive about this attribute, it's a differentiator; if they feel negative, it will be seen as a dissatisfier;
- Energizer attributes: they are so powerful that not only distinguish a product from others, but often become the basis on which a purchase decision is made if consumers feel positive about it; if they feel negative, this feature will be an enraging that causes customers to flee to competitors.

The present study will then classify sugarcane farmers attribute's perception and compare farmers' opinions with farm machinery specialists' expectations. In the last part, the tractor will be decomposed into a bundle of attributes concerning both product and dealer aspects, in order to help manufacturers and dealers marketing decision making.

4. METHODOLOGICAL ASPECTS AND DATA

Marketing research is a task that consists in the preparation, data collection, analysis and editing of systematic data reports about an specific marketing situation faced by a company, evaluating the needs of new information and providing upper management precise, reliable, valid and current information. Qualitative research is an excellent way to understand customer's perception about a brand or product, providing a better understanding of the problem context (Kotler and Keller 2006; Malhotra 2001).

Given the objective of assessing how sugarcane farmers choose tractors, the use of exploratory qualitative research is adequate because it provides knowledge expansion about a problem, according to Mattar (1996). Semi-structured interviews were chosen as data collection means because they allow the researcher to deepen some of the interviewee answers in order to comprehend his behavior and what led his reaction, an aspect that could not be properly captured by a survey, for example.

Finally, the broad range of activities that a tractor operates in the farm must be considered when studying farmer's buying behavior, for they demand a whole set of distinctive attributes (e.g., a tractor used for applying defensives has different characteristics than one utilized for pulling planters). For this reason, it was chosen the range that covers the higher amplitude of activities in the sugarcane culture, the 110-185 hp range.

4.1. DESCRIPTION OF THE FIELD RESEARCH

Two different questionnaires were made for the interviewees: one for the specialists, and one for the sugarcane suppliers. The purpose of making interviews with those three different audiences is being able to take different views of the same product: Manufacturer Vision, Dealer Vision (intermediary), and the Farmer Vision, which is the final consumer. Research was then divided in two stages:

1. In the first stage, the specialists group was interviewed. This group was composed of specialized upper management staff from John Deere tractor automaker, and also experts of the sugarcane division in the John Deere's authorized dealer Colorado Maquinas, which is based in the most productive sugarcane area in Brazil.

2. In the second stage, after the conclusion of the specialist's interviews, sugarcane suppliers were interviewed. Farmer's interviews were strategically placed after the one with the specialists to provide previous knowledge and allow a better question driving

The scripts were prepared aiming to reap the most relevant information about the purchase alternatives evaluation, making possible to conduct the questions to optimize the collection of information. The script applied to specialists, represented by two John Deere experts and two Colorado (dealer) experts, aimed to characterize the personal and professional respondents and also get information on what they believed to be the reasons that led the consumer to choose a particular tractor brand and dealer. The script applied to the suppliers was more overarching, since it should also take into consideration aspects such as the characteristics of the property, the type of production and the activities for which the purchased tractor was designed.

Interview collection took place during the months of September and October of 2014. Dealer's specialists were interviewed personally, while Deere's specialists had to talk via telephone because of their physical distance and busy agenda. The specialist's interview lasted around 12 minutes.

The farmers were approached during Colorado Maquinas (Deere's dealer) events: six were interviewed personally and only two were interviewed by telephone, because they could not talk during the event. Unlike the specialists, it is important to emphasize farmer's aversion to answer the interview. In order to encourage them to answer, most of the times it was necessary to count on the dealer's salesmen to introduce the interviewer and to ask the farmers to cooperate, although even then some still refused. Farmer's interviews lasted approximately 15 to 20 minutes.

5. RESULTS

Aiming reader's convenience and better understanding, the results are hereby divided in sub-segments.

5.1. SAMPLE'S PROFILE

The farmer's group was entirely constituted of male respondents, being two single and the others married. Concerning their ages, there was a relative heterogeneity, with ages varying from 25 to 67 years; the youngest three (25-28 years) share the farm management role with their fathers and work exclusively on their farms. Only two of them did not have superior education.

Both Deere's specialists had postgraduate education and worked on the strategic level of the organization, whereas one Colorado specialist had undergraduate education and the other only primary education (but with 55 years of experience in the sugarcane market).

5.2. FARM'S PROFILE

Two farms outstood in the sample, having 1,800 and 2,350 ha, while the others had between 230-600 ha. All the farms were situated on the Northeast of the State of Sao Paulo and used soy for crop rotation. Santiago and Rosseto (2014) state that the sugarcane culture benefits from soy crop rotation in various ways: soil conservation, herbs control, indirect plague control, organic matter incorporation and higher sugarcane productivity due to nitrogen biological fixation.

Another aspect worth noticing is that all farmers' production systems consist in planting and cultivating the sugarcane, while it is the sugar mill responsibility to cut, harvest and transport the cane.

Only two farmers had other income sources in their farm – one also planted potato, and the other had beef cattle.

5.3. CONSIDERED BRANDS

Farmers and specialists were asked about which tractor brands they knew had models in the studied range (110-185 hp). For farmers, the objective was knowing which brands they consider when searching for suppliers, and for specialists the purpose was verifying to what extent they knew who were their competitors.

Specialists knew more brands, recalling some that none of the farmers did (e.g., LS, Tramontine, Stara). All farmers and specialists considered John Deere, New Holland and Valtra, and just one farmer forgot about Massey Ferguson. Interestingly, every specialist remembered Case, but only two farmers recalled this brand.

Farmers were then asked about what was their favorite brand: six of them chose John Deere, and two chose Valtra; just one farmer did not buy his favorite brand (John Deere) and bought another (New Holland), showing the importance that brand loyalty plays in their buying behavior. Farmers that chose John Deere as their favorite brand cited as loyalty reasons the clutch's quality, technology, durability, fuel economy and operational mode, whereas the farmers whose favorite brand was Valtra justified their preference because the brand has been in the family for more than 20 years, durability, ease of operation and accessible price.

An interesting fact that must be noted was Valtra's strong presence in farmers' consideration group, being second only to John Deere and much ahead of the other brands (it is important to notice that Deere's overall strength may be influenced by the fact that the farmers were whether clients or prospects of a Deere dealer). After saying what their favorite brand was, farmers were asked what was the last tractor they had bought and if they had compared it with another brand. From the 8 farmers studied, the brand had a tractor considered in 4 cases and had the bought tractor in 2 other cases.

Curiously, the two farmers that bought a Valtra tractor are friends and have their farms in the same city: a small city that only has one dealer, which represents Valtra. Both claimed the tractor low price in their decision and one also said that some friends recommended the brand, an indication of the importance of friends' recommendation and the potential presence of an opinion leader in the region, some of the social factors that Foxall (1979) said that affect farmers purchase decisions (e.g., present and desired group membership, opinion leadership, status and prestige).

5.4. TRACTOR'S OPERATIONS

This section covers the way the studied farmers use the tractors in their property. They were asked about what was the last tractor they had bought (in the studied range) and for what activities they were designed in the farm; the answers compilation can be seen in Table 1. This table contains information about farmers' characteristics, like farm size and tractor model. MF 7180 is built by Massey Ferguson, BH 180 by Valtra and all the others by John Deere.

The first important thing to notice is the tractor's versatility in the farm, being used in various cultures: from the total of 34 activities, only half of them were exclusively sugarcane related operations. Mechanized planting was the most common operation, taking place in 7 of the 8 farms analyzed. Another aspect worth noticing is that the larger farms (1, 2 and 6) mainly destined the tractor for one culture (cane), possibly indicating that as farms get larger, tractors are designed to specific cultures, thus saving time and fuel because of the long distances they would have to travel to operate in another area, therefore enhancing logistically the farm management.

Table 2 provides specialists' expected tractor operations, in order to investigate if they knew what operations the farmers actually did in their farms. They were not asked to differentiate cultures, because many of the operations are redundant and performed in innumerable cultures.

Comparing specialists' and farmers' answers, some discrepancies are observed, such as the fact that specialists expected the tractors to be used in light soil preparation activities (e.g., light disc harrowing), while in fact farmers operated heavier activities (e.g. heavy disc harrowing, subsoiling and stump removal). Some of the lighter operations like plowing, cart pulling, spraying, light disc harrowing etc. may have appeared less than expected by specialists because only two farmers had 110 hp tractors, whereas the others had 165 hp or more, being more adequate for heavier activities. Specialist 2 reinforced the versatility of this tractor range, able to operate various activities in small and medium farms, provided that the implements attached are compatible with the tractor's power.

Table 1. Farmers' characteristics and tractor operations

Farmer's Characteristics Operation	Farmer								
	A	B	C	D	E	F	G	H	
	1,800 ha 6110D (110 hp)	2,350 ha 7185J (185 hp)	550 ha 6180J (180 hp)	270 ha MF 7180 (180 hp)	500 ha BH 180 (180 hp)	232 ha 6110E (110 hp)	600 ha BH 180 (180 hp)	300 ha 6165J (165 hp)	
Manure application	Cane								
Soil correctives application	Cane								
Cart pulling	Soy								
Plague control	Cane								
Triple cultivation	Cane								
Stump removal	Cane								
Middle disc harrowing			Cane/soy	Cane/soy	Cane/soy				
Heavy disc harrowing			Cane	Cane/soy	Cane/soy	Cane/soy			Cane
Land leveling	Soy								
Mechanized planting			Cane/soy	Soy	Soy	Cane/soy	Cane	Cane	Soy/corn
Spraying	Cane								
Subsoiling			Cane	Cane/soy	Soy			Cane	Cane
Furrow making			Cane/soy	Cane/soy	Cane	Cane		Cane	
Infield wagon pulling	Cane								

Source: Author's own elaboration

Table 2. Specialists' expected tractor operations

Operations	Specialists			
	A	B	C	D
Manure application			X	
Soil correctives application	X			
Plowing		X		
Cane loading				X
Cart pulling		X	X	X
Furrow covering	X			
Row crop cultivating	X	X		
Light disc harrowing		X	X	X
Spraying		X	X	X
Rottary cutting		X		
Subsoiling		X	X	
Water tank pulling	X			
Infield wagon pulling		X	X	X

Source: Author's own elaboration

5.5. PURCHASE MOMENT

Tractors in the 110-185 hp range are versatile and utilized in various cultures and operations, as aforementioned. Therefore, it is interesting to precise the tractor's purchase moment and purchase reasons, considering the amount of capital destined to this purchase and the fact that financing in Brazil reaches up to 10 years.

Half the farmers purchased the tractor due to operational reasons: two bought for soy planting, one for sugarcane planting and the other for sugarcane cultivation. This shows the relevance that other cultures, even

crop rotation ones, have in the tractor's purchase moment; the other farmers bought their tractors for different motives, such as horsepower gap (upwards and downwards) and property expansion. When it comes to fleet renovation, most farmers buy new tractors after 10 years, mainly because of the rising maintenance costs, low tractor availability and the rise of new technologies.

Specialists expectations regarding the purchase moment were met, but none of them said that the farmer might buy the tractor due to other cultures seasonality, demonstrating a weak point in specialists' understanding of sugarcane farmer's behavior.

5.6. PURCHASE DECISION INFLUENCERS

The influencer role in the buying center, according to Webster and Wind (1972), is to influence directly or indirectly the buying process, through information and criteria for alternate purchase evaluations. Foxall (1979) states that studies of consumer motivation are subject to respondents' own estimations of the extent of which, and ways in which, they admit the various influences in their purchase decision, being concerned to project an image of independence, rationality and economic motivation.

Even though the majority of farmers displayed Foxall's predicted behavior, some of them claimed to have been influenced by a third part. Inasmuch this is an exploratory study, those farmers that admitted influence in their purchase decision will have their reasons further explained.

Two of them claimed being influenced by their farm neighbors, who work with the same culture. The specialists were very confident about the impact of neighbor farmers in influencing the purchase decision, and also said that tractor operators and good salesman impact the decision as well, even though this evidence was not found in any of the farmers' interviews.

Two other very unique influences were found. One farmer stated that the mill to which he sells his production influenced his decision. The mill's entire fleet is constituted of John Deere tractors, and they provide free precision agriculture signal to the contracted farmers. It is clearly a win-win: farmers do not have to spend money on building signal transmission towers and benefit from the use of the precision signal when planting and cultivating, and the mill harvests a higher quality cane, enhancing their production. This case shows the evolution of the farmer-mill relationship, that Neves et al. (1998) considered conflictuous.

Another interesting case concerns one of the farmers. His entire tractor fleet is John Deere, and he describes himself as a fan of the brand. Nevertheless, he complained during the interview that it had been a long time since the dealer last invited him to visit the factory, and in his opinion it is due to the fact that he is a small farmer (300 ha). A competitor offered him a visit to their factory, and he ended up buying there a self-propelled sprayer, a machinery that is much more expensive than a medium-sized tractor. He does not consider buying ever again a John Deere self-propelled sprayer, and as soon as the competitor begins building tractor, he will begin to buy it from them. This case perfectly illustrates the importance of behavior factors (Foxall 1979) like prestige and the significance of building a long-term relationship to enhance dealer's performance (Akdeniz et al. 2008).

5.7. TRACTOR'S BASIC ATTRIBUTES

Basic attributes are those that the consumer expects from all competitive offerings (MacMillan and McGrath, 1996). Assessing what the farmers consider nonnegotiable about a tractor is fundamental if a brand wants to be considered as a potential supplier.

Farmers' most cited basic attributes were: fuel consumption, comfort, hitch-lift capacity, pump rated output, wheels' turn angle and ease of operation. The specialists recalled all these attributes, and also some others like cabin, automatic transmission, autopilot compatibility etc.

5.8. DEALER'S BASIC ATTRIBUTES

In comparison with tractor's attributes, the dealer's attributes showed a much higher opinion convergence, both intra and inter group. Table 3 shows the compilation of both farmers and specialists' answers.

Both groups considered important: technical assistance agility and quality, good treatment, parts availability and price. Specialists failed to predict some factors, like dealer's historic, technical assistance price, closeness to the farm and negotiation flexibility.

Table 3. Dealer's basic attributes

	Farmers	Specialists
Negotiation flexibility	2	-
Parts availability	3	2
Mechanics availability	1	-
Good treatment	4	2
Technical assistance quality	3	1
Proximity of dealer	2	-
Parts price	2	1
Technical assistance price	3	-
Technical assistance agility	4	3
Dealer's historic	3	-
Long-term relationship	-	1
Best practices advice	-	2
Maintenance contracts	-	1

Source: Author's own elaboration

5.9. ENERGIZER ATTRIBUTES

To undercover the energizer attributes, the ones that are basis on which a purchase is made (MacMillan and McGrath 1996), farmers' were inquired about what was their last tractor purchase on the studied range, if they had compared the purchased tractor with other brands' tractors and why they chose it. The compiled answers are shown in Table 4.

Table 4. Energizer attributes

	Farmer							
	1	2	3	4	5	6	7	8
Purchased tractor	6110D	7185J	6180J	T 7040	BH 180	6110E	BH 180	6165J
Comparison models	A 950 BH 125	Didn't remember	BH 180 T 7180	6180J MF 7140		Valtra's equivalent	MF 7180	BH 180
Pump rated output		X						
Fuel economy						X		
Conservation state					X			
Brand loyalty								X
Parts longevity			X					
Integrated autopilot			X					
Total price				X	X		X	
Price/hp	X							
Dealer support	X		X					
Wheel Turn Angle			X					
Automatic Transmission			X	X	X			
Oil output		X						

Source: Author's own elaboration

The results show little consensus between farmers on which attributes define the tractor purchase. Webster and Wind (1972) state that industrial purchase decisions are influenced by both task and non-task related motives. In the tractor purchase scenario, this study has already exposed that farms' characteristics (e.g. size and

agricultural culture) and tractor operations vary among farmers (i.e. task related motives), and considering that farmers are influenced by a broad range of behavioral factors (Foxall 1979), their goals and personal objectives may vary as well. Thus, considering that each farmer has different task and non-task related motives, the basis on which the purchase is made can be expected to vary. Though influencing factors on the purchase differ from one another, some energizer attributes were common to two or more farmers: total price, automatic transmission and dealer support.

Concerning total price, it is interesting to note that happened to be an energizer attribute in the only three cases where the purchased tractor was not from John Deere. This finding indicates that the studied Deere's tractor customers are less susceptible to allow total price define their purchase, even though Deere's tractors are the most expensive in the category, reflecting the brand's pursuit in building advanced and integrated equipment systems (Bjornson and Klipfel 2000).

Automatic transmission, another energizer attribute, takes away the responsibility to engage the clutch from the operator, being relevant to the farmer by increasing clutch's life cycle, productivity and fuel consumption. Finally, the farmers that chose dealer support as an energizer attribute were referring to dealer's negotiation flexibility, spare parts and mechanics availability, proximity of dealer and low spare parts and maintenance prices.

5.10. ATTRIBUTES' PREFERENCE ORDER

After answering all the previous questions, the last question consisted in asking farmers to rank all tractor's and dealer's attributes declared during the conversation in their preference order. Table 5 brings the top 5 attributes for each farmer, while table 6 contains specialists' opinions on what they considered to be farmers' top 5 attributes.

Just one farmer did not have a dealer attribute among his top 5 ranking. This result indicates that dealer's attributes are important to farmers, corroborating with Kirkup and Anderson (1987)'s view that the best product does not ensure marketing success, and manufacturers and dealers must jointly build effective customer services if they are to win farmers' purchase choices. Generally, farmers' most cited attributes were: fuel consumption, tractor resistance, tractor price, technical assistance quality and agility, good treatment, automatic transmission and comfort.

Table 5. Farmers' ranked attributes

Farmer			
1	2	3	4
Price/hp	Tech. assistance quality	Integrated autopilot	Tractor resistance
Maintenance price	Good treatment	Fuel consumption	Hitch-lift capacity
Negotiation flexibility	Fuel consumption	Maintenance price	Fuel consumption
Good treatment	Operational flexibility	Parts availability	Automatic transmission
Automatic transmission	Comfort	Parts price	Pump rated output
5	6	7	8
Tractor price	Tractor resistance	Tractor resistance	Tractor resistance
Tech. assistance price	Fuel consumption	Tractor price	Clutch
Tech. assistance agility	Ergonomy	Ease of operation	Front wheel drive electric actuation
Conservation (for used tractor)	Comfort	Operator's training	Power take-off electric actuation
-	Tech. assistance quality	Tech. assistance quality	Tech. assistance quality

Source: Author's own elaboration

Table 6. Specialists' ranked attributes

Specialists			
1	2	3	4
Tractor price	Fuel consumption	Dealer's solution offers	Fuel consumption
Fuel consumption	Tractor price	Dealer's long term relationship	Tractor resistance
Tech. assistance agility	Engine-transmission-hydraulics equilibrium	Tech. assistance quality	Price/hp
Tech. assistance price	Good treatment	Tractor price	Farmer's training
Ease of maintenance	Comfort	Fuel consumption	Tech. assistance quality

Source: Author's own elaboration

Regarding specialists' opinion, their expectations were generally aligned with farmers' opinions, mixing both dealer and manufacturer attributes. The manufacturer's vision is represented by specialists 3 and 4, and brings a more strategic view of the attributes, concerned about a solution offer, long term relationships and farmer's training, whereas dealer's vision contains more technical aspects, such as tractor's ease of maintenance and engine-transmission-hydraulics equilibrium.

6. CONCLUSION

This study objective was to investigate how sugarcane farmers purchase tractors in the 110-185 hp range, examining how they compare supplier's offers and which attributes are the basis of their purchase decision.

The studied farmers had their properties in the Northeast of the State of Sao Paulo, and some aspects must be highlighted. Every sugarcane farmer was responsible for planting and cultivating the cane, whereas the sugar mills were accountable for cutting, harvesting and transporting the cane, demonstrating the importance of this production system in the region.

Another peculiarity that draws attention is the evolution of the mill-farmer relationship seen in one case. The interviewed farmer purchases Deere's tractors because the mill to which he supplies provides free precision agriculture signal that is compatible with Deere's receptors, so the farmer wins because precision agriculture reduces other farm inputs (Bjornson and Klipfel 2000) and increases farm productivity, and also by saving money that would be necessary to build transmission towers, while the mill also wins by harvesting a higher quality cane, increasing its sugar/ethanol production. It is a clear evolution of the mill-farmer relationship, formerly quarrelsome and with short-term perspectives (Neves et al. 1998), but perhaps moving towards a partnership vision seeking mutual benefits.

During the interview it was possible to see that broken tractors trouble farmers, because they are kept from performing farm chores, thus they are kept from their income generation. Further analysis of the results shows that some tractor breaking related attributes appear in farmers' top 5 attributes: some characteristics are responsible for preventing tractor breaks (e.g. tractor resistance and technical assistance quality), while others help to decrease the time that the tractor is out of use (e.g. parts availability, technical assistance agility). The presence of these attributes in many cases reinforces specially the dealer's role in providing assistance to shorten the maintenance time so farmers can have their tractors running again.

The studied tractor range (110-185 hp) proved to be very flexible in the farm, performing a total of 15 different operations in the studied sample. Though in the biggest farms tractors appeared to be designed to a specific culture, tractors were usually used in different cultures and activities, which may alter the purchase period due to cultural seasonality, requiring salespeople to be alert to farmers' needs not only in their main crop, but also in their crop rotation. Specialists failed to predict some operations in which the tractors were used believing that they operated lighter activities, whereas farmers destined them to heavier operations, demonstrating a knowledge gap that both dealers and manufacturers must surpass in order to fully understand their customers' product usage so they can offer farmers the appropriate solution to their problems.

Manufacturers can improve their performance by developing products that offer the exact mix of attributes that consumers want. The utilization of MacMillan and McGrath (1996)'s approach to identify salient attributes can guide manufacturers to uncover potential insights for new products development; there are four ways to do it:

1. Identify parallel needs (e.g. utilization in other cultures)
2. Identify purchasing patterns (e.g. cultures and operations seasonality)
3. Observe how customers actually use the product (e.g. watching how the operator uses the tractor)
4. Identify customers' perceptions of risk (e.g. risks of changing brands and/or dealers)

On the other hand, dealers can try to improve their performance with Lele and Karmarkar (1983)'s suggested three steps involved in developing effective support strategies for a given product:

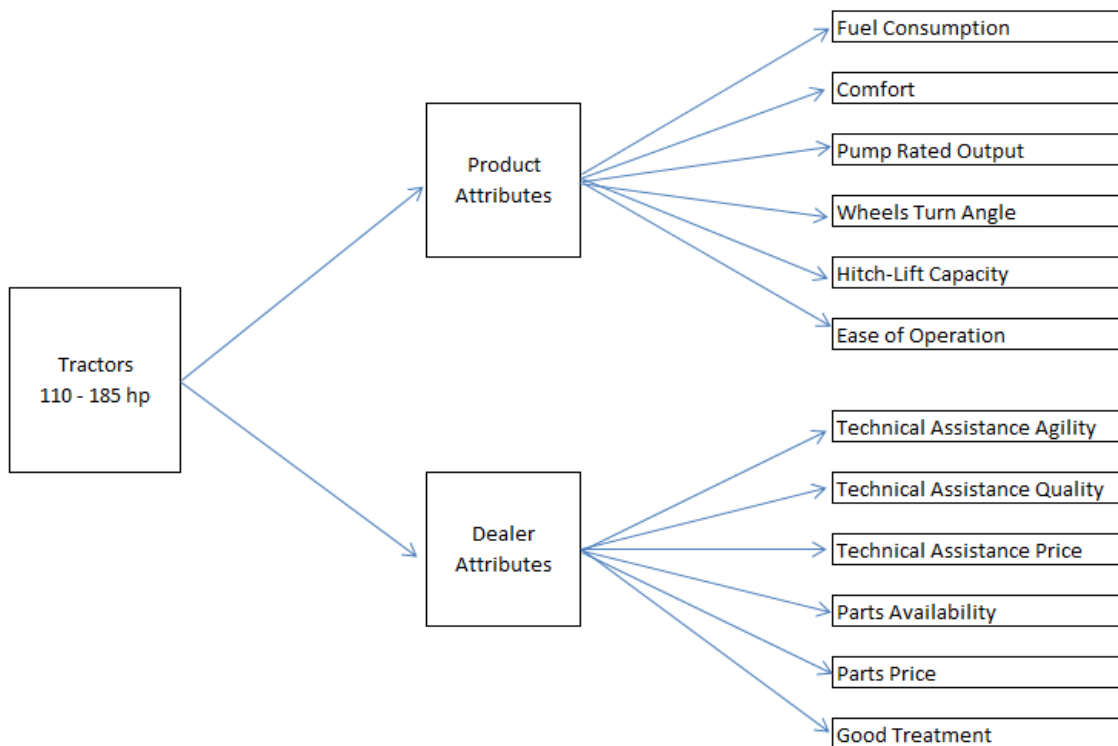
1. Defining customer expectations regarding support
2. Understanding the trade-offs implied in each support strategy
3. Identifying the strategies that best fit management's objectives.

6.1. BUNDLE OF ATTRIBUTES

This study views the tractor as an expanded product, taking into account not only its physical aspects, but also the services offered by the dealer. Drawing a product's bundle of attributes is useful to detail product's aspects and to help companies to decide whether to add, remove or modify the existing attributes, according to Peter and Olson (1993).

Tractor's bundle of attributes was split in two categories: product and dealer attributes. This segmentation allows a broader view of what is considered when purchasing a tractor, and the attributes used to build it were the ones mentioned by two or more farmers, in order to avoid taking into considerations farmers' individual buying preferences. Figure 2 displays tractor's bundle of attributes.

Figure 2. Tractor's bundle of attributes



Source: Author's own elaboration

6.3. RESEARCH LIMITATIONS AND FUTURE RESEARCH SUGGESTIONS

Farmers' sample was chosen by convenience, thus it is a nonprobability sampling that does not permit to make generalizations for the studied population, according to Malhotra (2001). All farmers had properties in the Northeast of the State of Sao Paulo, what might characterize a geographical limiting of the conclusions. Also, most farmers were interviewed in a Deere's dealer event, fact that may have interfered in the neutrality of their answers. Manufacturer specialists worked at John Deere and dealer specialists worked for a John Deere dealer, thus forming another possible bias that must be considered.

Future researches can use the attributes that this study has highlighted with a quantitative approach, using a probabilistic sample that allows generalization of the results, supplying manufacturers and dealers with data that can be the basis for managerial actions. It is suggested the use of conjoint analysis, that reveals how people make complex judgements and provides insights into the relative importance of product attributes and how they relate to each other (Walley et al. 2007). Future researches could also study other horsepower ranges and cluster the answers according to respondent profiles (e.g. technical, loyal, price-oriented etc.) so dealers could target these publics with different approaches.

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