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**Supplementary material D - Factors and categories that can affect the adoption resulting from expert interviews - Selection of quotes**

The answers of the interviewed experts are categorized and classified according to the Theory of Planned Behavior, to produce the transcripts and results shown in this Supplementary material.

Table S4. Selection of quotes from the interviewed experts.

TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
Attitude (advantages, benefits, expected positive results)	“The general picture of irrigation is that the farmer uses a lot of water, this is not adequate. The farmer uses the water, the farmers who irrigate use the water and return it most of the time clean, in the form of transpiration,” expert 17.	Water use	Quantitative performance measures
	“Regarding the information needed for irrigation planning, the basics are the availability of water, the water flow, the water balance to understand how much the farmer can irrigate, the cost to use the water and the cost to apply the water where the farmer needs, the energy demand cost to apply the water,” expert 27.	Crop water requirement, water use cost, energy use cost	Quantitative performance measures
	“The adoption of more advanced technologies in the water use can generate great advantages such as better use of this resource,” expert 24.	Water use	Quantitative performance measures
	“As for the grant for access to water, the farmer pays a fixed tariff that gives the right to use water in the social irrigated perimeters. In professional perimeters, in addition to the fixed tariff, he pays for each cubic meter of water used. The fixed tariff is for maintaining the perimeter because agriculture uses pumps and pressurized systems,” expert 14.	Water use cost	Quantitative performance measures
	“The farmer, thanks to the adoption of Precision Agriculture, will have a more effective level of resource use, that is, he will add more value to production for less cubic meter of water used. So, he will use less water, he will use less energy, he will have greater production yield and generate more profit,” expert 25.	Water use, energy use, production yield	Quantitative performance measures
	“The first thing is the rational use of water and with it the rational use of energy, which is something that is becoming more expensive and which is an important part of the cost of production and inputs, as well as labor,” expert 16.	Production cost	Quantitative performance measures
	“So, thinking about Precision Agriculture, the great advantage is the optimized use of water, in terms of applying the necessary amount of water that the crop needs. And being able to vary this accordingly along the central pivot, applying more water where you need it, saving where you do not need it. This is also expected to lead to better production yield, also avoiding water stress,” expert 23.	Crop water requirement, variable rate water use, production yield	Quantitative performance measures
	“One change that has taken place is the appreciation of the efficient use of water. So, today, in compliance with grants for access to water, farmers have to install a flow meter that they are using,” expert 2.	Water use	Quantitative performance measures
	“The adoption of Agriculture 4.0 makes it possible to increase the productivity of inputs. So, in this case the farmer can use less water with the same product, less input than would be water and have the same output. It also allows obtaining information that will facilitate the control, a set of information on the availability of water, such as soil conditions, soil moisture,” expert 3.	Production yield	Quantitative performance measures
	“I see a strong issue of efficiency in the use of water and other resources. So, more efficiency in inputs, which naturally can impact a reduction in production costs and given the sale price of the product, in better profitability for the farms. I think Agriculture 4.0 can play a significant role in efficiency and via efficiency in sustainability,” expert 6.	Water use, profit, production cost	Quantitative performance measures
	“I think that when a technology offers knowledge that the producer did not have yet, knowledge of what happens in his production system, and if he understands that as a differential for management, for increasing production yield, for improving quality, I think this factor reduces the cost of production,” expert 8.	Management benefits	Qualitative performance measures
	“For the farmer to adopt, I think the main factor is to show the benefits, to show how much he will improve his processes, he will optimize his processes, he will be able to rationalize costs,” expert 27.	Management benefits	Qualitative performance measures
	“Irrigation planning has become more manageable. The farmer leaves an operation often based on experience and begins to gain a methodology and a set of data that make this planning more automated, more scientific, easier to be operationalized,” expert 26.	Improvements in irrigation planning	Qualitative performance measures

TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
	"Control will become much more detailed. So, in terms of water costs, the farmer will be able to create parameters to measure the efficiency of water use .... the use was equal to x liters of water and the return of growth or production yield resulted y," expert 20.	Improvements in irrigation control	Qualitative performance measures
<b>Attitude</b> (advantages, benefits, expected positive results)	"The adoption of Agriculture 4.0 also has an important advantage, which consists of the farmer having organized data," expert 16.	Access to data	Access to data
	"And the farmer need to see if he has the water, if he owns the source, if the source is on his farm. But if the farmer is in a collective irrigation canal, water is not always available. The water demand side comes in, which is irrigation, the water supply side comes in. In a water basin, the farmer needs to have knowledge of hydrology, of resource management, and to be informed in advance that he will have so many cubic meters of water available on a given day, so that he can then carry out irrigation management based on this information and adjust that he can irrigate that day when the crop needs it, when he will have water", expert 17.	Access to agronomic data, access to operational data	Access to data
	"The farmer needs from the characterization of the type of soil, all the physical and hydric information, defining which is the ground water, the amount of water available, the water capacity and climate information. Once he has this information, he will move on to the water demand of the crop, characterizing it in terms of evapotranspiration. So, the farmer needs data from these 3 pillars: the water, soil, crop and climate relationship is fundamental for the farmer to define the water depth to apply", expert 11.	Access to agronomic data, access to operational data	Access to data
	"In the case of collective management, one of the main challenges that affect irrigation planning is if there is not adequate planning within a community, if the farmer does not have knowledge of how much each one will use of water resources," expert 18.	Access to operational data	Access to data
	"Regarding the information needed for irrigation planning, the basic is the availability of water. Now the farmer has enough technology and knowledge of water balances to understand how much he can irrigate. And today, as it is mandatory to have authorization from the state, whether from the federal domain or from the state domain, it is mandatory to have an authorization and this authorization must have a consistency of demand, of water flow. So, the basic information is to know what the water availability is and if it is authorized," expert 27.	Access to operational data	Access to data
	"Farmers today have a big limitation, which is the issue of water resources. As much as Brazil has great availability today, in many regions this resource is now under much greater control. So, the adoption of more advanced technologies in the water use can generate great advantages such as better use of this resource," expert 24.	Access to operational data	Access to data
<b>Perceived Behavioral Control</b> (impediments and obstacles, available resources and opportunities)	"In Brazil, there is still a substantial portion of production that is made by producers with low training. The training of human resources is a factor that will be problematic in the adoption," expert 7.	Training	Changes for the farmer
	"Regarding the changes, I think the technology has to adapt to different profiles of producers, the size, the type of equipment," expert 5.	Training	Changes for the farmer
	"We certainly need to raise awareness a lot, how irrigation management should be done, so that the farmer does irrigation and it is not applying water, it is still little adopted. Farmers need to internalize this, they need to be trained, they need to understand what irrigation is, what irrigated agriculture is. Irrigating is not applying water, irrigating is not rainfed agriculture plus water. He has to do irrigation management and irrigation management is a cultural practice, how to fertilize, how to control pests, diseases and invasive plants," expert 17.	Training, technical training, mental model	Changes for the farmer
	"The big question is that there are farmers of different intellectual levels, the producer who has minimal educational level and a producer who has completed higher education, who are agronomists, agricultural engineers. And there are producers who are in the administration area and have little knowledge about agriculture and irrigation. So, within agricultural planning, this issue of training and the issue of knowledge of the producer is fundamental to facilitate any agricultural activity, from fertilization to the planning of the water depth to apply," expert 11.	Training, technical training	Changes for the farmer

TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
	"The area of administration, management, in which planning is included, is not an activity that the farmer values and, therefore, because he does not value it, he does not know it, and because he does not know it, it is difficult. So, there is a change in training, and that improves with the new generations, compared to the old generation, of older farmers," expert 1.	Training, managerial training	Changes for the farmer
	"The first change is in management, the farmer has to be trained for a more advanced level of management of his property, working with data, working less with intuition, less with experience and more with data," expert 15.	Managerial training	
	"Training and technical training are an important pillar in this adoption process, which is not simply transferring a technology, technological packages, but adapting these technologies to local contexts and understanding that technology needs a set of factors including management capacity. It is pointless to think that there will be a highly technical agriculture without management capacity, management is also technology and this is not clear to all the actors involved. But it is not clear to the farmer that he needs to think first about how he is managing, managing the finances," expert 13.	Technical training, managerial training	Changes for the farmer
	"Planning is complex, it is necessary to improve the level of administration. This is still a fault among farmers. Large producers manage well. They are connected with stock exchanges, with markets very easily. Medium and small farmers do not know how to manage their business, they sometimes know how to produce very well. But they do not know how to trade, many of them have losses because they did not plan well. They do not really know what they are going to sell for, they do not know their market demands. So, they have these difficulties, they also need to be trained for this management issue," expert 17.	Managerial training	Changes for the farmer
	"We are talking about data, planning, the need to integrate systems within an agricultural company, because the farmer needs to collect data, evaluate this data to identify the heterogeneities present in the rural property and then he needs to plan his production system to work according to these heterogeneities," expert 6.	Managerial training	Changes for the farmer
	"There are changes in management, production processes and even changes in the farmer's paradigm. Rural producers must have a change in terms of technology because it is different to consider a highly technological producer, for him to implement Precision Agriculture is supernatural. If you consider a family farmer who has a hectare of land, how he will change his mind. even if he has access to credit, even if he gets the financial resources? So, a factor of change in the social paradigm is particularly important in the mind of the agricultural producer," expert 18.	Mental model	Changes for the farmer
	"An accustomed producer has a trained workforce. Producers often see this as a disadvantage that interferes with their daily lives, because they must update many things. I do not see it as a disadvantage, this is an inertia break," expert 2.	Mental model	Changes for the farmer
	"The advantage is evidently great, that the farmer has data, mainly to manage a resource that is expensive and quite complicated, which is water, to manage his irrigation system, stop applying water and start managing the water supply to the plant," expert 4.	Mental model, irrigation management	Changes for the farmer
	"Sometimes measuring the benefits is a little difficult, the farmer ends up neglecting the potential that these technologies have to help," expert 15.	Mental model, data-based management	Changes for the farmer
	"Regarding planning being easy or difficult, this is one of the ways to start talking about Agriculture 4.0. I am not going to say that it is easy, but that it has become more feasible to plan. The farmer leaves an operation that was often based on experience, and he begins to gain a methodology and a set of data available that make this planning more automated, more scientific, easier to be operationalized. Of course, it all depends on the size, the region, but it is a trend," expert 26.	Mental model, data-based management	Changes for the farmer
	"First, I think prepare to assimilate this technology, when analyzing farmers who are around 40 years old, who already have a certain difficulty in adopting, in using the application to manage irrigation, in believing that the use of a sensor will improve efficiency and not basically his experience. So, for these farmers this adoption may be a culture shock, and this may complicate adoption a bit. The big problem is teaching this, trying to pass on this innovation, this technology to someone who trusts his experience," expert 14.	Mental model, data-based management	Changes for the farmer

TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
	<p>"If the farmer irrigates a lot, he enables a much more intensive use of the soil. In addition to water resources, Brazil has never worried about water because it has always rained a lot, and the farmer has always thought that water is an inexhaustible resource. He is already realizing more that he is a finite resource. So, if the farmer does not have a well-done planning in the use of these resources, he will end up with it. Furthermore, a much more intensive agriculture is possible, which, in addition to using up water, can also use up the soil," expert 22.</p>	Mental model, data-based management	Changes for the farmer
	<p>"I think that the information needed is exactly this guarantee of having water availability throughout a season because there are years when it rains more and there is no problem, but the years when it rains less, the farmer starts to say, "but you told me that there was this water flow and I am running out of water in the river, the river has gone down so much that there is no more". So, I see that this information is a little lacking and there are still some farmers who believe "The river is there, it is endless, it will never end," expert 27.</p>	Mental model, data-based management	Changes for the farmer
	<p>"The farmer will adopt if he is going to seek profit. He will not seek until he finds profit. It is not just him, it is everyone, who only does things if he has an economic advantage, if he does not, he will not do it," expert 19.</p>	Mental model, data-based management	Changes for the farmer
	<p>"It is not an easy control depending on the technology it adopts. Today, even coming from Precision Agriculture itself, this type of control will become much more detailed. In terms of water costs, it will even be able to create parameters to measure efficiency, the water costs it generates. So, in Precision Agriculture, I think he can adopt this. If he does not have any kind of technology to make this measurement, this control is hardly in the farmer management. Now, if he has a very well-structured technology, he will be able to detail a lot of information," expert 20.</p>	Mental model, data-based management	Changes for the farmer
	<p>"We know how much producers do not manage their farm as a business. We can see that if they do not have a clarity of their costs, their revenues, it is difficult to think or try to convince someone that something is possible, that will generate a good result," expert 24.</p>	Mental model, farm management as a business	Changes for the farmer
	<p>"We know how much the farmer is still very informal in his activities, he does not treat the property as a business. We see that if he does not have a clear understanding of his costs, his revenues, it is difficult to think, or try to convince someone, that a new technology will generate a good result," expert 23.</p>	Mental model, farm management as a business	Changes for the farmer
<b>Perceived Behavioral Control</b> (impediments and obstacles, available resources and opportunities)	<p>"Planning is complex, and the farmer needs to improve his level of administration. This is still a flaw among farmers: management, especially trade management. Only the big producers do this well. They are connected with stock exchanges, with markets very easily. Medium and small farmers do not know how to manage their business, they sometimes know how to produce very well. But they do not know how to trade and many of them are at a loss because they did not plan well. So, we are talking about planning, the farmer does not really know what he is going to sell for, the market demand. So, he also needs to be trained for management," expert 17.</p>	Farm management	Changes for the farm
	<p>"It also depends on changes in the organizational sense, control mechanisms, monitoring and efficiency, performance and management indicators, which will not be done in the same way," expert 20.</p>	Farm management	Changes for the farm
	<p>"We are talking about the need to integrate systems within a farm, because the farmer needs to collect data, evaluate this data to identify the heterogeneities present on the property and then he needs to plan his production system to work according to these heterogeneities. It is an activity that is not so simple and especially for farmers who do not have an important level of qualification and who also have difficulty with the workforce," expert 6.</p>	Farm management	Changes for the farm
	<p>"Planning is not easy for the farmer and also for the agricultural technician and the agronomist, because he has no training for this activity. The farmer understands little about operations engineering, and often those who advise the farmer also does not have this training," expert 1.</p>	Operations management	Changes for the farm
	<p>"Operations management, planning, control and organization of operations, which is rural property management, is something that has lagged behind in recent years in Brazil. These are aspects of agricultural production have not evolved at the same speed as agronomic aspects," expert 6.</p>	Operations management	Changes for the farm

TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
	<p>"The difficulty of dealing with rural people, I'm not talking anymore about the decision maker, the entrepreneur, but often the workforce, the one who will really have access to this information, I think this is a bottleneck, I see as disadvantage, as a new challenge of qualifying the labor in the field for these new technologies," expert 12.</p> <p>"The farmer will not adopt a technology and will not use it fully, also depending on the specialized labor that the farmer will need. If this qualification is not available, it will be difficult to adopt and use," expert 9.</p> <p>"Agriculture 4.0 is inevitable because today more people are looking for control in agriculture. Within a country like Brazil, where the North is different from the South, there will be different paces for implementation. But the qualification of the workforce will be fundamental for any farm," expert 19.</p>	<p>Workforce qualification</p> <p>Workforce qualification</p> <p>Workforce qualification</p>	<p>Changes for the farm</p> <p>Changes for the farm</p> <p>Changes for the farm</p>
<b>Perceived Behavioral Control</b> (impediments and obstacles, available resources and opportunities)	<p>"Regarding the information necessary for planning operations, as in the industry, the farmer needs to have the times, costs, activities, a process flowchart, a process mapping. And none of this is done in agriculture," expert 1.</p>	Operations planning and control models	Operations Management models inspired by the industry
	<p>"There are planning tools, classic in the industry, that the farmer could consider, using PERT and CPM, for example, to do planning. For accounting the costs, the farmer could use an ABC costing system, for example, to do planning. The farmer uses a very primary system, very easy," expert 1.</p>	Operations planning and control models	Operations Management models inspired by the industry
	<p>"Producers will struggle because many of them will not have the time to do irrigation planning or even the knowledge to do data analysis and better planning," expert 3.</p>	Operations planning and control models	Operations Management models inspired by the industry
	<p>"If you compare agriculture with an industrial process .... in comparison, irrigation planning deals with an extraordinarily complex operation that depends on uncontrollable factors and deals with processes difficult to control," expert 4.</p>	Operations planning and control models	Operations Management models inspired by the industry
	<p>"Control can be easy if the farmer has the equipment, the information, if he has the irrigation management process, the information necessary for the management to be just-in-time, in real time. A model like this makes a lot of difference, for example adopting remote monitoring of irrigation pumps. So, the farmer will need to have information about irrigation efficiency, about how much to irrigate and when to irrigate," expert 25.</p>	Collaborative management models	Operations Management models inspired by the industry
	<p>"I think that the necessary information is exactly the guarantee of having water availability throughout a season because there are years when it rains more and there is no problem, but the years when it rains less, the farmer starts to say, 'but you told me that there was this water flow and I am running out of water in the river, the river has gone down so much that there is no more'. One issue that I think must be faced is for farmers to provide an information monitoring system that gives some advance notice about the availability of water for irrigation in the different annual seasonal cycles," expert 27.</p>	Collaborative management models	Operations Management models inspired by the industry
<b>Perceived Behavioral Control</b> (impediments and obstacles, available resources and opportunities)	<p>"Regarding irrigation planning, I think the farmer must have a good knowledge of water availability, which means the groundwater level. And also, knowledge relative to other farmers, therefore, planning that actually should be done together and should not be at the individual level of each farmer," expert 22.</p>	Collaborative management models	Operations Management models inspired by the industry
	<p>"You need to see if the farmer has water, if he is the owner of the water source, if the source is on his property. But if the farmer is on a collective irrigation canal, water is not always available, depending on water demand and supply. In a basin, the farmer needs to have knowledge of resource management," expert 17.</p>	Resources (inputs - water sources, water)	Resources
	<p>"Today, according to water grants, large producers must install a water flow meter that they are using. Previously, water flow measurement was done in rivers, in wells, at the macro use level. Today, the management agency is demanding that each farmer has a measurement, here in the water management system, of a basin, of a region. So, there is pressure from the management agency so that the producer puts in the measurement system, but also transmits the water flow data to the management system," expert 2.</p>	Resources (inputs - water, hardware - measurement system)	Resources

TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
	"As for the grant for access to water, the producer pays a fixed tariff that gives the right to use water, without controlling the volume, in the social irrigated perimeters. In professional perimeters, in addition to the fixed tariff, he pays for each cubic meter of water used, the fixed tariff is used to maintain the irrigated perimeter because agriculture uses pumps and a pressurized system. For example, there are different tariffs, the farmer has a tariff for use in the morning, a tariff for use in the afternoon or night," expert 14.	Resources (inputs - water)	Resources
	"In Brazil, there is the saying that for irrigation the farmer needs energy in quality, quantity, adequate price and in Brazil it has everything the opposite: little availability, high cost and low quality," expert 2.	Resources (inputs - energy)	Resources
	"Depending on the type of crop being cultivated, the farmer may experience water savings, energy savings and better product quality.," expert 8.	Resources (inputs - energy)	Resources
	"The farmer has to see the advantage, what would be the cost reduction, pumping water to make a localized application and see energy savings," expert 9.	Resources (inputs - energy)	Resources
	"Planning is an easy process because the farmers have consolidated equations and knowledge of the local water availability, the cost of water that the farmer will incur, the cost of energy," expert 18.	Resources (inputs - energy)	Resources
	"One issue that I think must be faced is for farmers to provide an information monitoring system that gives some advance notice about the availability of water for irrigation in the different annual seasonal cycles," expert 27.	Resources (hardware - irrigation management system)	Resources
	"Large producers usually have specialized workforce and need consultancy to help farmers with planning. It is difficult for farm personnel to take care of the integration of soil, water, climate, crop and operational factors", expert 2.	Resources (people - consultants)	Resources
	"Precision Agriculture is complex, and the disadvantage is that the farmer who will adopt these technologies needs a specialist, a consultant or a service provider," expert 8.	Resources (people - consultants)	Resources
	"The planning consists of a consultant recommendation. It is kind of easy because the information is sort of tabulated," expert 23.	Resources (people - consultants)	Resources
	"Regarding the changes, I think the technology has to adapt to different profiles of farmers in terms of size, level of education, type of equipment, labor," expert 5.	Educational level	Farmer characteristics
Antecedent factors	"What I think hinders any innovation, any adoption of technology is the fact that we professionals are moving towards a way of acting that is very dependent on computer science and communication engineering. The future, or the possibility of success, lies with the younger generations, who are much more familiar with these technologies that permeate the world of innovation. So, the biggest difficulty is for farmers to understand, to be aware, to be familiarized with innovative technologies. Innovations involve knowledge of computer science and mathematics, and therefore farmers will have to be guided and advised by professionals who have this knowledge," expert 8.	Age, familiarity with technologies, educational level	Farmer characteristics
	"First, I think prepare to assimilate this technology, when analyzing farmers who are around 40 years old, who already have a certain difficulty in adopting, in using the application to manage irrigation, in believing that the use of a sensor will improve efficiency and not basically his experience. So, for these farmers this adoption may be a culture shock, and this may complicate adoption a bit. The big problem is teaching this, trying to pass on this innovation, this technology to someone who trusts his experience," expert 14.	Age, experience in agriculture	Farmer characteristics
	"Adoption will depend on the educational, economic and social level of the farmer," expert 9.	Educational level	Farmer characteristics
	"Regarding the disadvantages, I also think the ability to manage this system. If you take the educational and training rates, it goes from the big centers, from the rural areas, it will decrease. You can find remarkably high quality in large centers, and you will move away from these large," expert 10	Educational level, training	Farmer characteristics
	"What is behind Agriculture 4.0 is the issue of digitalization. And knowing, applying and moving forward is something essential, remembering that for many producers Agriculture 1.0 would already be a satisfactory solution. And another key action is the issue of training the workforce. What is the use of a farmer having a whole technology if he does not take care of the people who will be in the field implementing the technology and if he does not take care of training people who will use the data obtained to decide," expert 4.	Educational level, absorptive capacity	Farmer characteristics

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	<p>"I think it will depend on the agricultural producer, obviously on the years of experience he has in the field, whether he is already from a family of farmers or not, he would be the first, the first generation of the family to work with these technologies. But, if the farmer has good knowledge, irrigation planning is not a complicated process," expert 20.</p> <p>"So, the profile of the farmer varies a lot according to each region of the country. Investment, I think basic would be investment in education, in qualification. Adoption involves basic education, most Brazilian farmers do not have a fundamental level, they have not even attended a professional technical school," expert 21.</p> <p>"It is the issue of income and education; these are two very worrying aspects when we think about technology adoption. And also, the product and the profitability of that product, production volume," expert 32.</p> <p>"In research we have analyzed not only economic factors, but this set of attitudes, perceptions that producers have, trying to obtain from him risk aversion and some indication that he is an innovator," expert 3.</p> <p>"I think that if the farmer had cost-benefit information, he would be able to decide whether to adopt or not. This is a failure of communication; it is a failure of information for the producer. The innovators, the beginners are those who end up taking this risk, the greater," expert 5.</p> <p>"Every time the farmer is going to adopt a technology it involves a risk, because many times he can bet on a technology that today is cutting-edge technology, and make a big investment, and a year from now that technology proves to be obsolete, the farmer will have a better technology from the neighbor producer competitor that did not bet on the risk and that at first was more conservative," expert 26.</p> <p>"There are highly technical farms that have personnel linked to the stock market 24 hours a day. Quite different from the rural farms, in which the farmer works like the father and the grandfather did. You cannot even ask: why don't you plant another crop? Because my father and grandfather did it this way, and I do the same, I only know how to plant onions," expert 16.</p> <p>"First, I think prepare to assimilate this technology, when analyzing farmers who are around 40 years old, who already have a certain difficulty in adopting, in using the application to manage irrigation, in believing that the use of a sensor will improve efficiency and not basically his experience. So, for these farmers this adoption may be a culture shock, and this may complicate adoption a bit. The big problem is teaching this, trying to pass on this innovation, this technology to someone who trusts his experience," expert 14.</p> <p>"Regarding the information necessary for a farmer to adopt, I think the farmer needs to see it happen, working and showing that that innovation can be his," expert 13.</p>	<p>Experience in agriculture, family of farmers, educational level</p> <p>Educational level</p> <p>Income, educational level</p> <p>Risk propensity, innovation capacity</p> <p>Risk propensity, innovation capacity</p> <p>Risk propensity</p> <p>Conservatism</p> <p>Conservatism</p> <p>Conservatism</p>	<p>Farmer characteristics</p> <p>Farmer characteristics</p> <p>Farmer characteristics</p> <p>Farmer characteristics</p> <p>Farmer characteristics</p> <p>Farmer characteristics</p> <p>Farmer characteristics</p> <p>Farmer characteristics</p>
Antecedent factors	<p>"There are highly technical farms that have personnel linked to the stock market 24 hours a day. It is impressive these properties, quite different from the rural farms, in which the farmer works a lot out of feeling and for what the father and the grandfather did. You cannot even ask: why don't you plant another crop? Because my father did it this way, my grandfather did it this way and I do it this way, I only know how to plant onions," expert 16.</p> <p>"Irrigation planning presents challenges and difficulties for small and medium producers, who have limited technical capacity because they do not have the workforce to do a lot of activities and they take care of a lot. At the same time, on the other hand, these farmers also do not have an area and production volume that makes it possible to pay for the consulting services they need. However, there is an opportunity for cooperativism, association of producers, so you would have a collective learning process, which can serve a cooperative," expert 2.</p> <p>"Irrigation management is also affected by the location of the farmer, depending on where his farm is within an irrigated perimeter. If it is right at the water inlet, it will not have any impact. Now, if he is at the end of the line, the risk of water shortage goes to him," expert 9.</p>	<p>Farm size (family farm, industrial farm)</p> <p>Farm size (family farm, industrial farm), cooperativism</p> <p>Farm location</p>	<p>Farm characteristics</p> <p>Farm characteristics</p> <p>Farm characteristics</p>



TPB constructs	Quotes from experts => Excerpts with similar topics	Factors	Categories
	<p>"Planning is complex, it is necessary to improve the level of administration of the farm, which is still a failure among farmers. Only the big producers, the entrepreneurs, do management well, trade management. They are connected with stock exchanges; they are connected with markets very easily. Medium and small businesses do not know how to manage their business, they sometimes know how to produce very well. But they do not know how to trade, many of them are at a loss because they did not plan well. They do not really know what they are going to sell for, they do not really know what their market demands. So, they have these difficulties, they also need to be trained for this management issue," expert 17.</p> <p>"It is the issue of income and education; these are two very worrying aspects in relation to the adoption of technology. And also, the product and the profitability of that product, production volume, a series of issues," expert 23.</p> <p>"Depending on the crop, the farmer can save water and energy. Depending on the crop types being cultivated, a better product quality can be obtained," expert 8.</p> <p>"A learning period will be necessary for the farmer to internalize these concepts in his agricultural practice. This has a cost, if he works with crops with low added value, it may not be profitable, and he chooses to leave this investment a little later because Precision Agriculture also requires a greater initial investment. Another challenge is if the farm is in a region with a low level of conflict over water use, that is, in a region that is abundant in terms of water resources, Precision Agriculture loses a little of its attractiveness, it continues to be attractive because of all the advantages of cost reduction but it loses a little attractiveness due to the initial investment," expert 25.</p>	<p>Farm size (family farm, industrial farm)</p> <p>Production profitability, product volume</p> <p>Crop type</p> <p>Crop type, farm location</p>	<p>Farm characteristics</p> <p>Farm characteristics</p> <p>Farm characteristics</p> <p>Farm characteristics</p>
<b>Antecedent factors</b>	<p>"Irrigation control is not easy depending on the type of technology used. This type of control will become much more detailed. If the farmer does not have any type of technology to measure water use, this control is hardly in farm management. The form of control he has for irrigation is costs, it is the only control he will have. If he has a very well-structured technology, he will be able to detail the cost of the equipment, of using water, to measure the efficiency of water use, which was the benefit generated, to check irrigation level ranges, productivity depending on the crop," expert 20.</p> <p>"The farmer first needs to have access to results, technologies, information about Precision Agriculture. And a second issue is the cost-benefit information, because he has not adopted anything yet, he is going to make a trade-off .... if I adopt what has to happen, if I do not adopt .... So, he needs information about the necessary investment, type of technology, increase or not in productivity, decrease in costs, increase in added value," expert 25.</p> <p>"There is the cost of production and the scarcity of companies that can provide this type of technology in Brazil, specific companies in Agriculture 4.0 are still very scarce here. So, you do not have market competition, you do not have a fair price for the producer, this means that he has a loss and does not facilitate adoption," expert 20.</p> <p>"Precision Agriculture is complex. Therefore, the disadvantage is that the producer who is going to adopt needs a specialist, a consultant, or a service provider," expert 8.</p> <p>"I think that technical and managerial information on technology management is also important, how it works, how this technology is managed, what the producer needs to do, what he does not need to do. This is fundamental information for him to better understand the complexities of technology," expert 6.</p>	<p>Technology type</p> <p>Technology type</p> <p>Price</p> <p>Complexity</p> <p>Complexity, technology type</p>	<p>Technology characteristics</p> <p>Technology characteristics</p> <p>Technology characteristics</p> <p>Technology characteristics</p> <p>Technology characteristics</p>