Detecting buyer’s role effects to achieve collaborative business relationships in the agriculture business, using electroencephalogram (EEG)

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Abstract: The relationships between suppliers and buyers in agricultural sector are crucial to the acquisition of resources for achieving competitive advantage. This paper examines several agricultural buyer and supplier relationships by testing the effects of different types of agriculture buyers on farmer’s perceived value, trust, performance, and commitment using neuroscience method. This provided objective information about farmers’ sensory, cognitive and emotional reactions based on cortical brain activity (electroencephalogram) in different brain regions. The pattern of brain activity was obtained in the Alpha (8–12 Hz) and Beta (13–30 Hz) frequency bands of the frontal (AF3 and AF4), parietal (Pz), and temporal (T7 and T8) brain areas. There are differences in farmers’ emotional responses towards each buyer type. Most farmers demonstrated the highest interest response in relation to perceived value, and demonstrated an engagement response indicating trust towards the farmers’ group, while the highest excitement response arose in relation to tengkulak performance.

Keywords: perceived value; trust; commitment; performance; agriculture; EEG; electroencephalogram.


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1 Introduction

The agricultural sector is the second-biggest contributor to the Indonesian economy. Agribusiness and the agricultural sector also contribute to the development of rural employment and food security (Fizzanty and Masyhuri, 2013). However, some problems remain in the agribusiness sector. Shifting trends along with shifting demand for agricultural commodities means that the sector needs to change in order to be effective. Therefore, there is a need to engage the sector in ways that achieve both social and economic objectives and build strong domestic business with the people at the bottom of the pyramid.

The agricultural supply chain in Indonesia faces frequent obstacles related mainly to the limited number of suppliers (farmers), while buyers often face inadequacies in the quality and quantity of supplies. Indonesian agricultural suppliers are generally restricted in technology, capital, extension services, and market integration (Devaux et al., 2009; Ferroni and Castle, 2011). As a consequence, it is often difficult for small-scale suppliers to respond to ever-changing market dynamics which demand the integrity of quality, quantity, safety and competitive pricing (Perdana, 2012).

To enhance the competitiveness and availability of Indonesian agricultural commodities in the market, effective relationship management in the agricultural supply chain is required. Indeed, over recent decades, interest in collaborative relationships between buyers and suppliers has surged. As argued by Hoyt and Huq (2000), buyer–supplier relationships have evolved, over the past two decades, from transaction processes based on arm’s-length agreements to collaborative processes based on trust and information sharing. Furthermore, collaborative buyer–supplier relationships play an
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important role in an organisation’s ability to respond to dynamic and unpredictable change. Recent empirical research shows that information sharing in relationships can increase and improve performance (Dröge and Germain, 2000).

1.1 Agricultural sector

In the Indonesian agricultural sector, there are four main buyers: cooperatives, farmers groups, brokers/tengkulak, and rural markets. Each of these has a particular trading pattern (Quincieu, 2016). (1) Agricultural cooperatives are units or service centres for agricultural development responsible for providing farm credit schemes with low interest to help its members, agricultural input and incentives distribution, marketing of farm commodities, and other economic activities. Cooperatives enable farmers to collaborate with one another, pooling their resources and collectively strengthening themselves to produce an abundance of cultivated crops. They help farmers not only control the land but also obtain better prices for their produce (Hendar, 2010). On the other hand, (2) a farmers group is a basic union allowing farmers to build a collective production system. The objective of farmers groups is to strengthen the role of farmers in Indonesian society, developing their abilities and self-confidence so that they become strong, independent stakeholders and partners to other stakeholders. Such groups provide farmers with greater collective bargaining power. The members of the group can gain knowledge through information sharing and teamwork in the interests of expanding their farm activity. The group leaders also encourage their members to sell some of their produce to the group. The group leaders sell some produce to select retailers by contract or formal agreement. Finally, the marketing network in rural areas is dominated by brokers called (3) tengkulak. Most farmers in Indonesia do not have the option to finance their production. These farmers borrow capital from the tengkulak and repay them in the form of agricultural products. While such capital input may provide farmers with the means they require to manage their farms and meet their daily needs, they can also fall victim to price discrimination by the tengkulak. (4) In rural markets, trade is characterised by the direct sale of small quantities of produce by farmers to village traders, and by sales by retailers to rural consumers. Rural markets form part of a trade network, are normally arranged on a periodic basis on specific weekdays, and are commonly organised at a central place in a village or district centre, or adjacent to the village’s access road (Adimihardja, 2006).

1.2 Perceived value, trust, performance, and commitment

In B2B marketing research, perceived value is traditionally estimated using utilitarian, functional and economic measures (Brillet et al., 2014). According to Chen et al. (2011), multidimensional perceived value consists of functional value, social value, and emotional value.

The literature on agricultural supply chain management states that value, trust, supplier performance, and commitment are vital components of business-to-business relationships. Perceived value is considered to be the evaluation of farmers of the effectiveness of products or service (Zeithaml, 1988). Neal (1999) argues that perceived value is a direct precursor to trust that can result in an increase in performance because, in business-to-business relationships, where outcomes depend on the intent of partners, trust is especially crucial and involves a belief that a relationship partner will act in the best interests of other partners. Trust exists when a firm has confidence in a partner’s
reliability and integrity (Kwon and Suh, 2005). Trust is often described as one of the most important variables in agricultural supply chain management (Lambe et al., 2001). Trust between firms creates an atmosphere where partners willingly exceed the minimum requirements of an exchange relationship based on the belief that the partner will only take actions that will result in positive outcomes for the firm (Anderson and Narus, 1990; Ireland and Webb, 2007). Trust is vital for firms to enter into, and develop, a relationship (Ireland and Webb, 2007; Morgan and Hunt, 1994). When a buyer and supplier trust one another, they are more willing to share resources without the fear of opportunistic behaviour by the other party. Differences in levels of trustworthiness can therefore be expected to relate to different levels of resource allocation from partners (Tsai and Ghoshal, 1998). The literature on trust in buyer-supplier relationships mainly describes the positive effects of trust. For example, a supplier’s trust in a buyer is found to be positively associated with the buyer’s perception of relationship performance (Johnston et al., 2004). Trust exists when the buyer and supplier understand and do not take undue advantage of each other (Roy et al., 2004). Trust has been linked with more cooperative supplier relationships (Johnston et al., 2004), and the supplier’s trust in the buying firm is linked to improved supplier performance (Lawson et al., 2008).

Schulze et al. (2007) defines commitment as an outcome of trust and the belief of the supplier that the relationship with the processor is so important that it warrants maximum effort to maintain it even if problems occur. Commitment implies the importance of the relationship to the relationship partner and their desire to maintain the relationship in the future (Cater and Cater, 2007). Commitment is essential for the development of long-term relationships (Lages et al., 2008). Applying this conceptualisation of commitment to a business relationship leads to stability, and many such connections form a network (Anderson and Medlin, 2016). Commitment goes beyond an evaluation of the current benefits and costs of a relationship; it implies long-term orientation towards the relationship (Saura et al., 2009). With commitment, a supplier can gain greater access to market information (Lages et al., 2008). In addition, commitment enables firms within a network to access their partners’ resources and capabilities.

Buyer-supplier relationships have evolved over the past two decades from arm’s-length relationships into collaborative processes. According to Fizzanty and Masyhuri (2013), a number of lessons can be drawn from agribusiness partnership cases to ensure good performance. One of these lessons is to build a relationship of trust and commitment between the partners. Partnerships between suppliers and buyersgrow stronger as trust between partners grows: without operations and information sharing between partners, it is unlikely that the partnership will be sustained. However, the results of previous research show that it is difficult for some to trust their business partners. Such distrust may be caused by unpleasant past experiences of working together. Nevertheless, trust is the most important factor in a good relationship (Cater, 2007). Because the benefits of collaboration do not occur automatically, the current literature provides insight into the role of factors such as trust and commitment in helping firms to build effective collaborations (Heirati et al., 2016).

Research on B2B marketing focuses mostly on service and industry, such as companies and SMEs. Research focusing on farmers, as suppliers to agribusiness who are usually excluded from the value chain, is rare. In addition, the existing research is rarely conducted from the perspective of farmers as suppliers; instead, most studies focus on the buyer’s point of view. In order to respond to this identified gap in the literature, future studies of perceived value, trust, commitment and performance should be conducted with a focus on agribusiness.
There is an urgent need to explore the agribusiness context. Agriculture differs from other contexts in that the goals of agribusiness are not only economic, but also social and emotional. There is a need for more scientific studies on the business-to-business (B2B) context, given that most of the existing research focuses on the business-to-consumer context.

Based on the preceding discussion, this study examines the relationships between agricultural buyers (cooperatives, farmers groups, collectors, and rural markets) and suppliers (farmer) from the perspective of farmers, and investigates the conditions under which collaboration is beneficial to farmers.

RQ1: Will farmers’ perceived value, trust, commitment, and performance differ towards different buyer types?

RQ2: How does the role of specific buyer types affect farmer’s perceived value, trust, commitment, and performance?

RQ3: What is the relationship between perceived value, trust, commitment, and performance?

The ability and willingness of suppliers to form relationships with buyers are conditioned by buyer types that show differences in perceived value, trust and performance (De Mooij, 1998). Based on Morgan and Hunt (1994), perceived value, trust and performance are vital components of business relationships. In light of the exogenous conditions (such as buyer types) affecting markets, the vital components of supplier–buyer relationships cannot be fully understood and should be examined under differing buyer conditions.

This discussion gives rise to a proposed model (see Figure 1) and a number of hypotheses:

H1: Buyer type differences result in differences in suppliers’ perceptions of value, trust, commitment, and performance.

H2: Perceived value has a positive effect on trust.

H3: Perceived value has a positive effect on commitment.

H4: Trust has a positive effect on performance.

H5: Commitment has a positive effect on performance.

Figure 1  Model of the research
The research objective is to test the effects of different types of agricultural buyers on farmers’ perceived value, trust and performance based on farmers’ biological response (as revealed by an EEG recording) to attempts to elicit their perceived value, trust, commitment, and supplier performance.

1.3 Electroencephalography (EEG)

The human brain receives input from the sensory organs and sends output to the muscles. The brain is divided into two hemispheres: left and right. The cerebral cortex brain area can be divided into four sections, known as lobes. The frontal lobe, parietal lobe, occipital lobe, and temporal lobe have each been associated with different functions (Allen et al., 2002). The frontal lobe is located at the front of the brain and is associated with reasoning, motor skills, higher-level cognition, and expressive language. This area of the brain receives information from various lobes of the brain and utilises this information to carry out body movements. The parietal lobe is located in the middle section of the brain and is associated with processing tactile sensory information such as pressure, touch, and pain. The temporal lobe is located on the bottom section of the brain. This lobe is central to the interpretation of stimulus and also heavily associated with the formation of perception and emotion. The occipital lobe is located at the back of the brain and is associated with the interpretation of visual stimuli and information. In this research, the authors focus on the frontal, temporal, and parietal lobe areas that can reflect suppliers’ perceived value, trust and performance. The discipline of neuroscience has as its aim the collection of knowledge about the structure and function of the brain. Cognitive neuroscience is a specific branch of neuroscience that tries to understand the neural mechanisms behind specific thoughts, such as reasoning, emotion, memory, decision-making, and so on. Electroencephalography (EEG) is a popular neuroscience research tool among scientists for evaluating somatosensory responses to stimuli and obtaining data on humans’ deeper reactions to various stimuli (Davidson et al., 2007; Ariely and Berns, 2010; Ohme et al., 2009; Wilson et al., 2008; Zurawicki, 2010). The general assumption is that human brain activity can provide marketers with information not obtainable via conventional marketing research methods (e.g. interviews, questionnaires, focus groups) (Ariely et al., 2010). This is mainly driven by the fact that people cannot fully explain their answer when explicitly asked at the level of conscious awareness (Calvert and Brammer, 2012).

EEG records are seen as indicators of humans’ true emotions and feelings because there are several activations in certain regions in the brain that may suggest consumers’ unfiltered responses (Davidson, 1992). By using electrophysiological responses in the form of EEG for this research, it is possible to gather immediate feedback to presented stimuli as fluctuations in farmers’ brain signal frequencies to learn more about emotion, judgement, and attention (Davidson, 1992; Fugate, 2007; Vecchiato et al., 2011). Frequency and amplitude are the characteristics of the recorded EEG patterns. The frequency range is normally between 1 and 80 Hz (divided into alpha bands, beta bands, and more), with amplitudes of 10 to 100 microvolts. The observed frequency is divided into groups, with specific frequency ranges denoting certain states of mind. The main spectral bands of Delta (0–4 Hz), Theta (3–7 Hz), Alpha (8–12 Hz), Beta (13–30 Hz), and Gamma (30–40 Hz) are observed to examine consumers’ cognitive or affective processes in response to given stimuli (Preference Extraction from Bio-Signals: An Experimental Study; Bourdaud et al., 2008; Custidio, 2010; Kawasaki and Yamaguchi,
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2012; Khushaba et al., 2013; Mostafa, 2012; Ohme et al., 2009; Application of Frontal EEG Asymmetry to Advertising Research, 2010). For this research, we use Alpha-wave and Beta-wave activity related to an active state of mind, most prominent in the frontal cortex and over other areas during intense focused mental activity (Jasper, 1958).

2 Methods

2.1 Participants

The participants in this research are Indonesian farmers chosen by non-probability judgemental sampling. All participants fulfilled the study criteria of having either normal or corrected vision, not currently using psychoactive medication, having no history of either neurological or psychiatric disturbances, and being right-handed, as assessed by the Edinburgh Handedness Inventory. The sample size for the experiment is 40 male participants between the ages of 28 and 74. The majority (45%) earned between IDR 1,000,000 and IDR 5,000,000 per month. Half of all participants earned less than IDR 1,000,000 per month, while the remaining 5% earned more than IDR 5,000,000 per month.

2.2 Experiment instrument

The brainwave data collection process employed EMOTIV Insight, a high resolution wireless EEG neuroheadset. It consists of five EEG channels that represent three brain parts: the frontal (AF3 & AF4), parietal (Pz), and temporal (T7 & T8), coded by the electrode position and hemisphere position according to the International 10–20 system, as shown in Figure 2.

Figure 2 EMOTIV Insight electrode positions

The experiments were conducted using several software programs, namely: (1) OpenViBE 0.13.0 for the creation of data recording scenarios; (2) EPOC Control Panel (EMOTIV Software Development Kit) to ensure that no data are lost, a writable marker
trace to ease single trial segmentation tasks, and a real-time sensor contact display to ensure the quality of measurements; and (3) Matlab R2014b in conjunction with EEGLAB for data recording and data processing.

2.3 Experiment procedure

The electrodes were placed on the F3–F4, T7–T8 and Pz sites. Participants were first exposed to several framed trading patterns of different types of buyer (cooperatives, farmers groups, collectors/tengkulak, and rural markets) as stimuli. After being exposed to these stimuli, participants answered questions regarding (1) perceived value, derived from Callarisa-Fiol et al. (2011); (2) trust, obtained from Dyer (2009), and (3) performance, obtained from O’Toolea and Donaldson (2002). Subsequently, the farmers’ reactions – sensory, cognitive and emotional state responses based on cortical brain activity (EEG signals) in different brain regions – were measured while they answered the questions. This procedure was repeated three times with an interblock interval of 10–15 minutes.

2.4 Data processing and analysis

The raw data from the EMOTIV Insight neuroheadset was translated into numeric data in the form of a CSV file. Thereafter, the raw data was processed in several stages: (1) Offset removal is the noise waveform (waves with 0 frequency) filter (band-pass filter); (2) Artefact removal is a filter removing artefacts waveforms due to participants’ muscle movements, such as blinking or head movements; and (3) Separation of beta wave data from other brain waves with the filtering process using the filter beta waves (13–30 Hz).

Partial Least Squares (PLS) regression was used to identify the causal modelling for the latent variables. SmartPLS 3.0 was used to help identify the model, such as perceived value, trust, commitment and performance. In any reflective measurement model, several aspects must be determined to establish the fitness of the measurement model, namely internal consistency reliability, indicator reliability, convergent validity, and discriminant validity.

3 Results and discussion

H1: Buyer types differences in Indonesian agricultural business relationships result in differences in suppliers’ perceptions of value, trust, commitment and performance.

A Perceived value

In the business-to-business context, perceived value is a multidimensional construct comprising functional value, emotional value and social value (Fiol et al., 2011). In relation to emotional value, the results of this study showed that participants’ beta brainwave amplitude was increased as compared to baseline values in each brain area (parietal lobe, temporal lobe, and frontal lobe) after the stimulus was applied, as shown in Figure 3. These results indicate that the stimulus of several framed trading patterns of different buyer types (cooperatives, farmers groups, tengkulak and rural markets) generally can cause the activity of neurons in the parietal, temporal and frontal areas to become more active due to the transient effects of the stimulus, as a natural adaptation to environmental conditions (Vandewalle et al., 2007).
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Figure 3  Farmers’ brain waves – mean difference of perceived value response in: (a) frontal channel; (b) temporal channel; and (c) parietal channel

Each pair of electrodes from the left and the right hemispheres was analysed together in each brain area that was studied. Data pooling of the beta wave spectrum in channel AF3 was compared with channel AF4 (frontal lobe) and channel Pz (parietal lobe). In addition, channel T7 was compared with channel T8 (temporal lobe) to determine EEG asymmetry for the left (AF3, Pz, and T7) and right hemispheres (AF4 and T8).

For female participants, the amplitude value in the left hemisphere is higher than that in right hemisphere, whether in the parietal lobe (Pz), frontal lobe (AF3–F4), or temporal lobe (T7–T8). Based on the paired sample t-test for each lobe, there was a significant difference between amplitude activity in the left and right hemispheres, except in the parietal lobe: AF3–AF4 $t(15.73) = 8.532, p < 0.05$; and T7–T8 $t(6.254) = 18.647, p < 0.05$. These results suggest that, when the stimulus was given, the participants in general had a positive emotional response towards the perceived value of each of the buyers, except for cooperatives, which reported a result below the baseline value ($1.4 \mu V < \text{baseline} = 5 \mu V$). Based on previous research, larger activations in the left hemisphere are indications of happiness or amusement, while larger activations in the right hemisphere indicate disgust (Davidson, 2004).

The results of the emotion analysis using EMOTIV Insight (Figure 4) show that most participants (86%) had the highest interest response on perceived value in relation to the farmers group, and the lowest interest in cooperatives (41%). This finding aligns with the results of Akwabi-Ameyaw (1997) and Van Niekerk (1988), who demonstrated that the perceived value of cooperatives were mainly hampered by a lack of management experience, knowledge and capital resources. This differs from the perceived value of farmers groups, which are seen to develop farmers’ own abilities and self-confidence so that they can become strong, independent stakeholders.
B Trust and commitment

In relationships with suppliers, trust and commitment are central factors. Jones et al. (2010) argue that, in essence, the concept of commitment indicates dedication as well as motivation to remain in a relationship. The buyer appears concerned about trust and commitment; the establishment of trust and commitment between buyer and supplier is critical to strategic partnerships (Sheridan, 1998; Jeong and Hong, 2007), and may be a prerequisite for establishing effective collaboration (Jap, 1999; Barney and Hansen, 1994). Based on the results of this study, there are two sets of factors that play a role in developing farmers’ trust in, and commitment to, their buyers. The first set of factors includes information and knowledge sharing. This is related mostly to price information and knowledge required to increase productivity. This occurs because farmers’ access to information is somewhat limited. Thus, their partners should share important information, and such information should be clear enough to be understood by them. The second category comprises actual proof of results. To gain farmers’ trust and commitment, farmers need their partners to provide actual proof about what they are promising, because farmers need to witness evidence of the promised results for themselves.

Based on the emotion analysis using EMOTIV Insight (Figure 5), the results show that most of the participants (69%) had the highest engagement response leading to trust and commitment in relation to farmers groups, and the lowest engagement response in relation to cooperatives (31%). In developing countries, attempts to organise farmers into cooperatives have often failed because of a lack of trust towards such cooperatives, despite their potential to supply farm inputs and market farm products, both of which are important for agricultural development (Hoyt, 1989). The reasons for such mistrust include problems in holding management accountable to the members. This leads to inappropriate political activities or financial irregularities, and culminates in members’ disloyalty and distrust due to ignorance. In contrast, farmers groups gained the highest trust response from farmers because such groups usually share information and knowledge, working as a team to expand their farm activity, and developing close relationships due to living in the same neighbourhood.
C Performance

Inherently, higher levels of trust rooted in people, relationship and buyer competency could yield improved performance, and it has been posited that trust in a relationship could lead to more positive performance levels. We measured the excitement of farmers towards each buyer type. When a person is excited, their emotions become more powerful, having divergent effects on performance and holding the potential to affect decision-making abilities. Excited people are more likely to make a decision.
The results of the emotion analysis using EMOTIV Insight (Figure 6) show that most of the participants (69%) have the highest excitement response towards *tengkulak* performance, while the lowest response is elicited towards the performance of cooperatives (31%). The *tengkulak* plays an important role in farming communities. Its first role is as a provider of financial or capital input. The *tengkulak* provides access to capital inputs for smallholders who are unable to access formal credit (via banks). Its second role is in relation to the production process. The *tengkulak* facilitates smallholders by providing agricultural input. Its third role is that of post-production or marketing. The *tengkulak* enables smallholders to sell their agriculture products easily. Its fourth role is socio-religious in nature. Smallholders need money, for instance, school fees, medical care, and donations for socio-religious activity. They are able to borrow money from the *tengkulak* without any administrative procedures. These considerations may account for the fact that most of the farmers are excited by the performance of *tengkulak*.

Based on these results, it appears that differences between the various buyer types in Indonesian agricultural business relationships result in differences in suppliers’ perceptions of value, trust, and performance. Therefore, H1 is supported.

### 3.1 Perceived value, trust, commitment, and performance in business relationships

Participants’ agreement with statements about perceived value, trust, commitment and performance in relationships with different buyers were expressed through numeric electroencephalograph data. The data were then analysed using PLS regression to test the correlation between perceived value, trust and performance. The construct validity and reliability results are set out in Table 1.

#### Table 1 Construct validity and reliability

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach’s α</th>
<th>rho-A</th>
<th>Composite reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived value</td>
<td>0.829</td>
<td>0.984</td>
<td>0.875</td>
<td>0.86</td>
</tr>
<tr>
<td>Trust</td>
<td>0.887</td>
<td>0.820</td>
<td>0.937</td>
<td>0.72</td>
</tr>
<tr>
<td>Commitment</td>
<td>0.891</td>
<td>0.864</td>
<td>0.852</td>
<td>0.79</td>
</tr>
<tr>
<td>Performance</td>
<td>0.837</td>
<td>0.885</td>
<td>0.866</td>
<td>0.76</td>
</tr>
</tbody>
</table>

The composite reliability and Cronbach’s $\alpha$ values should be 0.7 or higher (Bagozzi and Yi, 1988; Wong, 2011) and all variables were larger than 0.7, meaning that a high level of internal consistency and reliability has been demonstrated among all three reflective latent variables. For all indicators to be valid, the convergent validity for each item should have an average variance extracted (AVE) of 0.50 or higher. The validity and reliability results set out in Table 1 were acceptable for all variables.

The results of the hypothesis testing are set out in Table 2.

#### Table 2 Hypothesis testing results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>$\beta$ Coefficient</th>
<th>t-value</th>
<th>p-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2</td>
<td>Perceived value → Trust</td>
<td>0.780</td>
<td>0.104</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3</td>
<td>Perceived value → Commitment</td>
<td>0.688</td>
<td>0.017</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
<tr>
<td>H4</td>
<td>Trust → Performance</td>
<td>0.667</td>
<td>0.040</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
<tr>
<td>H5</td>
<td>Commitment → Performance</td>
<td>0.784</td>
<td>0.043</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
The relationships among farmers’ perceptions of the value, trust, commitment and performance of their buyers were assessed through the correlations among the three factors. In support of H2–H5, the correlations reveal strong relationships among value, trust, and performance. H2, H3, H4 and H5 were accepted, and this result aligns with the findings of previous research that identified perceived value, trust, commitment and supplier performance as vital components of business-to-business relationships. Perceived value is a direct precursor of trust that can result in an increase in performance (Morgan and Hunt, 1994; Kalafatis and Miller, 1997; O’Malley and Tynan, 1997). The results indicate that farmers’ perceived value plays an important part in gaining their trust and lead to increased performance in business relationships.

4 Conclusion and implications

Buyer–supplier relationships play an important role in enabling those engaged in agricultural business to respond to dynamic and unpredictable change. Each of the four main agricultural buyers (cooperatives, farmers groups, brokers/tengkulak and rural markets) in Indonesia has a particular trading pattern. The results of the study are:

1. Buyer type affects suppliers’ (farmers’) perceptions of value, trust, commitment and performance. There are differences in the emotional responses of farmers towards each buyer type. Most farmers have the highest interest response to the perceived value, and engagement response leading to trust, towards farmers groups, while exhibiting the lowest interest and engagement responses to cooperatives. However, most participants exhibited the highest excitement response towards the performance of tengkulak, with the lowest towards the performance of cooperatives.

2. There are correlations among perceived value, trust, commitment and performance. Perceived value affects trust and commitment positively in business relationships, while trust and commitment positively affect performance. The results indicate that perceived value plays an important part in gaining farmers’ trust and leads to better performance in business relationships.

Our study provides empirical evidence for the hypothesis that perceived value, trust, commitment and performance matter in buyer–supplier relationships. Suppliers’ evaluation of their buyers’ trading system in the network will elicit different reactions that can affect their relationships. This study aids the understanding of the conditions in buyer–supplier relationships and will add to the growing literature on relationship management in agricultural supply chain contexts by combining such research with a neuroscientific approach in order to fully explore the biological responses of suppliers. It provides objective, honest and unmanipulable information about the inner workings of the brain.

In terms of its implications for future research, this study focuses on the relationships between buyers and their strategic suppliers, providing insight into actual practices and indicating that there will be mutual efforts by buyers and suppliers from which both can derive value. This research extends the study of buyer–supplier relationships even further by combining it with a neuroscientific approach in order to fully explore neural responses (as evidenced by EEG results) that can provide objective and honest information about the inner workings of consumers’ brains. The study’s findings also provide a framework
for further research. It enriches existing knowledge, especially for buyers, to prepare them to invest in a variety of mechanisms to enhance value extraction from their suppliers. Future research should search for different operationalisation of value, trust, and commitment that will be more appropriate. Further work also needs to be done in order to take account of cultural dimensions; in-depth interviews and other forms of qualitative research are needed.

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