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COMPETITIVE BLIND SPOTS IN AN INSTITUTIONAL FIELD

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Unlike institutional or macro-cultural explanations of competition, competition need not be viewed as a shared social reality. Instead, competition can be interpreted differently by multiple stakeholders of a value chain. However, due to managerial blind spots, such various interpretations of competition are less than apparent to management. Yet explanations of such blind spots are not well documented. Hence, to explain such blind spots, a conceptual model based on overconfidence biases is developed in which managers develop a 'self-centered' view of competition that blinds them from the competitive beliefs of their value chain customers. Differences in competitive beliefs, thus, arise and are argued to contribute to such managerial blind spots. Furthermore, to empirically examine such managerial blind spots, the competitive perceptions held by various members of a swine genetics value chain were surveyed. Through cluster and MANOVA analyses, this study shows that, unlike institutional/macro-cultural explanations of competition, these members do not share a common consensus of the key attributes and groupings of competition. The implications and contributions of this study are also discussed.

INTRODUCTION

Jack Welch, the former chief executive officer of General Electric, said the task of management is 'staring reality straight in the eye' (Gilad, 1996 : 1). Yet, staring straight into one's competitive reality is a deceptively difficult managerial task. Managers are subject to interpretative biases that 'blind' them from other perceptions of competition (e.g., Schwenk, 1986; Zahra and Chaples, 1993; Zajac and Bazerman, 1991), because these biases yield but one of many possible perceptions of competition (Hodgkinson, Tomes, and Padmore, 1996; Zahra and Chaples, 1993). Results from cognitive research suggest that industry competition is not only defined by managerial interpretations among rival firms, but also by the interpretations of its value chain members, including direct and end customers (Abrahamson and Hambrick, 1997; Bergen and Peteraf, 2002; Chen, 1996; Hodgkinson *et al*., 1996; Rindova and Fombrun, 1999). As Rindova and Fombrun (1999) note, '... the boundaries of an industry and a market are determined not only by how firms define their businesses... but also by how constituents [customers] understand and choose among these businesses' ([authors' insertion], Rindova and Fombrun, 1999: 693).

Yet, value chain customers have different interpretations of competition than management. This is because competition is not just based on a firm's rivalry for scarce factor inputs, but also on the satisfaction of consumers' needs (e.g., Bergen and Peteraf, 2002; Besanko *et al*., 2004; Porac,

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Thomas, and Baden-Fuller, 1989). This satisfaction of consumer needs stems from a competitive process in which each firm submits product and price 'bids' to their customers (Besanko *et al*., 2004). Within this process, customers define competition by firms that can offer products/services that yield the greatest utility or customer surplus (Besanko *et al*., 2004; Porac *et al*., 1989). As a result, direct customers and end users may perceive traits such as product functionality, credit terms, and service support as defining features of a firm's competition. Unlike customers, managers are more likely to characterize their competition relative to their firm's perceived competitive advantage (Porter, 1980). Hence, managers may define their competition on the basis of input factors, geographical location, economies of scale (e.g., Porac *et al*., 1995), and reputation (Abrahamson and Fombrun, 1992). Furthermore, value chain customers possess knowledge, experiences, skills, and histories different from management. Value chain customers will, thus, focus their attention on actions and dimensions of competition that are most salient to their domain of experience. As a result, value chain customers will exhibit views on the key attributes and groupings of competition different from a firm's management (e.g., Bergen and Peteraf, 2002; Chen, 1996; Peteraf and Bergen, 2003).

However, such differences in competitive perceptions are not likely to be recognized by a firm's management, because they are subject to competitive 'blind spots.' Blind spots have been well documented in research that finds that top management teams (TMTs) have a flawed or incomplete understanding of their competitive situation (e.g., Audia, Locke, and Smith, 2000; Zahra and Chaples, 1993; Zajac and Bazerman, 1991). Such an incomplete understanding has been attributed to a problem of overconfidence (Schwenk, 1984, 1986; Zajac and Bazerman, 1991). Overconfidence limits managers' ability to question their assumptions and beliefs, which can blind them from alternative interpretations of their competition (Hayward, Rindova, and Pollock, 2004; Prahalad and Bettis, 1986; Russo and Schoemaker, 1992; Zajac and Bazerman, 1991). In that, Russo and Schoemaker (1992) find managers tend to place undue confidence on their prior judgments. Such confidence leads to an interpretation of competition that is consistent with the manager's past beliefs. As a result, managerial overconfidence can lead to a *self-centered view* of competition (e.g., Zajac and Bazerman, 1991: 43) that blinds management from sufficiently accounting for the various competitive perceptions of its value chain customers (e.g., Zahra and Chaples, 1993).

However, prevailing institutional (DiMaggio and Powell, 1983) or *macrocultural* (Abrahamson and Fombrun, 1992, 1994; Porac *et al*., 1989, 1995) explanations have largely discounted such managerial blind spots. An institutional/macrocultural explanation argues that managers and their value chain customers share similar views of competition because of an overarching industry culture (i.e., macroculture) and pressures for institutional conformity. For instance, Abrahamson and Hambrick (1997) contend that powerful institutional members, such as customers, can limit managerial discretions in their beliefs of competition. With such restrictions, managers tend to conform to the beliefs of their customers. Such conformance pressures can also originate from firm-level processes. For instance, Porac *et al*. (1989, 1995) contend macrocultures are socially constructed by the interpretations and actions of competing firms. By *enacting* (Weick, 1969) interpretations of their competition, the competitive beliefs of the TMT become diffused to the greater value chain of customers, suppliers, and competitors. Through such an institutionalized process, Abrahamson and Fombrun note that ' ... in an ocean of microcultural heterogeneity, islands of greater macrocultural homogeneity tend to emerge and persist along vertical, horizontal, and diagonal dimensions of value-added networks' (Abrahamson and Fombrun, 1994: 737). Therefore, as managers and their value chain members develop such a shared understanding of competition, managerial blind spots cannot exist within an institutional/macrocultural framework.

As a result, the objective of this study is to conceptually and empirically advance a 'heterogeneous' explanation of managerial blind spots. A conceptual model based on overconfidence biases is developed to explain managerial blind spots in a value chain context. This conceptual model argues that a TMT's overconfidence can yield a 'self-centered' view of competition that limits a TMT's ability to sufficiently account for the competitive beliefs of its value chain customers. Differences in competitive beliefs, thus, arise that reflect basic flaws or gaps in a TMT's understanding of its competition. This heterogeneity of competitive beliefs

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is, therefore, argued to contribute to managerial blind spots.

To empirically examine such blind spots, differences in the competitive perceptions of three stakeholder groups in a swine genetics value chain are investigated. Specifically, differences in the perceptions of the attributes and groupings of competition in this swine genetics value chain are examined using cluster and multivariate analysis of variance (MANOVA) analyses of survey data. The results of these analyses are then discussed, and we conclude with the implications and contributions of this study.

CONCEPTUAL FOUNDATIONS

To develop this study's conceptual framework, the concept of managerial blind spots and its unit of analysis are first defined. Blind spots are defined by flaws in a TMT's interpretation of the attributes and groupings of its competitive rivals (e.g., McNamara, Luce, and Tompson, 2002; Schwenk, 1986; Zahra and Chaples, 1993). As blind spots are unique to a TMT's experiences (Zahra and Chaples, 1993; Zajac and Bazerman, 1991), blind spots are taken from the vantage point of a TMT for a given 'focal firm.' Furthermore, since competition is interpreted differently by multiple stakeholders of a firm's value chain, a TMT's blind spots are defined by the TMT's inability to account for the competitive perceptions of its value chain customers. Specifically, a TMT's blind spots reflect deviations in its beliefs of competition from those of its direct and end customers. The unit of analysis is, thus, based on a dyadic pairwise comparison between the competitive perceptions of the TMT of the given/focal firm with that of its value chain customers.

Blind spots as a problem of overconfidence

Although managerial blind spots have been attributed to various influences, overconfidence has been identified as one important factor (e.g., Audia *et al*. 2000; Hayward *et al*., 2004; Klayman *et al*., 1999; Russo and Schoemaker, 1992; Zajac and Bazerman, 1991). According to Klayman *et al*., overconfidence means that individuals '. . . are systematically overconfident about the accuracy of their knowledge and judgment. That is, they tend to express confidence in their judgments that exceeds the accuracy of those judgments' (Klayman *et al*., 1999: 217). Overconfidence contributes to managerial blind spots because overconfidence limits managers' ability to question their assumptions and beliefs, which leads to a restrictive interpretation of their competitive environment (Hayward *et al*., 2004; Zahra and Chaples, 1993; Zajac and Bazerman, 1991). Yet, despite the ubiquitous nature of managerial overconfidence (Einhorn and Hogarth, 1978; Russo and Schoemaker, 1992), the underlying biases impacting overconfidence are not well understood (Alba and Hutchinson, 2000; Klayman *et al*., 1999; Hayward, Shepherd, and Griffin, 2006). Some psychologists and cognitive researchers have, however, suggested that overconfidence has been linked to availability and confirmation biases (e.g., Russo and Schoemaker, 1992; Schwenk, 1986; Tversky and Kahneman, 1974).

Availability bias refers to the notion that 'people assess. . . the probability of an event by the ease with which instances or occurrences can be brought to mind' (Tversky and Kahneman, 1974: 1127). Availability bias is impacted by salience; the vividness of an event increases the ease by which the event can be brought to mind. That is, as vivid events are more easily recalled, greater subjective probabilities or confidence is placed on richly described events over less lucid events. This 'salience bias' can arise especially when the information event has a strong association to an individual's past experiences or beliefs (see also Beyer *et al*., 1997: 731; Kiesler and Sproull, 1982). This is because information events that are more easily related to one's personal experiences are more deeply encoded into one's memory. These events are more richly recalled, which increases an individual's confidence in the likelihood of recurrences of those events (e.g., Kiesler and Sproull, 1982).

Because managers interpret their competition through their past experiences (Walsh, 1995), a TMT's perception of the key attributes of competition is subject to such a salience bias. The competitive experiences of TMT members reflect established patterns or beliefs of competitive success (e.g., Audia *et al*., 2000; Lant, Milliken, and Batra, 1992; Prahalad and Bettis, 1986). Such memories are used to guide interpretations of the external and central features of the competitive environment (Audia *et al*., 2000). As the interpretation of competition is filtered through such managerial experiences (Walsh, 1995), managers focus on those attributes/features of competition that are

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most pertinent or relevant to their past beliefs of competitive success (e.g., Bowman and Daniels, 1995). By focusing on these features, managers place greater confidence (i.e., greater subjective likelihood) on these attributes as being the defining features of its competition. A salience bias can arise because not only does the TMT focus on those attributes of competition that are relevant to its past successes, but such attention to those attributes reinforces a TMT's confidence that its prior judgments are correct. This is similar to findings from self-attributional studies that show that executives attribute positive firm outcomes to their own actions because such causal attributions increase managerial confidence (Bettman and Weitz, 1983; Clapham and Schwenk, 1991; Hayward *et al*., 2004; Salancik and Meindl, 1984; Schwenk, 1986).

Availability bias is also attributed to an imagination bias (Russo and Schoemaker, 1992). An imagination bias occurs when an event that can be readily imagined or constructed by some decision heuristic influences the subjective likelihood of the occurrence of the event (Kahneman and Tversky, 1973; Tversky and Kahneman, 1974). Individuals cannot imagine or anticipate all possible outcomes, and as a result they rely on decision heuristics that can readily 'construct' an imagination of their information environment (Kahneman and Tversky, 1973; Russo and Schoemaker, 1992; Tversky and Kahneman, 1974). As a result, greater confidence or a higher subjective likelihood is placed on imaginations that can be readily constructed over those that require more extensive examinations of the information environment. As Russo and Schoemaker explain,

> A major reason for overconfidence in predictions is that people have difficulty in imagining all the ways that events can unfold... Because we fail to envision important pathways in the complex net of future events, we become unduly confident about predictions based on the fewer pathways we actually do consider (Russo and Schoemaker, 1992: 11).

A TMT is susceptible to an imagination bias because the construction of competitive groups is subject to a basic *interpretative problem* (Porac and Thomas, 1990). This interpretative problem refers to the idea that managers face cognitive limits in their ability to conduct pairwise comparisons to all possible firms (Porac and Thomas, 1990). As a TMT cannot 'imagine' all the possible ways that its firm is similar/different to/from all other firms, a TMT relies on a classification heuristic or cognitive map to make sense of its complex information environment (Porac and Thomas, 1990; Reger and Huff, 1993). A classification heuristic or a cognitive map facilitates interpretation of the competitive environment by simplifying the '... complex cognitive problem of independently analyzing a larger number of competitors by grouping them' (Reger and Huff, 1993: 105). However, by simplifying the competitive environment, cognitive maps lead to myopic interpretations that resist or ignore emerging competitive threats and thereby creating blind spots (Porac and Thomas, 1990; Reger and Huff, 1993; Walsh, 1995). With this form of imagination bias, managers can become unduly confident in their categorizations of competition. This imagination bias can, thus, limit managers' abilities to not only consider other interpretations of competition, but also limit managers' abilities to anticipate emerging or outside competitors. For instance, despite the fact that international firms offered close substitutes to Scottish knitwear, Porac *et al*.'s (1989, 1995) study found that Scottish knitwear producers, who only had a three percent market share of international exports, did not recognize Japanese or Italian knitwear producers as key competitors.

Moreover, a TMT's salience bias can impact its imagination bias. This is because a TMT's construction of its cognitive maps is dependent on defining the relevant attributes that are used to construct its competitive groups (Ketchen and Shook, 1996; Porac and Thomas, 1990; Reger and Huff, 1993). To elaborate, since the classification of competitive groups is influenced by a TMT's experiences and biases (e.g., Daniels, Johnson, and Chernatony, 1994; McNamara *et al*., 2002; Walsh, 1995), such experiences condition the TMT's salience bias of the key attributes of its competition. Because a TMT's salience bias focuses their attention on attributes that are highly related to their past experiences, these attributes are more vividly recalled. As these attributes are more readily recalled, it impacts the ease to which a TMT can construct its cognitive maps and thereby increases a TMT's imagination bias. This is consistent with research that finds TMTs utilize only a few key attributes to construct their competitive groups (Gripsrud and Gronhaug, 1985;

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McNamara *et al*. 2002; Porac *et al*., 1995; Reger and Huff, 1993; Reger and Palmer, 1996).

In addition to such availability biases (salience and imagination), overconfidence is also attributed to a confirmation bias (Russo and Schoemaker, 1992; Schwenk, 1986). Confirmation bias refers to the idea that individuals tend to reject *disconfirming information* in favor of confirmatory information because individuals do not reason through a falsification of beliefs (Einhorn and Hogarth, 1978; Schwenk, 1986). Zahra and Chaples note that to maintain consistency in beliefs, 'executives will more readily accept industry and competitive information that supports their existing beliefs' (Zahra and Chaples, 1993: 14). Overconfidence is associated with confirmation bias, because seeking confirmatory information reduces managers' need to adjust their beliefs to other competing views, thereby increasing confidence in their prior judgments. Such increases in confidence can eventually lead to an *escalating commitment* to managers' prior beliefs and courses of action (e.g., Audia *et al*., 2000; Clapham and Schwenk, 1991; Hayward *et al*., 2004; Lant *et al*., 1992; Schwenk, 1986), which restricts managers' ability to identify and respond to their competitive environment (Audia *et al*., 2000; Russo and Schoemaker, 1992; Zajac and Bazerman, 1991).

By seeking confirmatory information, a TMT's confirmation bias not only increases confidence in its prior judgments, but a TMT's confirmation bias can also serve to validate or reinforce its salience and availability biases. To validate a TMT's salience bias, a TMT's confirmation bias involves seeking comparisons to rivals who share similar beliefs on the key attributes of competition (e.g., Fiegenbaum and Thomas, 1995; Hodgkinson, 1997; Hodgkinson, and Johnson, 1994; Porac and Thomas, 1990; Walsh, 1995). As these social comparisons promote the exchange of detailed and rich information (e.g., Coleman, 1988; Peteraf and Shanley, 1997), the key attributes of competition are more vividly or richly identified. These social comparisons, thereby, promote greater recall and thus increase a TMT's salience bias. Furthermore, as the key attributes conveyed by such comparisons are mutually consistent to a TMT's background of competitive experiences (Peteraf and Shanley, 1997), these comparisons further increase a TMT's salience bias. As the TMT places greater confidence in these attributes as the defining features of its competition, a TMT can more readily construct competitive groups from these identified attributes. A TMT's confirmation bias, therefore, not only validates a TMT's salience bias, but as consequence reinforces a TMT's imagination bias. In addition, as a TMT's confirmation bias promotes comparisons to similar rivals, significant referents are more readily identified (e.g. Fiegenbaum and Thomas, 1995; Peteraf and Shanley, 1997). This increases a TMT's imagination bias because it reduces the space of competition to a more manageable set and thus promotes recall. As a TMT's confirmation bias validates or reinforces such availability biases (salience and imagination), the TMT becomes increasingly confident in its judgments of the key attributes and groupings of its competition.

As perceptions of competition entail a multitude of interpretations, such managerial overconfidence leads to a 'self-centered' view of competition that blinds the TMT from sufficiently accounting for other interpretations of its competition; and, because a TMT's availability and confirmation biases increase a TMT's confidence, greater weight is placed on a TMT's internal judgments of competition over that of other/external interpretations. This is consistent with Zajac and Bazerman: 'Competitors, however, often develop perspectives for understanding a problem in self-centered ways' (Zajac and Bazerman, 1991: 43). This 'self-centered' view of competition can be similarly described by psychological motives of 'self-justification'; that is, enhancement or protection of one's self-esteem influences one's interpretation of external events (Taylor and Brown, 1988). A consequence of this self-centered or self-justified view of competition is that managers who seek to protect or maintain their confidence will develop a selective, and thus flawed, interpretation of their competitive environment. In particular, as managerial overconfidence—consisting of such availability and confirmation biases—leads to a 'self-centered' view of competition, the TMT develops 'a' perception of competition that differs from that of its value chain customers. Managerial blind spots arise from such differences in competitive perceptions because such differences reflect basic gaps or flaws in a TMT's ability to account for the perceptions of its value chain customers.

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Blind spots in a TMT's institutional field: swine genetics value chain

To illustrate such differences, the competitive perceptions of three stakeholder groups from a swine genetics market are compared. In this market, competition among rivals in swine genetics is perceived by a TMT and by its value chain customers. This market comprises a focal swine genetics company that maintains the germplasm stock and breeds for specific biophysical characteristics, its downstream customers—hog producers—who transform the genetic potential into a marketable product, and its intermediary customers—veterinarians—who act as medical and scientific consultants between them.

Differences in the perception of competition arise because value chain customers face different availability and confirmation biases than the TMT. Specifically, each vertical segment faces a salience bias that is unique to its domain of experience. For instance, minimizing operating costs are a key determinant to the profitability of hog operations. Hog producers may identify genetic attributes relating to costs as the defining features of swine genetics competition. These might include the reproductive performance of sows, genetic performance as measured by weight gain per day, and price of the genetics. Unlike the hog producers and the TMT, salient factors for veterinarians relate to their knowledge of medicine, practical and educational experiences, and affiliations to professional associations (Brush and Artz, 1999). As a result, veterinarians may define the salient attributes of swine genetics competition in health and service quality attributes; such as the swine genetics company's ability to innovate, commitment to the industry, and genetic potential. The TMT may identify firm reputation as the salient feature of its competition as it represents access to new resource dependencies (Pfeffer and Salancik, 1978), power (Stuart and Podolny, 1996), increased identity (Peteraf and Shanley, 1997), and a level of protection from its competition (Zahra and Chaples, 1993).

Furthermore, as each value chain segment faces a unique salience bias, members of each segment should exhibit imagination biases that are specific to their vertical segment. Each vertical segment will thereby construct different perceptions of competitive groups. For example, due to the salience bias of the hog producers, they may classify rivals only on the basis of the rival's perceived ability to improve the hog producers' operating cost. Similarly, the veterinarians may classify swine genetics competition on affiliations to medical associations. A TMT may construct cognitive maps based on a firm's reputation (e.g., Abrahamson and Fombrun, 1994). Moreover, as each vertical segment faces an availability bias (i.e., salience and imagination) that is unique to the experiences of its segment, each vertical segment has a confirmation bias that validates/reinforces the experiences of its particular segment. This is consistent with Daniels *et al.*'s (1994) work that finds members have a greater tendency to confirm their beliefs with those that are within their own vertical segment than between segments. As each segment faces a different confirmation bias, these confirmation biases should, thus, uniquely reinforce the availability biases of its segment. Heterogeneous perceptions of competition are, thus, expected to arise. As such differences in competitive beliefs yield departures from a TMT's perceptions of its competition, such differences in competitive perception are, therefore, key to managerial blind spots. Thus, the following is hypothesized:

Hypothesis 1a: Diversity in competitive attributes: We expect participants at different stages of the swine genetics industry (hog producers, veterinarians, and the focal swine genetics firm) to have heterogeneous beliefs/perceptions about competitive attributes.

Hypothesis 1b: Diversity in competitive groupings: We expect participants at different stages of the swine genetics industry (hog producers, veterinarians, and the focal swine genetics firm) to have heterogeneous beliefs/perceptions about competitive groupings.

Value chain customers not only have different perceptions of competition, but their perceptions are subject to fewer overconfidence biases (i.e., availability and confirmation) than the TMT. Value chain customers face fewer problems of overconfidence because they receive more frequent information feedback than the TMT. In particular, information feedback has been argued as a key remedy to problems of overconfidence, because with greater information feedback, there can be significant adjustments in beliefs that reduce overconfidence (e.g., Russo and Schoemaker, 1992;

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Schwenk, 1986). In a competitive environment, this information feedback arises in the form of a process in which firms submit multiple product and price 'bids' to the customer (Besanko *et al*., 2004). As customers are subjected to alternative 'value bids,' they are exposed to greater sources of competitor information than is available to the TMT.[1] In particular, as consumers receive multiple product and price bids, they face fewer problems of confirmation bias because such competitive feedback broadens their understanding of competition. This enables significant adjustments in the customers' beliefs of competition, because such feedback serves to question or challenge the customers' personal beliefs. Therefore, as customers are less likely to define competition through their personal experiences and biases, they face fewer problems of salience bias. Subsequently, reductions in the customers' salience bias reduce customers' imagination bias because their categorization of competitive groups is based on broader sources of competitive information. Thereby, with such information feedback, customers, face fewer problems of overconfidence than the TMT.

As a consequence, swine genetics customers most distant from the TMT are more likely to exhibit fewer problems of overconfidence (i.e., availability and confirmation biases). Because the hog producer is the swine genetics market's end customer, the hog producer should receive the greatest information feedback and thus face fewer problems of overconfidence. This suggests the hog producer should exhibit the greatest divergence of competitive beliefs from that of the TMT; whereas, because the veterinarian is an intermediary user of swine genetics, the veterinarian's beliefs should yield a divergence that is less than that between the hog producer and the TMT. This suggests that the farther away a value chain customer is from the TMT, the greater the degree of heterogeneity in competitive beliefs. The magnitude or degree of managerial blind spots, therefore, can be hypothesized as follows:

Hypothesis 2a: Distance in competitive attributes: The greater the distance between an industry participant and the TMT firm, the more likely the beliefs/perceptions about competitive attributes will differ.

Hypothesis 2b: Distance in competitive groupings: The greater the distance between an industry participant and the TMT firm, the more likely the beliefs/perceptions about competitive groupings will differ.

METHODOLOGY

Data and sample

To elicit the competitive beliefs of the swine genetics market, a survey was administered in 2002 to members of each vertical segment. The survey required each respondent to name up to eight swine genetics firms with which they were familiar. The respondents then rated each of the firms that they had identified on a 10-point Likert scale across 16 competitive attributes (1 = least important/significant–10 = most important/significant) (e.g., Hodgkinson *et al*., 1996). These 16 attributes described a swine genetics firm's competitive characteristics: firm size, genetic potential of animals (sows, boars) sold for leanness, sow productivity, herd health, ability to innovate in bringing traits to market, price, consistency of animals sold, ability to meet market demand, financial soundness of firm, quality of service, commitment to the industry, technical support, responsiveness to customers, promotional budget, quality of personnel, and organizational reputation. See the Appendix for a detailed listing of these competitive attributes.

This list of attributes was obtained by using the repertory grid technique described by Reger (1990) (see also: Daniels *et al*., 1994; Reger and Huff, 1993; Reger and Palmer, 1996). These attributes were elicited by a group of 24 veterinarians that had either specialized swine practices in the Midwest or were employees of swine health or swine genetics companies. The veterinarians were used because we felt that their position as intermediaries in the value chain exposed them to a broader array of attributes than would be obtained by either the managers or the hog producers. To elicit these competitive attributes, veterinarians were then asked to list the swine genetics firms with which they were familiar. After this bounded sample of firms was elicited, two researchers led the group through the process of eliciting the constructs, or competitive attributes, over which rival firms differed. One researcher placed the names of three firms on a whiteboard and posed the question,

[1] As a result, one could argue that customers have a more comprehensive understanding of competition than management.

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'Which two of these firms are most alike and which firm is most different from the other two?' When the group proposed the answer, the researcher asked, 'Why do you say this?' Open discussion followed and the second researcher recorded the characteristics that defined similarity and differences among this triad of firms. The list of constructs was discussed until consensus was reached and the process was repeated with another set of three firms. The triads were repeated until a significant proportion of the triads available from the bounded sample were covered. The attributes that were used to distinguish among the firm triads were collated and presented back to the group as a list. Discussion also followed regarding the inclusiveness of the list. Some additional attributes were added and the group agreed that the final list (1) covered the important characteristics of firm structure, behavior, and product performance (which constitute the key competitive attributes of swine genetics firms in the industry) and (2) was clearly worded so that managers in the swine genetics industry, veterinarians, and hog producers would understand the constructs.

Using these 16 attributes, a survey form was prepared, printed, and mailed out to all of the participating members of the swine genetics market. In particular, one veterinarian was a member of a TMT. He administered the survey to five other members of his team. These six members constituted the TMT of the focal swine genetics company. Out of 132 identified swine genetics firms, the veterinarian and hog producer respondent groups identified this focal firm as the sixth most frequently identified swine genetics provider. The remaining veterinarian and hog producer respondent groups were then asked to complete the survey form for up to eight swine genetics firms with which they were familiar.

The survey forms were mailed back to the researchers for coding and analysis. The data were recorded on a spreadsheet and analyzed with the SPSS statistical package (version 15.0). A total of 1,645 case observations (approximately 206 survey forms) were reported from the administered surveys. In this instance, a case refers to one individual respondent's assessment of a swine genetics firm. For the TMT, veterinarian, and hog producer respondent groups, there were 43 (6), 338 (42), 1264 (158), cases (surveys) identified, respectively. Although the TMT sample is small relative to the sample of the other respondent groups, the six surveys provided by this group of top management personnel represented this firm's perception of competition. The six surveys were representative of the size of the TMT of this focal firm. In addition, given that blind spots are defined with respect to the TMT's experiences for a given focal firm, this sampling is consistent with our research approach.

Cluster analysis techniques

Cluster analysis techniques have been extensively used in assessing strategic groups (Ketchen and Shook, 1996; Porac and Thomas, 1990; Porac *et al*., 1995; Reger and Huff, 1993). An attractive feature of this method stems from organizing and simplifying large multivariate data sets into clustered configurations (Aldenderfer and Blashfield, 1984; Romesburg, 1990). In analyzing these data for each respondent group, cluster analysis placed firms into strategic groups on the basis of their degree of similarity, or dissimilarity, in the 16 competitive attribute ratings.

To examine differences in competitive beliefs between the three respondent groups, the 'intersection' of firms that was common to all respondents was sought. Such an intersection provides a conservative and restrictive test for determining differences in the respondents' beliefs about the attributes and groupings of competition. Among all three respondent groups, a set of 11 common firms was identified. Based on this intersection of 11 firms, the TMT, veterinarian, and hog producer respondents respectively identified 43, 271, and 933, cases. A total of 1,247 observations, or 76 percent of the cases from the initial sample, were available from this restricted set. This smaller firm sample offered potential advantages in the performance of the cluster algorithm. As Punj and Stewart note, 'as a clustering algorithm includes more and more observations [number of firms], its performance tends to deteriorate, particularly at high levels of coverage, 90% and above. This effect is probably the result of outliers beginning to come into the solution' (Punj and Stewart, 1983 : 143). This restricted set can, thus, minimize the deteriorating performance of the cluster algorithm.

In order to examine differences in respondent groups' perceptions of competition, individual perceptions within each respondent group were aggregated (e.g., McNamara *et al*., 2002). Specifically, based on the intersection of firms, the mean

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response for each firm's attribute was calculated for all 16 attributes. The cluster analysis procedure was performed on the mean values for each respondent group. The resulting firm clusters or strategic groups reflected the respondent group's cognitive map. Differences in cluster solutions (i.e., competitive groupings) were then examined across these respondent groups.

Methodological issues in cluster analysis

However, in spite of the extensive use of the cluster analysis method in cognitive strategic group research, cluster analysis faces considerable criticism because it can 'impose groupings where none exist' (Ketchen and Shook, 1996: 442). Much of this criticism stems from inadequate validation procedures that are associated with the choice of clustering algorithm, appropriate cluster cutoff, and resemblance coefficients (Ketchen and Shook, 1996; Romesburg, 1990). Different cluster memberships can arise from different choices of agglomeration procedure, cluster algorithm, cluster cutoff, and resemblance coefficients (Ketchen and Shook, 1996). To develop greater validity in cluster solutions, these issues are dealt with in the following manner.

HA and K means classification procedure

Cluster researchers advocate a two-step classification procedure to increase the validity of cluster solutions (Ketchen and Shook, 1996). This involves using hierarchical agglomeration (HA) and nonhierarchical procedures to develop cluster solutions (Ketchen and Shook, 1996). Specifically, the HA classification procedure is first specified and applied to the mean attribute values for each firm of each respondent group. To form clusters, the HA algorithm requires the use of a resemblance coefficient. Although there are many types of resemblance coefficients, the commonly used squared Euclidean distance measure was used.

Of the five common HA algorithms—single linkage (nearest neighbor), complete linkage, UPGMA (unweighted pair-group method using arithmetic averages), centroid, and Ward's method)—the UPGMA and single linkage (nearest neighbor) are most commonly used (Aldenderfer and Blashfield, 1984). Based on the Euclidian distance measure, the UPGMA method is useful because it considers the degree of (dis)similarity between pairs of cases in different clusters and thus tends to utilize more respondent information than other algorithms (Romesburg, 1990). This is an important feature, especially given the limited sample of the TMT respondent group. In addition, Reger and Huff comment that 'This method [UPGMA] "tends to join clusters with small variances and is slightly biased toward producing clusters with the same variance"' (Reger and Huff, 1993: 109). This is particularly relevant for the TMT respondent group because all managers belong to the same firm and thus, due to their confirmation biases, should yield greater similarity in their perceptions of competition than other respondent groups. This is supported by the fact that relative to all other respondent groups, the attribute ratings of the TMT respondent group had the smallest variance.

The single linkage algorithm is also an appropriate choice, as this algorithm reflects a similar process described by the members' confirmation bias. In that it tends to form clusters from cases based on the smallest distance (Romesburg, 1990). Since respondent group members have a confirmation bias, they will have a greater tendency to form comparisons with members of similar perceptions and beliefs. Therefore, the single linkage algorithm is another suitable alternative.

Both the UPGMA and single linkage algorithms revealed very similar cluster solutions.[2] When using the UPGMA and single linkage method, the veterinarian and hog producer respondent groups had identical clusters solutions. For the TMT respondent group, the cluster solutions differed by only one firm. This indicates that these cluster solutions are robust to differences in clustering algorithm, and therefore cluster solutions are likely to reflect natural groupings. However, because the UPGMA has desirable properties with respect to the data used in this research, the UPGMA method was chosen.

Number of clusters in the solution

One of the criticisms of cluster analysis concerns identifying the appropriate number of clusters in a solution (Ketchen and Shook, 1996). This specification often involves researcher judgment and may reflect a researcher's biases rather than natural groupings within the data (Ketchen and Shook,

[2] Results are available on request.

1996). One solution proposed by Ketchen and Shook (1996) and Romesburg (1990) is to analyze the incremental changes in distance measures (Euclidean distance) between the clustering stages. Through the use of a dendogram, the cluster cutoff -the number of clusters- is found at the point where large increases in the Euclidean distance measure are found between joining clusters (Ketchen and Shook, 1996). *Large jumps* potentially indicate the absence of natural groups found at that stage of the HA clustering process (Ketchen and Shook, 1996). Based on this criterion, defined cluster cutoffs for the TMT, veterinarian, and hog producer groups are 4 or 5, 5 or 6, and 5 or 6 clusters, respectively. The cluster cutoffs for each respondent group is then used to specify the cluster solutions for a K-means (nonhierarchical) analysis (Ketchen and Shook, 1996; Romesburg, 1990).

K-means analysis

As part of the two-stage process, K-means analysis is based on a *nearest sorting* procedure where 'a case is assigned to the cluster with the smallest distance between the case and the center of the cluster (centroid)' (Ranade *et al*., 2001: 1264). To determine the robustness of cluster solutions, the cluster solutions from the HA and K-means procedures are compared. To compare cluster solutions from these procedures, the Goodman-Kruskal (G-K) lambda test statistic (Goodman and Kruskal, 1954) was used. This G-K lambda test is an 'associational' statistic that measures the degree of similarity between two sets of cluster solutions. Based on the calculation of proportional reduction in error (PRE), the G-K lambda test has a range between 0 and 1 (Goodman and Kruskal, 1954). A G-K test value of 1 denotes a condition when one cluster solution perfectly predicts that of another. In the extreme case of nonoverlapping cluster solutions, the G-K test takes a value of 0. Because the G-K test statistic relies on pairwise comparisons, such a statistic provides both symmetric and asymmetric associational (lambda) measures. The symmetric G-K lambda test statistic is used because there is no implied causality when comparing the cluster solutions from the HA and K-means procedure. Similar cluster solutions would indicate the data are robust to cluster procedures and cluster solutions are valid. Table 1 shows the G-K test results of this comparison.

With the exception of the TMT respondent group at the 5 cluster cut-off, the G-K test values indicate that the cluster solutions are robust to both the HA or K-means procedure. Thus, cluster solutions are likely to reflect their natural groupings and are not likely an artifact of the clustering algorithm.

Furthermore, in drawing on the properties of the G-K lambda (asymmetric) test statistic, the G-K test is used to measure the existence and degree of differences in competitive beliefs between the three respondent groups. Because it is reasonable to expect that beliefs of competition flow from the TMT through the veterinarian and finally to the hog producer, the asymmetric form of the G-K test is used (see e.g., Abrahamson and Fombrun, 1994; Porac *et al*., 1989). The G-K test is also converted to reflect the degree of divergence in competitive beliefs between the respondents by subtracting the value of the computed lambda by one. This is a measure of the degree of heterogeneity in competitive beliefs between the respondent groups.

MANOVA analysis

In addition to the within group triangulation methods (i.e., use of both HA and K-means analysis), further validation is conducted by using between-group triangulation methods (Ketchen and Shook, 1996). MANOVA procedures can be used to increase confidence in cluster analysis findings (Aldenderfer and Blashfield, 1984; Ketchen and

Table 1. GK (symmetric) lambda test statistics of HA and K-means cluster solutions

TMT group	Farmer group	Veterinarian group
0.778* (4 cluster cutoff)	0.846* (5 cluster cutoff)	1.00* (5 cluster cutoff)
0.545 (5 cluster cutoff)	0.867* (6 Cluster cutoff)	1.00* (6 cluster cutoff)

* Significant $p < 5\%$

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Shook, 1996).[3] MANOVA is a procedure for testing the equality of mean vectors for more than two population groups. Such a procedure simultaneously accounts for multiple and correlated dependent variables[4] across two or more populations. The MANOVA procedure in Stata 9.0 is used to test for significant differences in the mean competitive perceptions of the 16 competitive attributes between the three respondent groups. To examine such differences, the F test using Pillai's trace statistic[5] was used (e.g. Bowman and Daniels, 1995).

RESULTS AND DISCUSSION

Based on the cluster cutoffs that were determined through the HA clustering, the competitive attributes used in forming strategic groups (i.e., Hypothesis 1a) is examined by the K-means analysis. In using the K-means analysis, the salient or key competitive attributes used to determine cluster groupings are determined by the F statistics of the ANOVA analysis (e.g., Bowman and Daniels, 1995). Specifically, higher F-statistic values among the 16 competitive attributes indicate those attributes that contribute to the greatest separation in cluster solutions. To determine these key attributes, the top four competitive attributes that yielded the highest F-statistic values were chosen. We chose only four attributes because cognitive strategic group research suggests organizations use only a few, but salient, attributes to classify firms (Gripsrud and Gronhaug, 1985; Porac *et al*., 1995; Reger and Huff, 1993; Reger and Palmer, 1996). This is consistent with Porac *et al*.'s (1995) study of the Scottish knitwear industry in which they found the industry was organized around four key competitive attributes consisting of size, technology, location, and product styles. Through the ANOVA analysis of the K-means clusters, the top four competitive attributes perceived by each of the respondent groups are shown in Table 2.

From Table 2, the TMT identified firm size as the top attribute used in constructing competitive groups. This is consistent with Gripsrud and Gronhaug (1985) and Porac *et al*. (1995) studies that found TMTs use a firm's size as a key attribute in constructing competitive groups. This firm size attribute is followed by a firm's promotion budget, support, and innovation. The hog producers' top four competitive attributes were: firm size, promotion budget, innovation, and firm reputation. The TMT and hog producers, thus, shared a common view that both a firm's size and promotion budget were the top two attributes that differentiated competitive groupings in the swine genetics market. However, hog producers perceived reputation as one factor that was not considered by the TMT. As a result, it appears the hog producers categorize competition on slightly different criteria than that of the TMT. Furthermore, the veterinarians viewed a firm's product consistency as the top attribute used to construct its competitive groups, while the TMT viewed firm size as the distinguishing attribute. In addition, the veterinarians indicated a firm's commitment, promotion budget, and reputation as the remaining attributes used in constructing their competitive groups. In particular, firm reputation was viewed as a significant factor impacting not only the veterinarians' categorization of competition but also for that of the hog producers. Because swine genetics exhibit 'credence' characteristics—products that contain

[3] Readers are reminded that MANOVA is not conducted within the cluster analysis procedure as this will invariably show significant findings (see Ketchen and Shook, 1996).

[4] Due to the presence of multiple and correlated dependent variables, the MANOVA procedure is a basic extension to an ANOVA. Empirically, the Pearson correlation statistics show significant positive correlations among the 16 competitive attributes. Results are available on request.

[5] Pillai's trace is recognized as the most powerful and robust approximation of the F statistic. Furthermore, this study had also repeated the same analysis using the Wald statistics (exact) and found almost identical results.

Table 2. ANOVA analysis of top four attributes by respondent group using K-means cluster

TMT	Veterinarian	Hog producer
Size (25.11)	Product Consistency (41.5)	Size (62.1)
Promotion (19.8)	Commitment (29.4)	Promotion (35.3)
Support (16.4)	Promotion (29.2)	Innovation (22.4)
Innovation (10.3)	Reputation (24.5)	Reputation (21.4)

Parenthesis denote F statistic values from ANOVA

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attributes that are difficult to evaluate even after purchase (Brush and Artz, 1999)—reputation may be a strong signal for these customers to classify a firm's competition. Yet, unlike other studies (e.g., Peteraf and Shanley, 1997; Pfeffer and Salancik, 1978; Stuart and Podolny, 1996; Zahra and Chaples, 1993), the TMT did not view reputation as one of the top four attributes used in identifying its competition. Such differences in the perception of this competitive attribute, as well as the other attributes shown in Table 2, appear to support Hypothesis 1a.

Since ANOVA can only examine differences in the means of one dependent variable, a MANOVA analysis was conducted. In particular, according to an institutional/macro cultural explanation, a convergence in the beliefs about the salient attributes of competition is expected. For instance, according to a macrocultural logic, the TMT is instrumental to the diffusion of the key attributes of competition to its value chain members (Abrahamson and Fombrun, 1994; Porac *et al*., 1989). Therefore, we would expect that the salient attributes identified by the TMT are more easily recalled by its value chain members than less salient attributes. With a macrocultural explanation, a reduction in the F statistic of the MANOVA procedure toward a value of 1 is expected. To test this macrocultural argument (Abrahamson and Fombrun, 1994), and also to perform a more restrictive test of Hypothesis 1a, the MANOVA procedure was applied to the top four competitive attributes identified by the TMT. In conducting this MANOVA procedure, the F test increased (approximate $F = 3.89 > 1$, $df = 8, 2334$) and is highly significant ($p = 0.0001$). A macrocultural explanation is, therefore, rejected in favor of Hypothesis 1a.

In addition, to further examine differences in the perceptions of all competitive attributes, a MANOVA procedure was used on all 16 attributes, as they exhibit some multicolinearity. Among the TMT, veterinarian, and hog producer respondent groups, the F test on the MANOVA procedure indicated significant differences in the means of these 16 attributes (approximate $F = 3.11 > 1$, $d.f. = 32, 2120$) with high significance ($p = 0.00000$). Hypothesis 1a is, therefore, not rejected.

Moreover, since this study predicts that each vertical segment has a unique perception of the salient attributes of competition, a MANOVA analysis was conducted on the top four competitive attributes for *each* respondent group (see attributes in Table 2). Based on this MANOVA analysis, the hog producers', veterinarians', and TMT's respective F statistics are, 2.98 ($df = 8, 2358$, $p = 0.0025$), 4.02 ($df, 8, 2396$, $p = 0.0001$), 3.89 ($df = 8, 2334$, $p = 0.0001$). These results suggest the salient attributes of competition are unique to each vertical segment. These MANOVA results are consistent with Hypothesis 1a.

Given support for Hypothesis 1a, each respondent group should develop different categorizations of competitive groups (Hypothesis 1b). As each vertical segment faces different salience biases, the salient attributes of competition identified by each segment (Table 2) should lead to availability biases that create different competitive groupings. Hence, to examine such differences in competitive groupings, Table 3 shows the results of the HA algorithm. Table 3 shows that the TMT places its firm—the focal firm—in cluster group 4

Table 3. Cluster analysis solutions (cluster memberships using HA)

Company	Veterinarians' map		Farmers' map		TMT's map	
	6 Cluster	5 Cluster	6 Cluster	5 Cluster	5 Cluster	4 Cluster
Babcock	1	1	1	1	1	1
Cotswold	2	2	1	1	1	1
Danbred	3	3	2	2	1	1
Dekalb	4	4	3	3	2	2
Farmer's Hybrid	1	1	4	4	3	3
Focal firm	3	3	5	1	4	4
GIS	5	5	1	1	1	1
Newsham	3	3	2	2	1	1
PIC	6	4	6	5	5	2
Premier	2	2	2	2	1	1
Segher's Hybrid	2	2	1	1	1	1

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with no direct competitors. Regardless of whether we use a 4- or 5 -cluster cutoff for arraying the competitive groupings, the TMT places its firm uniquely into its own cluster. At the 5-cluster cutoff, the hog producers placed the focal firm in a cluster group containing direct competitors GIS, Babcock, Cotswold, and Segher's Hybrid. In addition, for the 5-cluster cutoff, the veterinarians placed the focal firm in cluster Group 3 containing Danbred and Newsham. In addition to the focal firm's competitors, Table 3 shows that there are other significant variations in the groupings of firms among the respondent groups (see also G-K test statistics in Table 7). Hypothesis 1b is, therefore, not rejected.

However, since such differences in cluster solutions could be an 'artifact' of the HA algorithm, Hypothesis 1b is reexamined with the K-means cluster analysis. Tables 4, 5, and 6 show the cluster solutions of the K-means analysis for the TMT (4-cluster cutoff), veterinarian (5-cluster cutoff) and hog producer respondents (5-cluster cutoff), respectively. These tables show the Euclidean distances between clusters. Smaller Euclidean distances denote greater similarity between cluster solutions and larger Euclidean distances denote more distant or peripheral competitors. Since Porac *et al*. (1995) and Reger and Huff (1993) indicate competitive groupings could exhibit a core and peripheral structure, these tables of Euclidian distances enable further examination of the differences in core and peripheral competitive structures for each respondent group.

From Tables, 4, 5, and 6, the focal firm's core and peripheral competitors differed for each respondent group. For instance, for the TMT (Table 4), the focal firm resides in a strategic group (3) that contains Newsham as a core competitor. With a Euclidean distance measure of 6.95, Group 4 that contains PIC and Dekalb are the next closest competitors to the focal firm. More distant or peripheral competitors are found by firms in strategic Group 1 (Babcock, Cotswold, Danbred, GIS, Premier, and Segher's Hybrid) and Group 2 (Farmer's Hybrid), respectively. Yet as shown in Table 5, the veterinarians perceived the focal firm as having two core rivals within cluster Group 3: Danbred and Newsham. In addition, the veterinarian respondents perceived cluster Group 2 (Cotswold, Premier, and Segher's Hybrid) to be their next closest competitors, whereas for the TMT, the focal firm's next closest competitors contained firms PIC and Dekalb. Moreover, from Table 6, we note that the hog producers placed the focal firm in a cluster group with Danbred, Newsham, and Premier and their next closest competitors consists of members in cluster Group 2 (Babcock, Cotswold, GIS, and Segher's Hybrid). This differs from the core and peripheral competitive structures of the TMT. Hence, in using the K-means analysis, such differences in core and peripheral competitive memberships do not lead us to reject Hypothesis 1b.

Since the G-K test can be used to determine differences in cluster solutions, Hypothesis 1b is also tested by using the asymmetrical G-K lambda

Table 4. (TMT). Euclidean distances between final cluster centers (K-means)

Clusters and membership	1	2	3	4
1 (Babcock, Cotswold, Danbred,GIS, Premier, and Seghers Hybrid)		10.68	7.591	8.473
2 (Farmer's Hybrid)	10.68		17.526	16.171
3 (Focal firm, Newsham)	**7.591**	**17.52**		**6.951**
4 (PIC, Dekalb)	8.473	16.17	6.951	

Table 5. (Veterinarian). Euclidean distances between final cluster centers (K-means)

Cluster and membership	1	2	3	4	5
1 (GIS)		3.461	6.322	9.957	4.056
2 (Cotwold, Premier, and Segher's Hybrid)	3.461		4.014	7.217	4.806
3 (Danbred, focal firm, Newsham)	**6.322**	**4.014**		**5.488**	**8.666**
4 (PIC, Dekalb)	9.957	7.217	5.488		11.153
5 (Babcock, Farmer's Hybrid)	4.056	4.806	8.666	11.153	

Table 6. (Farmer). Euclidean distances between final cluster centers (K-means)

Cluster and Membership	1	2	3	4	5
1 (Danbred, Focal firm, Newsham, Premier)		**2.60**	**6.184**	**3.80**	**5.661**
2 (Babcock, Cotswold, GIS, Segher's Hybrid)	2.60		8.032	4.98	3.483
3 (PIC)	6.18	8.03		3.68	9.699
4 (Dekalb)	3.80	4.98	3.686		6.439
5 (Farmer's Hybrid)	5.66	3.48	9.699	6.43	

Table 7. HA converted GK lambda (asymmetric) statistics

Veterinarians (5 cluster) vs. Farmers (5 cluster)	**Farmers (5 cluster) vs. TMT (4 cluster)**	**TMT (4 cluster) vs. Veterinarians (5 cluster)**
0.666 (Farmer dependent)	0.666 (Farmer dependent)	0.500* (Veterinarian dependent)
Veterinarian (6 cluster) vs. Farmers (6 cluster)	**Farmers (6 cluster) vs.TMT (5 cluster)**	**TMT (5 cluster) vs.Veterinarians (6 cluster)**
0.429* (Farmer dependent)	0.429* (Farmer dependent)	0.500* (Veterinarian dependent)

Note: * Significant at $p < 5\%$

test. The following pairwise asymmetric tests are made: (1) the TMT's cognition does not predict the veterinarians' cognition; (2) the veterinarians' cognition does not predict the hog producers' cognition; and the transitive result (3) that the TMT's cognition does not predict the hog producers' cognition. Table 7 shows the converted G-K lambda test statistics for these pairwise comparisons for the two sets of cluster cutoff configurations. These comparisons are based on the HA cluster procedure.

According to the first row of Table 7 (first cluster cutoff configuration), there is a significant difference in the cognitive maps perceived by the TMT (cluster cutoff 4) and the veterinarian respondents (cluster cutoff 5) (0.500*). This indicates the TMT and veterinarians have different perceptions of competitive groups. However, no significant differences were found for other pairwise comparisons. Thus, only partial support is given for Hypothesis 1b. However, for the second cluster cutoff configuration (the fourth row of Table 7), there are significant differences in all pairwise comparisons. However, one might interpret these results with caution. This is because although the greater number of cluster solutions (i.e., second cluster cutoff) will place firms within their natural groups (relative to the first cluster cutoff); this can potentially increase differences in competitive group memberships. For instance, if one were to increase the number of cluster solutions in one respondent group but not for another, this can arbitrarily generate significant differences when conducting the pairwise GK lambda tests. This concern is, however, mitigated by the fact that the differences in the number of clusters between the pairwise comparisons are preserved between both cluster configurations. This serves to preserve the natural groupings of the respondent groups and to ensure comparisons are not skewed by increasing the cluster solutions of one respondent group while not increasing that of another. In addition, since value chain customers are more likely to have a broader understanding of competition, the larger cluster cutoff may be more reflective of their natural groupings. Hence, with the second cluster cutoff configuration, the G-K test statistic is more likely to reveal significant differences that are based on their natural groupings. This finding is further supported by Table 8. In Table 8, the same G-K asymmetric tests were applied to the K-means cluster solutions. Similar to the HA results for the second cluster cutoff, there are significant differences in cluster solutions. Hypothesis 1b is, therefore, not rejected.

To examine the degree to which respondents diverged in their perception of competitive attributes from that of the TMT (Hypothesis 2a),

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Table 8. K-means converted GK lambda (asymmetric) statistics

Veterinarian (6 cluster) vs. Farmers (6 cluster)	Farmers (6 cluster) vs. TMT (5 cluster)	TMT (5 cluster) vs. Veterinarians (6 cluster)
0.500* (Farmer dependent)	0.625* (TMT dependent)	0.500* (Veterinarian dependent)

Notes:
[1)] The Null Hypothesis is that cluster memberships are perfectly associated
[2)] * Significant at $p < 5\%$
[3)] When employing the asymmetric GK-tests, the dependent variable in question is found under the value of the test statistic.

a MANOVA analysis using the pairwise comparison of the G-K asymmetric lambda test was conducted. The F statistic can be used as a measure of the degree to which the pairwise comparisons of respondent groups vary in their perceptions about the swine genetics market's competitive attributes. These pairwise comparisons are based on the top four attributes identified by the TMT (see Table 2). The F statistics are as follows: 1) the hog producers and TMT comparison has an F statistic of 5.18 ($df = 4, 900, p = 0.0004$); 2) the veterinarians and TMT comparison has an F statistic of 2.49 ($df = 4, 305, p = 0.0431$); and 3) the veterinarians and hog producers have an F statistic of 3.26 ($df = 4, 1124, p = 0.0114$). These results indicate the hog producers' perception of the TMT's top four competitive attributes (F statistics = 5.18) are in less agreement than between the TMT and the veterinarians (F statistics = 2.49). As a result, these results suggest that as value chain members become increasingly removed from the TMT, they are less likely to share the same beliefs about those attributes identified by the TMT. Hypothesis 2a is not rejected.

To test Hypothesis 2b, the magnitude of the G-K lambda test is used to measure the degree to which competitive groupings differed from that of the TMT. Tables 7 and 8 show the G-K test statistics for both the HA and K-means clustering solutions. For the second cluster cutoff and for the HA method, the veterinarians' competitive grouping does not predict the hog producers' cognition ($1 - \lambda = 0.429$), and the TMT's competitive grouping does not predict the veterinarians' competitive grouping ($1 - \lambda = 0.500$) at the five percent confidence level. The transitive result holds as well at the five percent confidence level, where the TMT's competitive grouping does not predict the hog producers' competitive grouping ($1 - \lambda = 0.429$). These results indicate that competitive perceptions of competitive groups are distorted about equally, though not uniformly significantly, between the TMT and the hog producers and the TMT and the veterinarians. As a result, competitive groupings do not differ as one becomes farther removed from the TMT.

However, Ketchen and Shook (1996) contend K-means clustering can yield more optimal clustering solutions than HA procedures, because K-means analysis classifies groups based on numerous iterations. In Table 8, the G-K test statistics indicated that the veterinarians' competitive groupings do not predict the hog producers' cognition ($1 - \lambda = 0.500$) and the TMT's competitive groupings does not predict the veterinarians' competitive groupings ($1 - \lambda = 0.500$) at the five percent confidence level. As the TMT's competitive groupings does not predict the hog producers' competitive groupings ($1 - \lambda = 0.625$), these results indicate that the greater the distance from the TMT, the greater are the differences in competitive groupings. For the K-means analysis, Hypothesis 2b is not rejected.

CONCLUSIONS AND DISCUSSIONS

Traditionally, competition has been defined by either rivals who compete on similar physical traits (i.e., similarity of technology, economies of scale, cross price elasticity of substitutes, etc.) or by an agreed upon social reality (Abrahamson and Fombrun, 1994; Porac *et al.*, 1989, 1995). Competition, however, can also reflect a multitude of interpretations that operate on multiple levels of analysis. To stare straight into this competitive reality can be a difficult managerial task. This is because managers are subject to interpretative biases that blind or restrict a TMT from sufficiently accounting for other perceptions of its competition. In particular, this study argues that a TMT's overconfidence biases—availability and confirmation—can result in a 'self-centered' view of competition that

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blinds the TMT from sufficiently accounting for the perceptions of its value chain customers. Differences in competitive perceptions arise, which reflect basic flaws or gaps in a TMT's understanding of its competitive reality. Such differences are argued as a basic contributor to managerial blind spots. To empirically examine this heterogeneous explanation of managerial blind spots, the competitive perceptions of three stakeholder groups in a swine genetics value chain was surveyed. The findings of this study indicate that: 1) each of the three respondent group's perceptions about the competitive attributes and the competitive groupings of the swine genetics market were significantly different, and 2) the greater the distance from the TMT, the greater the disparity in competitive perceptions, and thus the greater a TMT's blind spots.

There are four implications of this research for the study of competitive blind spots. First, this study builds upon the earlier work of Zajac and Bazerman (1991) on competitive blind spots. They argue that managerial blind spots reflect an inability of management to account for the 'contingent decisions of competitors' (Zajac and Bazerman, 1991 : 47). This study further extends their construct by suggesting that managers can also fail to sufficiently account for the perceptions of stakeholders, such as their customers. Such an extension addresses a basic limitation of competitor identification research. Researchers have criticized competitor identification studies, because a majority of these studies have a strong supplier or managerial bias that does not account for the competitive perceptions of their customers (Bergen and Peteraf, 2002; Chen, 1996; Hodgkinson, 1997; Hodgkinson *et al*., 1996). As Chen comments, 'thus far, some of the most fundamental questions in competitor analysis have remained unexplored. . . ' (Chen, 1996: 101). By accounting for the perceptions of a firm's customers—direct as well as their end customers—this study's concept of blind spots serves to broaden such a managerial definition of competition. In particular, with such an extension, this study's concept of blind spots underscores the examination of competition 'through others' eyes,' which can serve to identify problems of competition positioning to which the TMT is otherwise blind.

Second, this heterogeneous view of competition offers an alternative to an institutional/macrocultural explanation of competition (e.g., Abrahamson and Fombrun, 1994; Porac *et al*., 1989, 1995). A basic argument and finding of this study is that different stakeholders pay attention to different attributes and thus group competition in ways that differ from the TMT. This heterogeneous view of competition underscores a basic premise that where one sits within in a value chain affects one's subsequent perception.[6] Such a heterogeneous premise reflects a basic departure from the homogeneous predictions of institutional/macrocultural theories (e.g., Abrahamson and Fombrun, 1994; Porac *et al*., 1989, 1995). This has significant implications to institutional arguments, because such differences in competitive beliefs suggest that institutional pressures for conformity maybe overemphasized by current perspectives in sociological research (e.g., Abrahamson and Fombrun, 1994; Abrahamson and Hambrick, 1997; Porac *et al*., 1989, 1995). Furthermore, this study's heterogeneous view of competition can also inform institutional research by offering a cognitive explanation as to why social norms may not be widely shared in an institutional field. This has been a subject of recent interest in institutional research (see e.g., Kostova and Roth, 2002).

Third, to our knowledge, there are few studies that have empirically examined this heterogeneity of competitive perceptions in a value chain context. For instance, although Porac *et al*. (1995) had examined the macroculture of competitive attributes in the Scottish knitwear industry, their data was based on the competitive perceptions of the managing directors of knitwear manufacturers. As a result, they did not directly examine differences in the perceptions of its value chain members, such as the fiber producers, yard spinners, and retailers. Furthermore, other studies have attempted to examine more market-based definitions of competition. For instance, Chen (1996) found that market- and managerial-based definitions of competition can differ, however, he did not directly consider customer perceptions of competition. While Hodgkinson *et al*. (1996) empirically examined customer perceptions of competition in the U.K. grocery retail sector; they did not examine managerial perceptions of competition. This study's empirical examination of the various competitive perceptions of the swine genetics value

[6] This was pointed out by a reviewer.

chain not only offers a unique empirical contribution to these studies, but lends further support for a heterogeneous characterization of competition.

Fourth, since understanding 'who one competes with' is a basic antecedent to a firm's strategy (Porac *et al*., 1989, 1995; Porter, 1980; Zajac and Bazerman, 1991), this study's concept of blind spots has normative implications to strategy research. Various cognitive researchers suggest that to overcome competitive blind spots, a TMT would need to 'complexity' (Weick, 1969) understandings of its competitive environment by accepting broader perspectives of competition (Bergen and Peteraf, 2002; Chen, 1996; Daniels *et al*., 1994; Hodgkinson, 1997; Hodgkinson and Johnson, 1994; McNamara *et al*. 2002; Peteraf and Bergen, 2003; Zahra and Chaples, 1993). This study's explanation of blind spots directly appeals to this view. As differences in competitive perceptions are a contributor to blind spots, embracing such alternative interpretations can thereby overcome imperfections in a TMT's understanding of its competition. Hence, managers can mitigate their blind spots by broadening their perceptions of competition to include those of its value chain customers (Zahra and Chaples, 1993). The ideal manager would be one who can effectively balance his or her own interpretations with those of others. However, with that said, caution should be exercised in accepting broader definitions of competition. Such broader definitions undermine a TMT's confidence in its judgments of competition. This undermines the cognitive value of managerial overconfidence, because overconfidence serves to replace multiple interpretations of competition with one that is 'perceived' to be more certain. Therefore, by accepting broader interpretations of competition, it creates uncertainties in a manager's judgment of 'who they compete with.' This subsequently limits a manager's ability to formulate his or her competitive strategy.

This study has some limitations. Bind spots can be influenced by other factors not directly considered here. For instance, blind spots can arise from factors relating to winner's curse and a limited frame of reference (e.g., Zajac and Bazerman, 1991). Blind spots can also arise from a firm's focus on local search (e.g., Levinthal and March, 1993). Local search limits a firm's market research capabilities, which can result in myopic behaviors (e.g., Levinthal and March, 1993). In addition, our data did not permit a direct testing of overconfidence biases. The overconfidence biases—availability and confirmation—identified by this study are, thus, offered as one possible interpretation for the heterogeneity of competitive perceptions in the swine genetics market. Although such overconfidence biases were not tested, they can, nevertheless, serve as an initial framework for future empirical studies. In particular, as the underlying cognitive mechanisms that impact overconfidence are not well understood or are highly debated in psychology and management research (see Alba and Hutchinson, 2000; Hayward *et al*., 2006; Klayman *et al*., 1999), these overconfidence biases not only serve as one explanation for the heterogeneity of competitive perceptions, but can provide further understanding to the determinants of managerial overconfidence.

In addition, although the concept of blind spots is taken from the point of view of a focal firm, the perceptions of the focal firm may or may not be representative of all other firms in the swine genetics market. By obtaining more firm level observations, the TMT's cognitive maps might come closer in agreement with that of its veterinarians and/or of its hog producers and thus reduce the possibility of competitive blind spots. Thus, future studies could benefit from increases in the size of the managerial sample.[7] Another related limitation is that in the construction of our survey, we did not ask how the managers' perceived their customers' beliefs of their competition. It could be the case that mangers do have an understanding of their customers' perceptions of their competition. For instance, large firms have greater marketing resources that enable their marketing managers to gain a better understanding of their customers. Yet since we did not ask for these managerial perceptions, the managers may not be subject to blind spots per se. Further examination of the managers' understandings of their consumers' beliefs of competition is thus called for in future research. Lastly, since different value chain customers focus on different attributes of competition, future research could consider identifying attributes separately for each group. Incidentally, because each group

[7] Readers are reminded, however, that increases in the managerial sample would not be capturing this study's concept of blind spots, because blind spots would then be defined at the population level and not that of the individual firm level.

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may likely exhibit group-specific attributes, greater divergence in competitive perceptions may arise, and thus this study's heterogeneous findings may be potentially understated.

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REFERENCES

Abrahamson E, Fombrun CJ. 1992. Forging the iron cage: interorganizational networks and the production of macro-culture. *Journal of Management Studies* **29**(2): 176–194.

Abrahamson E, Fombrun CJ. 1994. Macrocultures: determinants and consequences. *Academy of Management Review* **19**(4): 728–755.

Abrahamson E, Hambrick DC. 1997. Attentional homogeneity in industries: the effect of discretion. *Journal of Organizational Behavior* **18**: 513–532.

Alba JW, Hutchinson JW. 2000. Knowledge calibration: what consumers know and what they think they know. *Journal of Consumer Research* **27**: 123–156.

Aldenderfer MS, Blashfield RK. 1984. *Cluster Analysis Series: Quantitative Applications in the Social Sciences*. Sage Publications: New York.

Audia PG, Locke EA, Smith KS. 2000. The paradox of success: an archival and laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal* **43**(5): 837–853.

Bergen M, Peteraf MA. 2002. Competitor identification and competitor analysis: a broad-based managerial approach. *Managerial and Decision Economics* **23**(4–5): 157–169.

Besanko D, Dranove D, Shanley M, Schaefer S. 2004. *Economics of Strategy* (3rd edn). John Wiley & Sons: New York.

Bettman JR, Weitz BA. 1983. Attributions in the board room: causal reasoning in corporate annual reports. *Administrative Science Quarterly* **28**(2): 165–183.

Beyer JM, Chattopadhyay P, George E, Glick WH, Ogilvie Dt, Pugliese D. 1997. The selective perception of managers revisited. *Academy of Management Journal* **40**(3): 716–737.

Bowman C, Daniels K. 1995. The influence of functional experience on perceptions of strategic priorities. *British Journal of Management* **6**: 157–167.

Brush TH, Artz KW. 1999. Toward a contingent resource-based theory: the impact of information asymmetry on the value of capabilities in veterinary medicine. *Strategic Management Journal* **20**(3): 223–250.

Chen M. 1996. Competitor analysis and interfirm rivalry: toward a theoretical integration. *Academy of Management Review* **21**(1): 100–134.

Clapham SE, Schwenk CR. 1991. Self-serving attributions, managerial cognition, and company performance. *Strategic Management Journal* **12**(3): 219–229.

Coleman JS. 1988. Social capital in the creation of human capital. *American Journal of Sociology* **94**: 95–120.

Daniels K, Johnson G, Chernatony L. 1994. Differences in managerial cognitions of competition. *British Journal of Management* **5**: 21–29.

DiMaggio PJ, Powell WW. 1983. The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* **48**: 147–160.

Einhorn HJ, Hogarth RM. 1978. Confidence in judgment: persistence of the illusion of validity. *Psychological Review* **85**(5): 395–416.

Fiegenbaum A, Thomas H. 1995. Strategic groups as reference groups: theory, modeling and empirical examination of industry and competitive strategy. *Strategic Management Journal* **16**(6): 461–476.

Gilad B. 1996. *Business Blind Spots: Replacing Myths, Beliefs and Assumptions with Market Realities* (2nd edn). Infonortics: Tetbury, UK.

Goodman L, Kruskal W. 1954. Measures of association for cross classification. *Journal of the American Statistical Association* **49**: 265–268.

Gripsrud G, Gronhaug KL. 1985. Structure and strategy in grocery retailing: a sociometric Approach. *Journal of Industrial Economics* **33**(2): 339–347.

Hayward MLA, Rindova VP, Pollock TG. 2004. Believing one's own press: the causes and consequences of CEO celebrity. *Strategic Management Journal* **25**(7): 637–653.

Hayward MLA, Shepherd DA, Griffin D. 2006. A hubris theory of entrepreneurship. *Management Science* **52**(2): 160–172.

Hodgkinson GP. 1997. The cognitive analysis of competitive structures: a review and critique. *Human Relations* **50**(6): 625–654.

Hodgkinson GP, Johnson G. 1994. Exploring the mental models of competitive strategists: the case for processual approach. *Journal of Management Studies* **31**(4): 525–551.

Hodgkinson GP, Tomes AE, Padmore J. 1996. Using consumers' perceptions for the cognitive analysis of corporate level competitive structures. *Journal of Strategic Marketing* **4**: 1–22.

Kahneman D, Tversky A. 1973. On the psychology of prediction. *Psychological Review* **80**(4): 237–251.

Ketchen DJ Jr, Shook CL. 1996. The application of cluster analysis in strategic management research: an analysis and critique. *Strategic Management Journal* **17**(6): 441–458.

Kiesler S, Sproull L. 1982. Managerial response to changing environments: perspectives on problem sensing from social cognition. *Administrative Science Quarterly* **27**(4): 548–570.

Klayman J, Soll JB, Gonzalez-Vallejo C, Barlas S. 1999. Overconfidence: it depends on how, what, and whom you ask. *Organizational Behavior and Human Decision Processes* **7**(3): 216–247.

Kostova T, Roth K. 2002. Adoption of an organizational practice by subsidiaries of multinational corporations: institutional and relational effects. *Academy of Management Journal* **45**(1): 215–233.

Lant TK, Milliken FJ, Batra B. 1992. The role of managerial learning and interpretation in strategic persistence and reorientation: an empirical exploration. *Strategic Management Journal* **13**(8): 585–608.

Levinthal DA, March JG. 1993. The myopia of learning. *Strategic Management Journal* Winter Special Issue **14**: 95–112.

McNamara GM, Luce RA, Tompson GH. 2002. Examining the effect of complexity in strategic group knowledge structures on firm performance. *Strategic Management Journal* **23**(2): 153–170.

Peteraf MA, Bergen ME. 2003. Scanning dynamic competitive landscapes: a market-based and resource-based framework. *Strategic Management Journal* October Special Issue **24**: 1027–1041.

Peteraf M, Shanley M. 1997. Getting to know you: a theory of strategic group identity. *Strategic Management Journal* Summer Special Issue **18**: 165–186.

Pfeffer J, Salancik GR. 1978. *The External Control of Organizations*. Harper & Row: New York.

Porac JF, Thomas H. 1990. Taxonomic mental models in competitor definition. *Academy of Management Review* **15**(2): 224–240.

Porac JF, Thomas H, Baden-Fuller C. 1989. Competitive groups as cognitive communities: the case of Scottish knitwear manufacturers. *Journal of Management Studies* **26**(4): 397–416.

Porac JF, Thomas H, Wilson F, Paton D, Kanfer A. 1995. Rivalry and the industry model of Scottish knitwear producers. *Administrative Sciences Quarterly* **40**(2): 203–227.

Porter ME. 1980. *Competitive Strategy*. Free Press: New York.

Prahalad CK, Bettis RA. 1986. The dominant logic: a new linkage between diversity and performance. *Strategic Management Journal* **7**(6): 485–501.

Punj G, Stewart DW. 1983. Cluster analysis in marketing research: review and suggestions for application. *Journal of Marketing Research* **20**: 134–148.

Ranade K, Chang M-S, Ting C-T, Pei D, Hsiao C-F, Olivier M, Pesich R, Hebert J, Chen Y-DI, Dzau VJ, Curb D, Olshen R, Risch N, Cox DR, Botstein D. 2001. High-throughput genotyping with single nucleotide polymorphisms. *Genome Research* **11**(7): 1262–1268.

Reger RK. 1990. The repertory grid technique for eliciting the content and structure of cognitive constructive systems. In *Mapping Strategic Thought*, Huff A (ed). John Wiley & Sons: New York; 301–309.

Reger RK, Huff AS. 1993. Strategic groups: a cognitive perspective. *Strategic Management Journal* **14**(2): 103–124.

Reger RK, Palmer TB. 1996. Managerial categorization of competitors: using old maps to navigate new environments. *Organization Science* **7**(1): 22–39.

Rindova VP, Fombrun CJ. 1999. Constructing competitive advantage: the role of firm-constituent interactions. *Strategic Management Journal* **20**(8): 691–710.

Romesburg HC. 1990. *Cluster Analysis for Researchers.* Robert E. Krieger Publishing: Malabar, FL.

Russo JE, Schoemaker PJH. 1992. Managing overconfidence. *Sloan Management Review* **33**(2): 7–17.

Salancik GR, Meindl JR. 1984. Corporate attributions as strategic illusions of management control. *Administrative Science Quarterly* **29**: 238–254.

Schwenk CR. 1984. Cognitive simplification processes in strategic decision making. *Strategic Management Journal* **5**(2): 111–128.

Schwenk CR. 1986. Information, cognitive biases and commitment to a course of action. *Academy of Management Review* **11**(2): 298–310.

Stuart TE, Podolny JM. 1996. Local search and the evolution of technological capabilities. *Strategic Management Journal* Summer Special Issue **17**: 21–38.

Taylor SE, Brown JD. 1988. Illusion and well-being: a social psychological perspective on mental health. *Psychological Bulletin* **103**(2): 192–210.

Tversky A, Kahneman D. 1974. Judgment under uncertainty: heuristics and biases. *Science* **185**(4157): 1124–1131.

Weick K. 1969. *The Social Psychology of Organizing*. Addison-Wesley: Reading, MA.

Walsh J. 1995. Managerial and organizational cognition: notes from a trip down memory lane. *Organizational Science* **6**(3): 280–321.

Zahra SA, Chaples SS. 1993. Blind spots in competitive analysis. *Academy of Management Executive* **7**(2): 7–28.

Zajac EJ, Bazerman MH. 1991. Blind spots in industry and competitor analysis: implications of interfirm (mis)perceptions for strategic decisions. *Academy of Management Review* **18**(1): 37–56.

APPENDIX

Which firms are you familiar with within the swine genetics industry?

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Size of genetics firms: For each of the firms with which you are familiar, I'd like you to rate it on the *company's size*. Use a 10-point scale with 1 being very small and 10 being very large.

1._____,

Using the same scale with 1 being very small and 10 being very large, how do you rate

2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Genetic potential leanness: How would you rate the potential of each of the firm's genetic stock for increased leanness? Use a 10-point scale with 1 being very low potential and 10 being very high potential.

1._____,

Using the same scale with 1 being very low potential and 10 being very high potential, how do you rate

2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Sow productivity: For each of the firms, how would you rate your perceptions of the *productivity of sows* from this source of genetics? Use a 10-point scale with 1 being very low productivity and 10 being very high productivity.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Health status of stock: How do you rate the *health status* of animals that are in the firm's inventory for providing new genetic stock for your operation? Use a 10-point scale with 1 being very low herd health status and 10 being very high herd health status.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Ability to innovate on animal traits: One characteristic of firms in the swine genetics industry that is of interest is their ability to innovate in providing animal traits other than leanness. How do you perceive the ability of these firms to meet industry needs for this type of innovation? Use a 10-point scale with 1 being very low ability to innovate in swine traits and 10 being very high ability to innovate.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Product prices: Relative to industry norms, how do you rate the prices asked by the various firms that sell genetics into production units. Use a 10-point scale, with 1 being much below industry norms and 10 being much above industry norms.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Product Consistency: How do you rate these firms on their ability to provide consistent product quality to the swine production industry? Use a 10-point scale with 1 being highly inconsistent product quality and 10 being highly consistent product quality.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Ability to meet market demand: Each firm has a different ability to meet market demand for genetics on an ongoing basis. For each of the firms, rate them with a 10-point scale with 1 being often unable to meet market demand and 10 being always able to meet market demand.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Financial strength: We are interested in your perceptions about how strong these firms are financially. That is, do they have the financial strength to continue in the industry into the future? Use a 10-point scale with 1 being very low financial strength and 10 being excellent financial strength.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Service support: Among these firms, how do you rate their service support to producers? Use a 10-point scale with 1 being very poor service support for customers and 10 being excellent service support.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Commitment to the industry: One characteristic of these firms we are interested in understanding is your perception of how committed they are to staying in this business for the long-run. Use a 10-point scale with 1 being very low commitment and 10 being very high commitment.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Technical and business support system: Please rate these swine genetics firms on your perceptions of the strength of their internal support systems for research and development, product quality, and health management. Use a 10-point scale with

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1 being very poor system support and 10 being excellent systems support.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Customer responsiveness: How do you rate these firms on their responsiveness to customers' needs, requests for information, and other customer services? Use a 10-point scale with 1 being very low customer responsiveness and 10 being very high customer responsiveness.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Promotion budget: Based on your perceptions about the amount of advertising, product promotion at trade shows, and other marketing activities, how do you rate the promotion budgets for these firms? Use a 10-point scale with 1 being no promotion budget and 10 being a very large promotion budget.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

People-to-people relationships. Many of the marketing and service activities in the swine genetics industry require people-to-people relationships. Some of these are relationships to customers and some are among technical people, production people, and marketing people within each firm. Based on your perceptions and experiences, how do you rate the people-to-people relationships in these companies? Use a 10-point scale, with 1 being very poor people-to-people relationships and 10 being excellent people-to-people relationships.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

Company reputation: the final characteristic we'd like to ask you about is overall company reputation. Use a 10-point scale with 1 being a very poor reputation and 10 being an excellent reputation.

1._____, 2._____, 3._____, 4._____,
5._____, 6._____, 7._____, 8_____.

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