

THE VALUE AND USE OF CONCEPT MAPS IN THE ALIGNMENT OF STRATEGIC INTENT

*Louis C H Fourie, University of the Western Cape, South Africa
Trunel van der Westhuizen, University of Stellenbosch, South Africa
E-mail: Lfourie@uwc.ac.za, www.uwc.ac.za*

Abstract: The paper explores the value and use of Concept Maps in the alignment process of the strategic intent of a business. The success of strategy is often determined by a leader's ability to translate sophisticated strategic intent into simple, actionable language and to cascade this to every level in the organization to ensure alignment. To determine the success of the communication and level of alignment between the various hierarchical levels with regard to vision, mission and strategic objectives, concept maps were used. Five case studies are presented where a computer-based concept-mapping tool, CmapTools, was applied for the visual representation and measurement of strategic alignment amongst three hierarchical levels (CEO, Executive team and Employees) of co-operative wine cellars in the Paarl district of South Africa. The results of the empirical research clearly indicated a serious misalignment of strategic intent amongst all hierarchical levels and amongst each section of strategic intent. Concept maps and CmapTools proved to be invaluable tools to determine the degree of alignment with regard to strategic intent.

1 Introduction

Business teams need to follow an overall aligned organizational strategy in order to meet and exceed stakeholder expectations and to gain sustainable advantage over the competition (Pycraft, Singh, Phihlela, Slack, Chambers, Harland, Harrison & Johnson, 2000). However, employees often find themselves without direction in making daily decisions as they have no comprehension of the organizational purpose or direction. The task of providing this direction or strategic intent rests with the company executive (LeadershipNow, 2006). Strategic intent is the relentless pursuing of the achievement of an ambitious strategic objective and desired business position and entails the careful interlinking and balancing of the company's vision, mission and strategic objectives (Campbell & Yeung, 1991; Thompson, Strickland & Gamble, 2005). Strategic intent provides the emotional and intellectual energy for the journey of discovery of a compelling dream that the company wants to achieve in the long term (Hamel & Prahalad, 1994).

Strategic implementation and execution is a matter of alignment and focus (Kaplan & Norton, 2001), requiring committed and inspiring leadership on all levels and in all contexts of the organization (Senge, 1997) that are able to translate sophisticated strategy into simple, actionable objectives and to cascade these objectives to every level in the organization. Alignment is the lynchpin between vision, mission and execution. Alignment means having a direction that is accepted and understood by all employees in order to increase employee motivation and to get everyone lined up to do what is needed in order to achieve the strategic intent of the organization (Baltoni, 2006).

Successful organizations are characterized by good communication (Drucker, 1974; Peters & Waterman, 1982; Hesselbein & Cohen, 1999). No strategic plan or vision, regardless of the cleverness or quality of its design, will work without enlightened leadership to communicate the vision and strategic objectives to the people who need to make it real and tangible (Wall, Sobol & Solum, 1999). Identifying and communicating a clear strategic intent is one of the most important functions a business leader can perform (Puth, 2002). The alignment process therefore relies on an internal multifaceted communication program where the leadership communicates the strategic intent to the employees in an understandable way (Dibble & Langford, 1994). Hence, synergy is created and the shared vision becomes a powerful motivator to propel people into action (Hess, 1987). However, the paradox in leadership communication is that although it is natural and easy to communicate, it remains difficult to communicate effectively to ensure that meaning is shared, with the result that the communication messages from leadership are often misunderstood (Puth, 2002; Robbins & Decenzo, 2004; Lewis, 1975). For the vast majority of companies, having well-defined vision and mission statements does not change anything in their performance due to a lack of a clearly communicated intent.

The abstract and complex nature of business strategy makes strategies difficult to describe, define and communicate to employees. Richards (2001) pointed out that there are few published methods for representing strategy - none of which can capture strategy rapidly, and display it immediately in a simple, readily understandable form. Bullet point lists, PowerPoint slides and written statements are not always the best ways to communicate complex and interrelated strategic ideas. Neither are these methods ideal for discussion of the strategic ideas by the management team. More preferable is a visualization technique where the interlinking relationships are clearly indicated. Visual representation can both simplify complex ideas like business strategy (Margulies, 1991), as well as facilitate transmission of these ideas from individual to individual, business unit to business unit and even amongst different organizational levels.

This paper will focus on the application of CmapTools, a computer-based concept mapping tool developed by The Institute for Human Machine Cognition (IHMC) (Cañas et al., 2004; Novak & Cañas, 2008), as a method to give visual representation to business strategies, with specific reference to the vision, mission and

strategic objectives, as understood by the different organizational levels. Concept maps will be instrumental in the measurement of the alignment of the strategic intent between Chief Executive Officer (CEO), executive team and employees.

Concept maps are a two-dimensional representation of cognitive structures showing the hierarchies and interconnections of concepts (Martin, 1994). Novak developed it in the 1960's to visually represent the structure and relationships between different sets of information (Novak, 1991). Many experiments proved that understanding and knowledge retention improved with the use of concept maps (Mintez, Wandersee & Novak, 1998; Novak, 1998, 2002; Coffey, Carnot, Feltovich, P.J., Feltovich, J, Hoffman & Cañas, 2003b). Although relatively little has been written about the application of concept maps in the business environment (Leake, Maguitman, Reichherzer, Cañas, Carvalho, Arguedas, Brenes & Eskridge, 2003), concept mapping is increasingly being used in the business environment. It is ideal for strategy formulation, implementation and measurement; product development; training programs; operational planning and problem solving (Trochim, 2003). A study of the literature indicated that concept maps and –tools are used for knowledge management (Hoffman, Coffey, Carnot & Novak, 2002; Fourie, Schilawa & Cloete, 2004); to improve shared understanding (Bennett & Frazer, 1990; Freeman & Jessup, 2004); to enhance team or group performance (Trochim, 1989; Cannon-Bowers, Salas & Converse, 1993; Evans, Harper & Jentsch, 2004); to facilitate training (Coffey, Cañas, Reichherzer, Hill, Suri, Carff, Mitrovich & Eberle, 2003a); to manage projects and product innovation (Fourie, 2005); to generate ideas and communicate complex ideas (Plotnick, 1997), and to enhance product innovation and design (Novak & Iuli, 1994). However, until now concept mapping tools have rarely been applied in the formulation and alignment of business strategy.

2 Aim and methodology

Since concept mapping tools have a powerful capability to ensure that employees are on the same page, and could therefore enhance the alignment and shared understanding of the vision, mission and strategic objectives of the company (Novak, 1998; Fourie, 2005), this research endeavors to test this statement with regard to the alignment of strategic intent in business. Semi-structured interviews were used to interview employee and executive groups, as well as the CEOs of five co-operative wine cellars in the Paarl district of South Africa. Each interview gathered organizational information, as well as information on strategic intent (nature and status, internal communication, current strategy alignment measurement, vision, mission, and strategic objectives). During the sessions, the main concepts were recorded and CmapTools was used to construct visual representations of the perceptions of the organization's vision, mission and strategic objectives for each of the hierarchical levels. Frequently, "placeholder" maps, small segments that pertained to promising topics, were created to be revisited later (Cañas, Ford, Novak, Hayes, Reichherzer & Suri, 2003). The total amount of people interviewed was 30 of which 5 CEOs, 10 senior executives and 15 employees. The concept maps were eventually analyzed and compared to determine differences and alignment problems within each wine co-operative.

3 Research results

The results of the analysis and map comparisons amongst the different organizational levels are presented below. Only one example of each of the vision, mission and strategic objective maps are given.

3.1 Cooperative wine cellar A

The concept maps in Figures 1 to 3 below focus on the organizational visions of each of the three hierarchical levels. An analysis of the degree of alignment revealed that all three hierarchical levels identified the following concepts for the organizational vision: "Produce wine of excellence; quality wine for the international market and for South Africa; and wine that match the changing market needs." The CEO and executive team identified the following concepts: "Motivated and capable staff; and technological advanced facilities." Only the CEO mentioned: "To get an optimal balance between bulk and bottled wine sales; new focus area is bottled wine sales; values of innovation, social responsibility, and reliable supply; and to generate sustainable income for shareholders." The employees' perception of the organization's vision focuses only on the production of wine.

From the concept maps, it is clear that the communication of the vision to employees is not very successful, as the employees did not identify staff and technology as part of the vision. The CEO also clouded his vision with detailed aspects from the mission, which could have contributed to the misalignment and miscommunication that is occurring between the CEO and employee levels.

The same process was followed for the mission and strategic objectives of Cellar A. All three hierarchical levels identified "to generate sustainable income for members" and "to produce quality wine for South African and international markets" as part of the organizational mission. The CEO and employees identified "wine must

match the different market needs” as part of the organization’s mission, while only the CEO identified “to focus on a niche part of the international market.” In addition, the employees identified “to focus on quality of grapes and wine recipes”, which neither the CEO nor the executive team identified.

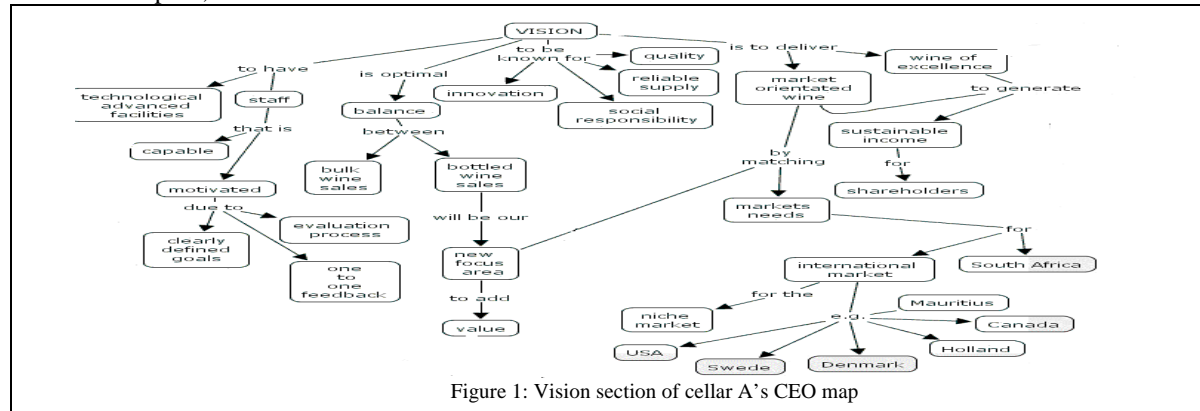


Figure 1: Vision section of cellar A's CEO map

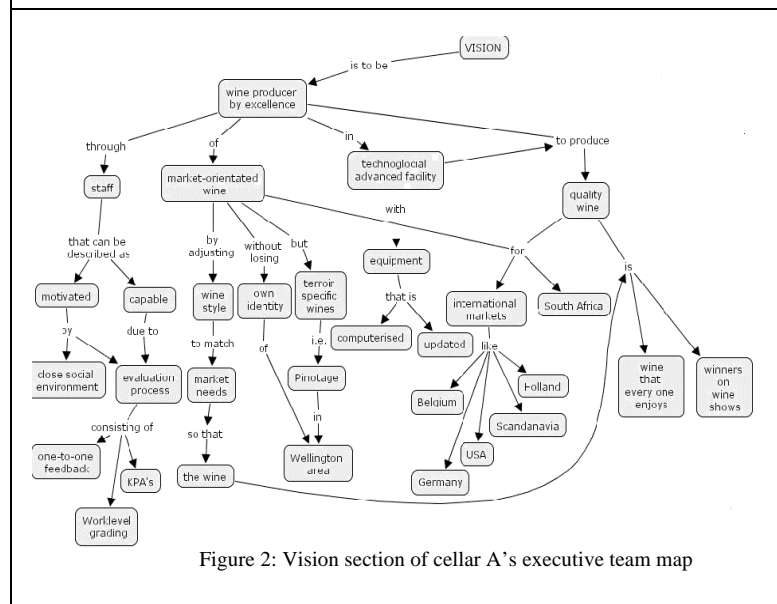


Figure 2: Vision section of cellar A's executive team map

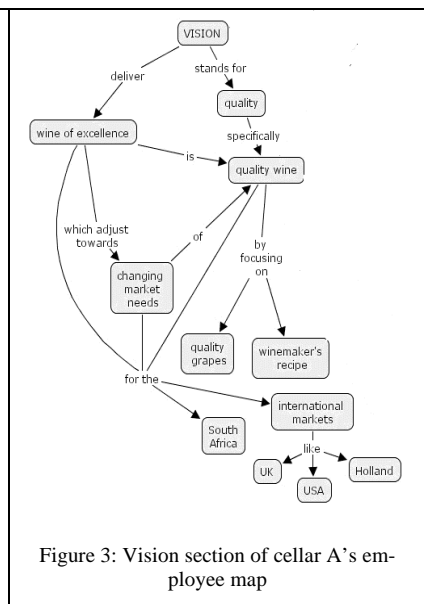


Figure 3: Vision section of cellar A's employee map

With regard to the organizational strategic objectives it became apparent from the comparison of the concept maps that the CEO of Cellar A identified more long term strategic objectives than the employees and executive team. None of the identified strategic objectives by any of the hierarchical levels were time-bound, casting a shadow of doubt on the level of commitment and buy-in into the cellar’s strategic intent, most probably due to the inability of the CEO to clearly communicate the strategic intent.

All three hierarchical levels identified the production of quality wine as part of both the vision and mission. The CEO and employees indicated that the wine must match the market needs as part of both the vision and mission. It could thus be concluded that there is some confusion amongst all three hierarchical levels in distinguishing the organization’s vision (its future positioning) from its mission (current positioning).

All corresponding concepts amongst the different hierarchical levels were counted and are depicted in Figure 4. The alignment amongst all three hierarchical levels for Cellar A is: vision (33,3%), mission (50%) and strategic objectives (20%). Amongst all three hierarchical levels, the mission sections of the maps obtained the highest percentage alignment. A comparison between the CEO and employee maps, as well as the executive team and employee maps, indicates that the mission sections showed the most alignment. The most alignment between the CEO and the executive team occurred in the strategic objectives section. The alignment of the vision was found to be the highest between the CEO and executive team members. The worst alignment of the vision occurred between the executive team and employee level. It seems as if the CEO (only 2 years in his current position) has fallen in the rut of crafting strategies without clearly communicating, implementing or aligning the strategy. The CEO will have to focus on the communication and alignment of the vision amongst all the hierarchical lev-

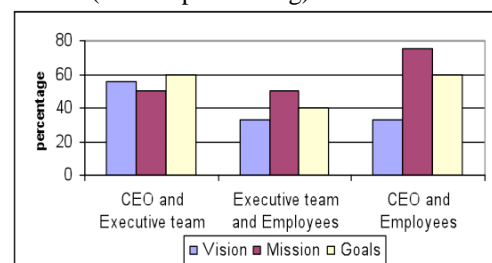


Figure 4: Alignment of strategic intent in cellar A

els. All the employees need to know where the organization is heading. A much clearer distinction between the vision and mission is needed.

3.2 Cooperative wine cellar B

Following the same procedure as above, concept maps constructed by the CEO, executive team and employees were used to determine the alignment of the vision, mission and strategic objectives of Cellar B.

From the vision concept maps it became clear that the focus of all three levels is on profitability. Quality was added by the CEO and the executive team; effectiveness by the executive team; and costs by the CEO.

In Figures 5 to 7 the mission maps that were used in the assessment of the alignment are presented. It is evident that all three hierarchical levels identified “to produce bulk and bottled wine” as the organizational mission.

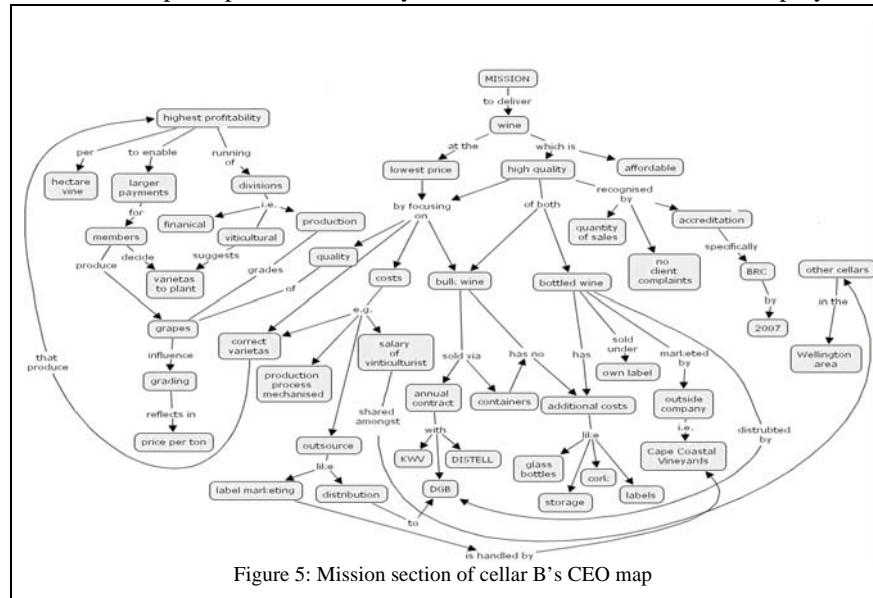


Figure 5: Mission section of cellar B's CEO map

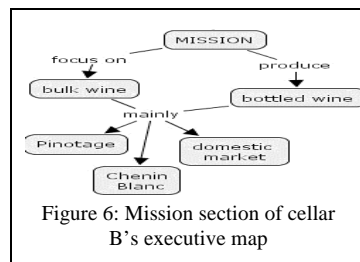


Figure 6: Mission section of cellar B's executive map

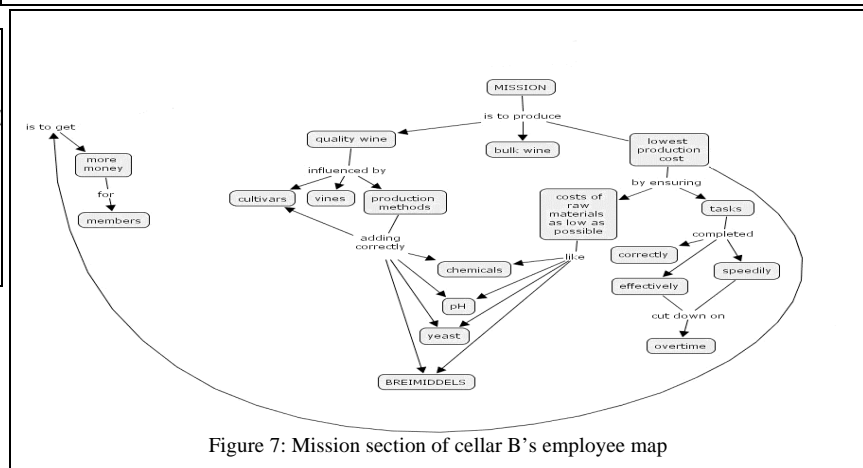


Figure 7: Mission section of cellar B's employee map

The CEO and employees identified “wine must be produced at the lowest costs” and “to produce quality wine by managing vines, cultivars and production methods” as part of the mission. In addition, the executive team identified “the focus must be on the South African market.” Clearly, there is a difference in segmentation and focus of the targeted consumer market amongst the different hierarchical levels, which could result in poor decisions being made by management and staff.

The comparison of the organizational strategic objectives maps revealed that there is alignment between the strategic objectives of the CEO and the executive team, as well as the CEO and employees. However, it seems as if there is miscommunication and misalignment amongst the executive team and the employees as their strategic objectives are not aligned. This can be due to the CEO filtering the strategic intent and only communicating what he feels relevant to the specific hierarchical levels. This partial alignment of hierarchical levels and partial commitment to the strategic intent could result in mediocre performance and results of the company.

The alignment of the identified concepts between the different hierarchical levels appears in Figure 8. The alignment amongst all three hierarchical levels for Cellar B is: vision (25%), mission (25%) and strategic objectives (25%). The comparison of the CEO and employees maps reveals that the mission sections of the maps showed the most alignment. The most alignment amongst the CEO and

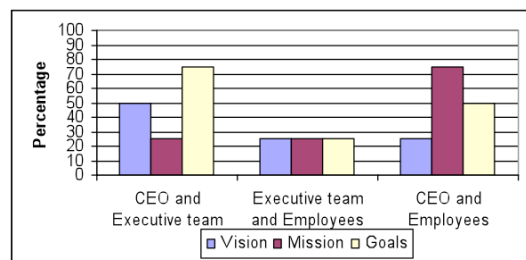


Figure 8: Alignment of strategic intent in cellar B

the Executive team occurred amongst the strategic objectives section. The alignment of the vision was the highest between the CEO and Executive team members. It is evident that the CEO will have to focus on the communication and alignment of the vision, mission and strategic objectives amongst all the hierarchical levels. The alignment of the strategic intent amongst the three levels are very low probably because the CEO is more involved in operational rather than strategic management of the cellar.

4 Cooperative wine cellar C

From the comparison of the vision maps it became apparent that the communication and the alignment of the vision amongst the CEO and the executive team level is very high, but that the vision is not properly communicated to the employees by either the CEO or the executive team.

No single corresponding concept could be identified in the mission section of the maps of all three hierarchical levels. It seems as if there is considerable confusion on what the mission of Cellar C is. It became evident that the CEO's mission formulation focuses on the management of processes. The executive team's mission is more marketing related, while the employees are more quality and service orientated in the formulation of the mission. From a comparison of the mission maps it thus seems that there is confusion about the organizational mission and that it is not properly communicated or aligned except between the CEO and executive team level.

Figures 9 to 11 display the concept maps representing the organizational strategic objectives of the CEO, executive team and employees. The maps were carefully analyzed to determine the level of alignment of the strategic intent.

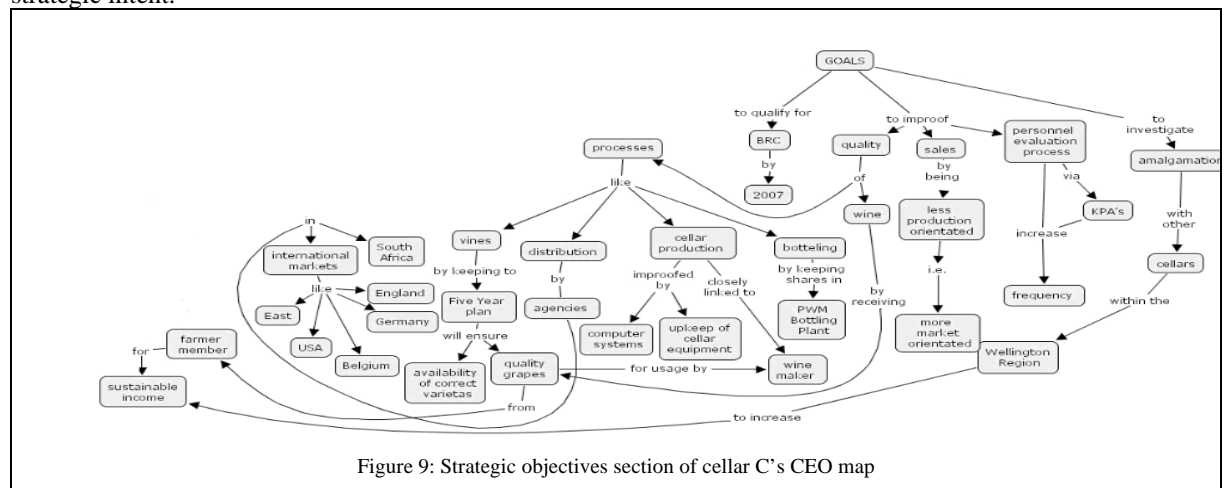


Figure 9: Strategic objectives section of cellar C's CEO map

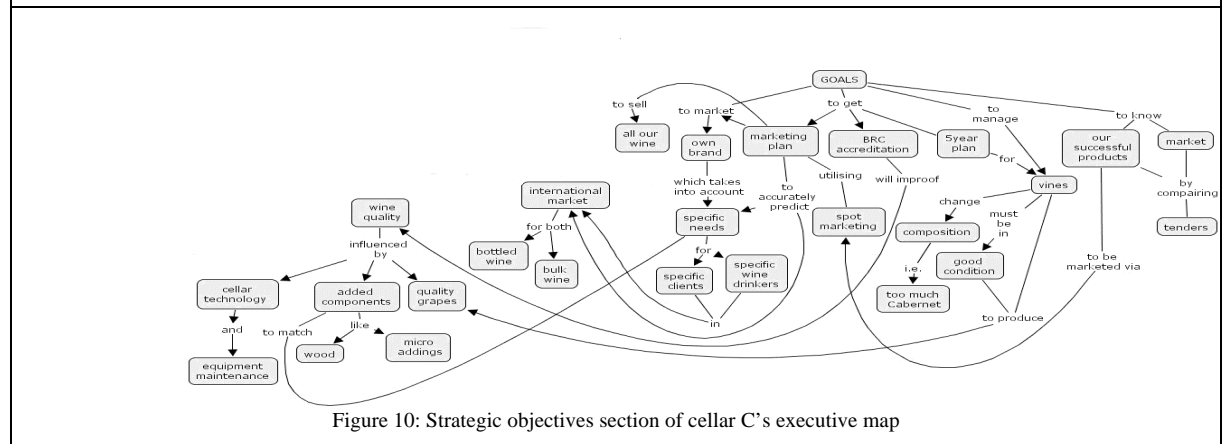


Figure 10: Strategic objectives section of cellar C's executive map

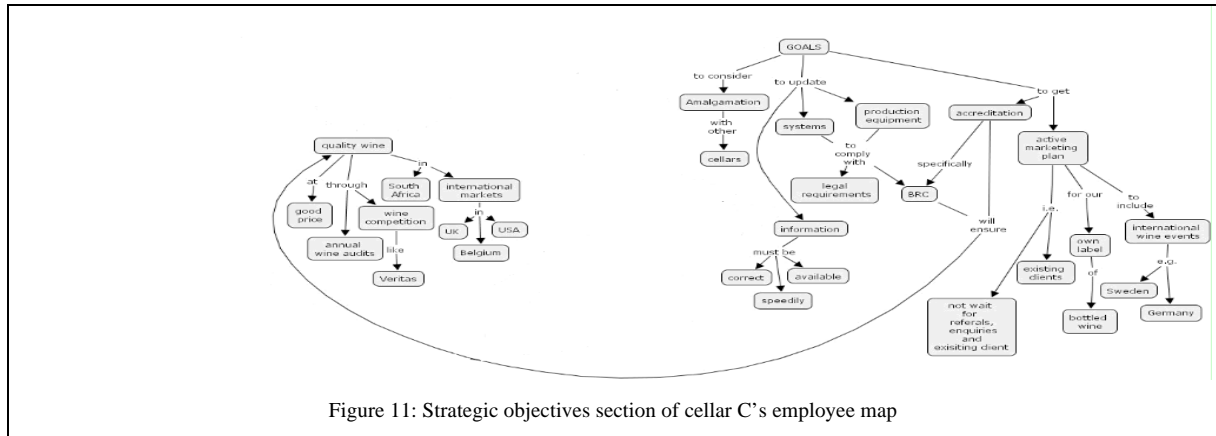


Figure 11: Strategic objectives section of cellar C's employee map

All three hierarchical levels identified “to get BRC accreditation” as part of the organizational strategic objectives. The CEO and executive team identified “to be more market orientated and not production orientated” and “to produce quality wine by managing and improving the production processes like focusing on viticulture, grape quality, and the winemaking process.” Both the CEO and employee level identified “to consider amalgamation”, while the executive team and employees identified “to get an active marketing plan”. The CEO is the only level that identified “to improve the personnel evaluation process” and the executive team is the only level to identify “to know the market by comparing prices of accepted tenders.” A comparison of the mission maps thus shows that the CEO does not communicate the organizational strategic objectives to all the hierarchical levels.

The alignment of the identified concepts per section of map between the different hierarchical levels is depicted in Figure 12. The alignment amongst all three hierarchical levels for cellar C is: vision (16.7%), mission (0%) and strategic objectives (20%). Amongst all three hierarchical levels, the strategic objective section of the maps obtained the highest percentage alignment. In the comparison of the

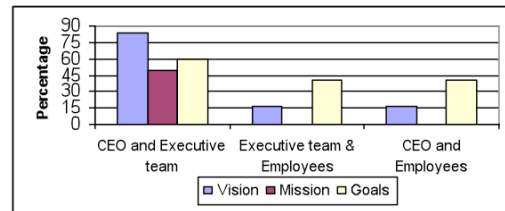


Figure 12: Alignment of strategic intent in cellar C

CEO and employee maps, the strategic objective sections of the maps showed the most alignment. This was also the case for the comparison between the executive team and employee maps. The most alignment between the CEO and the executive team occurred in the vision section. The alignment of the vision was the highest between the CEO and executive team members and the lowest between the executive team and employee level. The CEO will have to focus on the communication and alignment of the mission amongst all hierarchical levels.

5 Cooperative wine cellar D

The same comparison of the vision, mission and goal maps of the CEO, executive team and employees were done for Cellar D and the results are summarized in Figure 13. The alignment amongst all three hierarchical levels for cellar D is: vision (50%), mission (16,7%) and strategic objectives (28,6%). Amongst all three hierarchical levels, the vision sections of the maps obtained the highest percentage alignment. For the comparison between the CEO and employees' maps, the vision sections of the maps showed the most alignment. This was also the case for the comparison between the executive team and employees' maps. The most alignment between the CEO and the executive team occurred in the strategic objectives section. The alignment of the vision was the highest between the executive team and employees. The worst alignment of the mission occurred between the executive team and employee levels. Communication and alignment of the mission amongst all the hierarchical levels thus need attention.

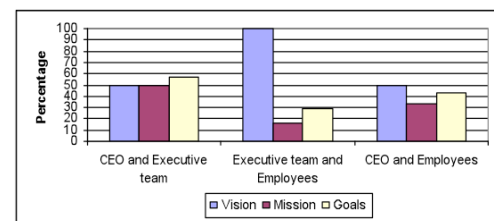


Figure 13: Alignment of strategic intent in cellar D

6 Cooperative wine cellar E

Again the alignment of vision, mission and objective maps of the CEO, executive team and employee were analyzed for Cellar E and the results are summarized in Figure 14. The alignment amongst all three hierarchical levels for Cellar E is vision (66,7%), mission (100%) and strategic objectives (0%). Amongst all three hierar-

chical levels, the mission sections of the maps were 100% aligned. From the comparison of the CEO and executive team maps, it became apparent that the vision and mission sections of the maps are 100% aligned, while the executive team and employee maps, as well as the CEO and employee maps, indicated a 100% alignment in mission. The alignment of the vision was the highest between the CEO and executive team. The worst alignment of the strategic objectives occurred between the executive team and employee levels. The communication and alignment of the vision between the executive team and employee levels and the CEO and employee level need attention, as well as the alignment of strategic objectives amongst the three levels as no single concept was identified amongst all three hierarchical levels. As strategic objectives serve as measurement and milestones of progress and also fulfill a motivational function, the CEO and executive team will have to focus on this.

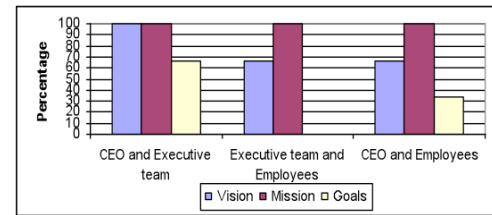


Figure 14: Alignment of strategic intent in cellar E

7 Comparative summary of alignment results

Figure 15 compares the combined results for the alignment of the vision, mission and strategic objectives for all the cellars, thus representing the current situation within co-operative cellars in the Paarl District. The highest

alignment of the vision was 58,3% and occurred between the CEO and the executive team levels. The lowest alignment of the vision for the combined cellars was 33,3% and was measured amongst all three levels. The highest alignment of the mission for the combined cellars was 65,2% and was reached between the CEO and employee levels. The lowest alignment of the mission for the combined cellars was 47,8% as measured amongst the three hierarchical levels and the executive team and employees levels. The highest alignment of the strategic objectives for the combined cellars was 63% and was measured between the CEO and executive team levels. The lowest objective alignment for the combined cellars was 18,5% and was measured when measuring alignment amongst all three hierarchical levels. Only the alignment of the vision, mission and strategic objectives between the CEO and the executive team levels for the combined cellars all exceeded fifty percent. This clearly indicates that the communication and the alignment of the vision is the best between the CEO and executive team levels. This could be attributed to the close and frequent nature of the communication, work relationship and reporting structures for these two hierarchical levels. The highest alignment occurs in the mission section.

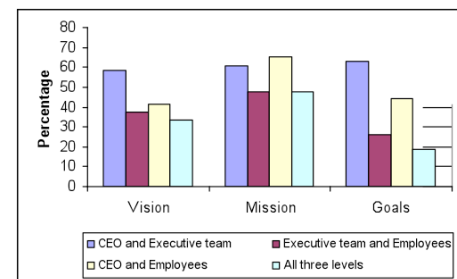


Figure 15: Comparison of combined results of the alignment of strategic intent for co-operative cellars

8 Conclusion

Based on study of the five wine cellars, as described above, the following major conclusions can be drawn:

- Serious alignment problems exist amongst the different hierarchical levels of the cellars' interpretation of the strategic intent as communicated in the vision, mission and strategic objectives. Interestingly, these alignment problems exist amongst all hierarchical levels, namely CEO and executive team, CEO and employees, and executive team and employees. Sixty percent of the cellars obtained less than fifty percent for the alignment of the vision. Eighty percent of the cellars obtained less than fifty percent for the alignment of the mission and all cellars obtained less than fifty percent for the alignment of the strategic objectives.
- The misalignment could mostly be attributed to a lack in visionary leadership and/or poor communication of the strategic intent.
- Concept maps are a valuable tool to visually represent the strategic intent of a business, namely vision, mission and strategic objectives. Participants found the construction of the concept maps extremely helpful in refinement of their own concepts around strategic intent. When the various maps were compared concept maps proved particularly useful in showing miscommunication and misperceptions of the strategic intent amongst the various hierarchical levels. It can thus be concluded that concept maps is a valuable tool in the alignment of business strategy by visually representing the strategic intent, alignment and misalignment amongst the identified concepts by different hierarchical levels of the organization. Concept maps can visually represent the complex and abstract nature of business strategy, making it easier to plan, describe, define, craft, communicate, implement and measure.

9 References

- Baldoni, J. 2006. *How Great Leaders Get Great Results*. Boston: Mc Graw Hill.
- Bennett, P.W. & Fraser, K. 1990. *Using Concept Maps to Improve Communication Effectiveness at Kodak*. Department of Education. Cornell University. Ithaca. New York.
- Campbell, A. & Yeung, S. 1991. Brief case: mission, vision and strategic intent. *Long Range Planning*, 24 (4), 145-147.
- Cañas, A.J., Ford, K.M., Novak, J.D., Hayes, P., Reichherzer, T., Suri, N., 2003. Using Concept maps with Technology to Enhance Collaborative Learning in Latin- America. 7 February. [Online] Available: <http://www.coginst.uwf.edu/users/acanas/Publications/QuorumSoupST/SoupsST.htm>
- Cañas, A. J., Hill, G., Carff, R., Suri, N., Lott, J., Eskridge, T., et al. (2004). CmapTools: A Knowledge Modeling and Sharing Environment. In A. J. Cañas, J. D. Novak & F. M. González (Eds.), *Concept Maps: Theory, Methodology, Technology. Proceedings of the First International Conference on Concept Mapping* (Vol. I, pp. 125-133). Pamplona, Spain: Universidad Pública de Navarra.
- Cannon-Bowers, J.A., Salas, E & Converse, S. 1993. Shared mental models in expert team decision making. In Castellan, N.J. (ed.). *Individual and group decision making: Current issues*. Hillsdale: Lawrence Erlbaum Associates, 221-246.
- Coffey, J.W., Cañas, A.J., Reichherzer T., Hill, G., Suri, N., Carff, R., Mitrovich, T. & Eberle, D. 2003a. Knowledge modeling and the creation of el-tech: A performance support system for electronic technicians. *Expert Systems with Applications*, 25 (4), 1-19.
- Coffey, J.W., Carnot, M.J., Feltovich, P.J., Feltovich, J, Hoffman, AJ, Cañas, A.J., 2003b. A Summary of Literature Pertaining to the Use of Concept Mapping: Techniques and Technologies for Education and Performance Support. Technical Report submitted to the Chief of Naval Education and Training. Pensacola, Florida.
- Dibble, J.A. & Langford, B.Y. 1994. *Communication Skills & Strategies: Guidelines for Managers at Work*. Cincinnati: College Division Southern-Western Publishing Co.
- Evans, A.W., Harper, M.E. & Jentsch, F. 2004. I know what you're thinking: Biting Mental Models about Familiar Teammates. In Cañas, A., Novak, D. & Gonzales, F.M. (Eds.). *Concept Maps : Theory, Methodology, Technology: Proceedings of the First International Conference on Concept Mapping*, Pamplona, Spain, Volume 1, 243-248
- Fourie, L.C.H. 2005. Computer-based concept mapping tools in business. *Proceedings*. San Diego International Systems Conference, San Diego, State University, USA, 8-10 July 2005.
- Fourie, L.C.H., Schilawa, J. & Cloete, E. 2004. The value of concept maps for knowledge management in the banking and insurance industry: A German case study. In Cañas, A., Novak, D. & Gonzales, F.M. (eds.) *Concept Maps: theory, Methodology, Technology*. Proceedings of the First International Conference on Concept Mapping. Pamplona, Spain. Volume 1, 249-256.
- Freeman L.A. & Jessup, M. 2004. The power and benefits of concept mapping: Measuring use, usefulness, ease of use, and satisfaction. *International Journal of Science Education*, 26(2), February, 151-169
- Hamel, G. & Prahalad, C.K. 1994. *Competing for the future*. Boston: Harvard Business School Press.
- Hess, K. 1987. *Creating the High-Performance Team*. New York: Wiley.
- Hesselbein, F. & Cohen, P.M. (eds.) 1999. *Leader to leader*. San Francisco: Tossey-Bass.
- Hoffman, R.R., Coffey, J.W., Carnot, M.J. & Novak, J.D. 2002. An Empirical comparison of methods for eliciting and modelling expert knowledge. Paper Presented at the Meeting of the Human Factors and Ergonomics Society, Baltimore.
- Kaplan, R.S. & Norton, D.P. 2001. *The Strategy Focused Organisation: How Balanced Scorecard Companies Thrive in the New Business Environment*. Boston, MA: Harvard Business School Press.
- LeadershipNow. 2006. *Leading thoughts: Building a community of leaders: Quotes on leadership* [Online]. Available: <http://www.leadershipnow.com/leadershipquotes.html> Accessed: 28 August 2006.
- Leake, D.B., Maguitman, A., Reichherzer, T., Cañas, A.J., Carvalho, M., Arguedas, M., Brenes, S. & Eskridge, T. 2003. *Aiding Knowledge Capture by Searching for Extensions of Knowledge models*. In Proceedings of K-CAP'03, Sanibel Island, Florida, October 2003.
- Lewis, P. 1975. *Organizational Communication*. Columbus, Ohio: Grid.
- Martin, D. 1994. Concept Mapping as an aid to Lesson Planning: A longitudinal Study. *Journal of Elementary Science Education*, 6(2), 11-30.
- Novak, J.D., 1991. Clarify with Concept Maps: A tool for students and teachers alike. *The Science Teacher*, 58(7), 45-49.
- Novak, J.D. & Iuli, R.J. 1994. *The Use of Metacognitive Tools to Facilitate Knowledge Production*. Florida Research Symposium. Pensacola Beach, Florida.
- Novak, J.D. 1998. *Learning, Creating and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations*. Mahwah: Lawrence Erlbaum.
- Novak, J.D., & Cañas, A. J. 2008. *The Theory Underlying Concept Maps and How to Construct Them* (Technical Report No. IHMC CmapTools 2006-01 Revised 01-08). Pensacola, FL: Institute for Human and Machine Cognition. Available online at: <http://cmap.ihmc.us/Publications/ResearchPapers/TheoryCmaps/TheoryUnderlyingConceptMaps.htm>.
- Novak, J.D. 2002. Meaningful learning: the essential factor for conceptual change in limited or appropriate propositional hierarchies (LIPs) leading to empowerment of learners. *Science Education*, 86 (40), 548-571.
- Peters, T.J. & Waterman, R.H. 1982. *In search of excellence*. New York: Harper & Row.
- Plotnick, E. 1997. Concept Mapping: A graphical System for Understanding the Relationship between Concepts. 5 January. [Online] Available: <http://www.ericdigest.org/1998-1/concept.htm>.
- Puth, G. 2002. *The communicating Leader*. Pretoria: Van Schaik.
- Pycraft, M., Singh, H., Phihlela, K., Slack, N., Chambers, S., Harland, C., Harrison, A. & Johnston, R. 2000. *Operations Management*. South African Edition. London: Pearson Education.
- Robbins, S.P. & Decenzo, D.A. 2004. *Fundamentals of Management: Essential Concepts and Applications*. Fourth Edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Senge, P. 1997. Leading Learning Organizations. In Shelton, K. (ed.), *A new paradigm of leadership*. New York: Executive Excellence Publishing, 97-100.
- Thompson, A.A., Strickland, A.J. & Gamble, J.E. 2005. *Crafting and Executing Strategy, The quest for competitive Advantage*. New York: McGraw-Hill Irwin.
- Trochim, W.M.K. 1989. An introduction to concept mapping for planning and evaluation. *Evaluation and Program Planning*, 12 (1), 1-16.
- Trochim, W.M.K. 2003. Q & A What is Concept Mapping? 28 February 2003. [Online] Available: <http://trochim.human.cornell.edu/tutorial/katsumot/conmap.htm>.
- Wall, B., Sobol, M.R. & Solum, R.S. 1999. *The mission-driven Organisation from mission statement to a thriving enterprise*. Rocklin, CA: Prima Publishers.