

## AL23 - Simplifying Joint Ventures

**Anthony Kjar**

Managing Director, Gibson Crest Pty Ltd., Melbourne, Australia

Corresponding author: arkjar@bigpond.com

### **Abstract**

More than half Western World production of alumina, aluminium and iron ore, as well as a significant proportion of copper concentrates, zinc concentrates, oil collected in sub-sea platforms, and LNG processing plants is produced by companies in Joint Venture arrangements. Some have been in operation for more than 50 years, are often complex, have not increased production substantially after the initial 20 years. Cash costs are rising.

This paper uses the aluminium industry as an example as this industry was a leader in the use of Joint Ventures.

Circumstances since formation have often changed considerably. These changes include the rapid increase in non-Western world production, usually by single company arrangements, newer technology that is often replicated; larger initial plants; energy availability; type; costs; and some partners are not adding value to the Joint Venture.

This paper builds on previous papers by the author. It starts with a case study on Joint Ventures established by Comalco Ltd. The paper examines ways to characterize a Joint Venture organization, and options for change that will result in simplification and potential refocus and cost reduction. Many issues involve technology, organization structure and management.

**Keywords:** Joint Ventures, simplification, partner characteristics, exit strategies.

### **1. Why Establish a Joint Venture**

A Joint Venture (JV) is usually established when the parties have a common objective, but each party does not have the resources or ability or appetite to develop, finance and manage the business with associated business risks by itself. At formation the JV is usually structured to carry out a business in a way that leverages the inputs and minimizes the risks to the parties, or at least allocates the risks accordingly to that party best able to manage them.

The JV Participants Agreement allocates tasks and shareholdings to those who are best able to manage. It also seeks to build on the competitive advantage of the parties. It is generally accepted that JVs, on average, create value for parent firms and that value creation is increased mainly due to synergies and common beliefs of individual participants, but decreased by the inherent tension between co-operative and non-cooperative behavior in JVs [1].

#### **1.1. Changes in JV Circumstances**

The tension between some of the parties often increases over time, particularly as the initial leaders depart and changes occur. These changes include the rapid increase in non-Western world production, usually by single company arrangements, newer technology that is often replicated, larger initial plants, energy availability, type and costs, changing Government and community expectations, and some parties not adding positive value to the JV.[2].

Working within a JV is challenging and complex. Some observations on strategy and governance structure, change and working in a JV are discussed in [3-9].

One of the main challenges and decision making of JVs is that three or more boards are involved, often with different company cultures, perspectives and interests. These boards have to agree on fundamental matters such as capital calls, development plans, major budgets and capital spend. It is important for JV parties to agree up front on a clear and coherent strategy for the business and to prioritise in the JV Agreement. An effective project governance process, a workable co-operation framework identifying the matters on which each party will have final say, and to embed a binding and uncomplicated dispute resolution process for any matters where all party decision making is critical.

Many aluminium JVs were established half a century ago. Individually they grew over the first twenty years but little thereafter. Costs have risen up the cash cost curve [6-8].

In the current environment of commodity price volatility, larger capital costs for projects than in China, Russia, and the Middle East, restrictions on capital raising and debt finance, enhanced sovereign risk especially in respect of large scale projects, the limited availability of large blocks of hydro power for expansion, and the drive amongst developers to reduce costs generally leads to a need to consider de-risking and simplifying existing JV structures.

JVs are now held back by the complexity and costs of operating within the JV, the absence of a single owner that has the ability to integrate fully within its own mainstream portfolio, optimization of managerial and technology leadership, substantial overheads and the ability to make unilateral decisions on output to fit market realities.

The natural trend has been a reduction over time in the number of parties in a JV. For this trend to be a win-win some Owners need to consider a serious look at their existing JVs.

## **2. Comalco, CRA and Rio Tinto as a Case Study**

### **2.1. Early History**

In 1949 Zinc Corporation in Britain merged with the Imperial Smelting Corporation Ltd to form Consolidated Zinc Corporation Ltd (CZC) and an Australian subsidiary, Consolidated Zinc Pty Ltd (CZP). A world class bauxite deposit was discovered at Weipa, Australia, by CZP in the early 1950s. A deliberate strategy was developed to grow an international business based on the export of bauxite and growth of that business, as well as a domestic integrated business to produce and sell semi-finished products [10].

In 1960 Kaiser Aluminum and Chemical Corp (KACC) and CZP agreed to form a 50/50 partnership, which later became Comalco Ltd (Comalco). Both parties accepted that Comalco would be Australian based.

In 1962 Rio Tinto Zinc Corp was formed by a merger of CZC with Rio Tinto Ltd London, a company with worldwide metals and metallurgical interests. Conzinc Rio Tinto of Australia (CRA) was formed at the same time, by a merger of CZP with the smaller Rio Tinto Mining Co.

CRA tightly controlled the international business, with KACC supplying technology for alumina, aluminium and downstream semi fabrication.

## 2.2. Growth of Joint Ventures

The strategy in the international business was to grow by selling bauxite to third parties, particular Japanese producers under long term contracts, as well as to Joint Venture alumina plants and the Comalco share to Joint Venture aluminium smelters.

Key attributes of the international business in the 1970s and 1980s are outlined in Table 1.

**Table 1. Key attributes of Comalco International Business in 1970s and 1980s.**

Business Unit	Positive Attributes	Negative Attributes
Bauxite	Huge reserves of open cut, high alumina grade bauxite next to a large port. In a good position following the imposition of a bauxite levy by the Jamaican Government. Bauxite was supplied for 25 % of production.	Although it was readily dissolvable, most bauxite required a high temperature digestion process. The bauxite had few impurities except for the relatively high soluble kaolin. Scaling, cracking and erosion issues were experienced in high temperature digestion process.
Alumina	A world unit size plant was established and was being expanded by a factor of four.  A replicated plant was built in Italy in the expectation of gaining relief of import tariffs.	QAL was a JV of four competitors with different languages, and changing interests and cultures.  Eurallumina was a JV of three companies with different languages, culture and interests.
Aluminium	NZAS was based on hydro power and proven P69 technology The JV partners were supportive.  BSL was based on rejects from the export of coal. The JV partners were supportive.  Gladstone Power Station was purchased as a JV, with output to supply the original smelter.	The technology was not operating at the potential and was being superseded.

In 1982 CRA purchased the KACC equity in Comalco, and this allowed both companies to compete internationally. In the 1980s the Comalco international businesses grew rapidly. Later, not all was straight forward. Some businesses were sold, and all Joint Ventures changed in ownership to some degree.

In 1996 Rio Tinto Ltd, which had an increasing ownership of CRA, merged in a dual listed arrangement. The simple effect of the dual listed company was that RTZ (now Rio Tinto Plc) and CRA (now Rio Tinto Ltd) listed separately. However, for all intents and purposes they were merged as one company [9]. Later in 2007 Rio Tinto purchased Alcan, a major aluminium company, which had interests in other aluminium companies including Alusuisse and Pechiney and a number of JVs.

A brief history of the Comalco initiated JVs is shown in Table 2.

**Table 2. Brief history of JVs initiated by Comalco.**

(Does not include all Rio Tinto acquisitions)

Joint Venture	Raw Materials Supplied by Comalco	Partners	Type [8]	Year	% Comalco	Prod Mtpy	Reason for Change
<b>Bauxite</b>							
Weipa		-		1963	100	5	
		-		2020	100	30	
Gove		3	A	1969	-	7	Started by Alusuisse.
		-		2000	-	7	Purchased by Alcan
				2007	100%Rio	7	Purchased by Rio Tinto
				2013		11	Closed alumina plant
Halco		7	D1	1963	-	7	
		7	D1	1996	4	7	Then sold to Alcan, Alcoa
		3	D1	2007	45% Rio		Alcan purchased by Rio Tinto
<b>Alumina</b>							
QAL	Yes	4	A	1963	CRA, then 20% Comalco	0.6	Comalco got stronger
		2	A	2020	80	4	Pechiney, Alcan, Comalco now held by Rio Tinto. KACC interest sold to Rusal.
EA	Yes	3	C	1973	26.9	0.6	
EA	Yes	2	C	1980	56.2	1.5	Partner sold out
		2	A	2007	0	0	Comalco sold to Rusal. Closed. Cash cost too high.
Yarwun	Yes	-		2004/2008	100	3.4	Design and operation not well integrated with adjacent QAL plant.
<b>Aluminium</b>							
NZAS	Yes	3	A	1971	50	0.25	
		2	A	1974	79.4	0.35	Showa Denko interest swapped for Comalco interest in Showa Denko Rolling in Japan.
BSL	Yes incl. power	5	A	1982	53	0.25	
	Yes incl. part power	7	A	1997	53	0.54	Japanese companies consolidated at board level
<b>Power Generation</b>							
Gladstone Power Station	yes	2	C	1994	42	1680MW	State PS purchased by Operator and Comalco (consumer).
<b>Rolling</b>							
Showa Denko	Yes	2	A	1986	50%	0.03	Partners could not agree. Comalco swapped their Showa Denko interest in NZAS. Plan to increase output in Japan.

Under Rio Tinto management a number of 100 % owned assets were sold and attempts were made to sell some JVs. At the present time there are 25 operations, of which 13 are 100 % owned and 12 are JVs. Within the electrolytic potlines there are 5 different AP technologies and 8 other designs.

Lessons that I learnt include;

- a. It is possible to use JVs successfully provided a high level of trust exists between the party principals. However, this is difficult to maintain over a long period as key leaders move and is often distracting if there is conflict due to competing company interests and changing priorities.

- b. There have been many JV changes over time. The general trend is to reduce the number of parties in each JV.
- c. There was too diverse a set of JVs to allow the development of common set of Shared Values throughout the Comalco.
- d. Most of the large JVs were of type A, as defined in [8], involving competitors and were difficult to gain consistent leadership.
- e. There was also conflict between upstream cost production (mainly JVs) and downstream product companies which require a different set of Shared Values.
- f. Comalco stalled in the 1990s due to:
  - Increased capital costs in Australia.
  - Unavailability of large stranded power blocks.
  - Complexity of Comalco JVs which were not encouraged by the later changes in ownership owner.
  - Low prices in the industry.
  - Purchase of Alcan by Rio Tinto.

## 2.3. Technology Joint Ventures

### 2.3.1. Types

There is a wide range of Research and Engineering Joint Ventures that follow on from those business arrangements outlined in [8] as shown in Table 3.

**Table 3. Research and engineering JVs.**

Type [8]	
F	Companies combine to <b>develop technology</b> . One example is the successful DUBAL Aluminium /Comalco development of the CD200 reduction cell, which was the genesis of the EGA DX and DX+ technology.
G	A company formed by the industry to <b>broker pre competitive research for multiple producers. One example is AMIRA International Ltd</b> which has celebrated its 60 <sup>th</sup> anniversary of formation. It was started by Australian mining companies and has had to reinvent itself over the years. It has extended in both client and research providers [12].
H	Collaboration of a <b>producer</b> with one or more <b>academic /government</b> funded organization to tackle specific industrial issues and solutions.
I	A <b>producer and developer of technology</b> combines with an <b>Engineering/construction</b> company to build an industrial plant.

In Comalco Research and Technology the predominance of JVs was a consequence of the growth strategy for a new small company growing into the market.

### 2.3.2. Research

The nature of the JVs led Comalco to start its own Research and Technology (R&T) base to

- a. Understand and reduce the variation within the main processes and encourage creep production.
- b. Explore breakthroughs, particularly in the minimization of silica uptake in the caustic alumina process, and
- c. Assist in the improvement and development of new downstream products.

An initial breakthrough was achieved by helping to resolve technical issues in cells installed at BSL. This was greatly appreciated by the JV parties and generated credibility for the young team.

Over the years this effort increased from a few to a corporate group of a few hundred staff, with many collaborations with academic groups, equipment suppliers, a few competitors and some financial interests in startup materials producers.

In 1985 there was a significant technology input when Comalco purchased a range of USA based operations from Martin Marietta Aluminum, including a rolling mill in Kentucky and the associated Intellectual Property of Martin Marietta Labs for the wetttable Drained Cathode and Aluminium Lithium alloy developments technology.

In interaction with outside research groups a framework was based on assessing the potential of any Intellectual Property to the core of the business. If this was significant work, it was done in house or paid for on a confidential basis.

If the work was of a more generic basis considerable interaction was encouraged with external research providers. This work had a number of benefits, including acting as a source of future staff, training and experience of existing staff, as well as a means of engaging world experts.

A wide range of collaborations were used, varying from Comalco led to follow and the government agency directs or supports [13] and shown in Figure 1. Success was variable. Generally, where a high degree of trust could be established between the parties and both parties operated in the middle ground of expertise there was success.

### **2.3.3. Reduction Cell Development**

By 1992 Comalco had developed modern cell designs and was looking at testing and upscale. Dubai Aluminium (DUBAL) was looking for cell designs for future expansion. A very open and enthusiastic JV was established in which Comalco provided the designs and DUBAL carried out the testing, with each having access to all Intellectual Property. This arrangement worked well, with open trust between the parties. This led to the development of CD200 and C26 for DUBAL, and CD200 for Comalco.[4]. The JV lapsed when Rio Tinto took another direction. Subsequently DUBAL successfully took over the IP and developed and implemented a range of world class designs.

### **2.3.4. EPCM Joint Ventures**

A subsidiary company of CRA, Minenco entered into Joint Ventures with the global engineering company, Bechtel, to carry out major expansions at New Zealand Aluminium Smelters (NZAS) and at Boyne Smelters (BSL), with an emphasis on reducing capital cost while improving safety using modern leadership management.

At NZAS a key role of Minenco was to provide the CRA shared values including the use of all staff work force in operation at NZAS and the introduction of new Comalco technology. At BSL the particular common focus was to maximize Net Present Value while implementing proven technology.

Both ventures were successful as leaders and staff were compatible and aligned with a common goal. The arrangements continued for another project in zinc, but lapsed when Rio Tinto decided to exit the engineering and construction business. Bechtel subsequently purchased Minenco.

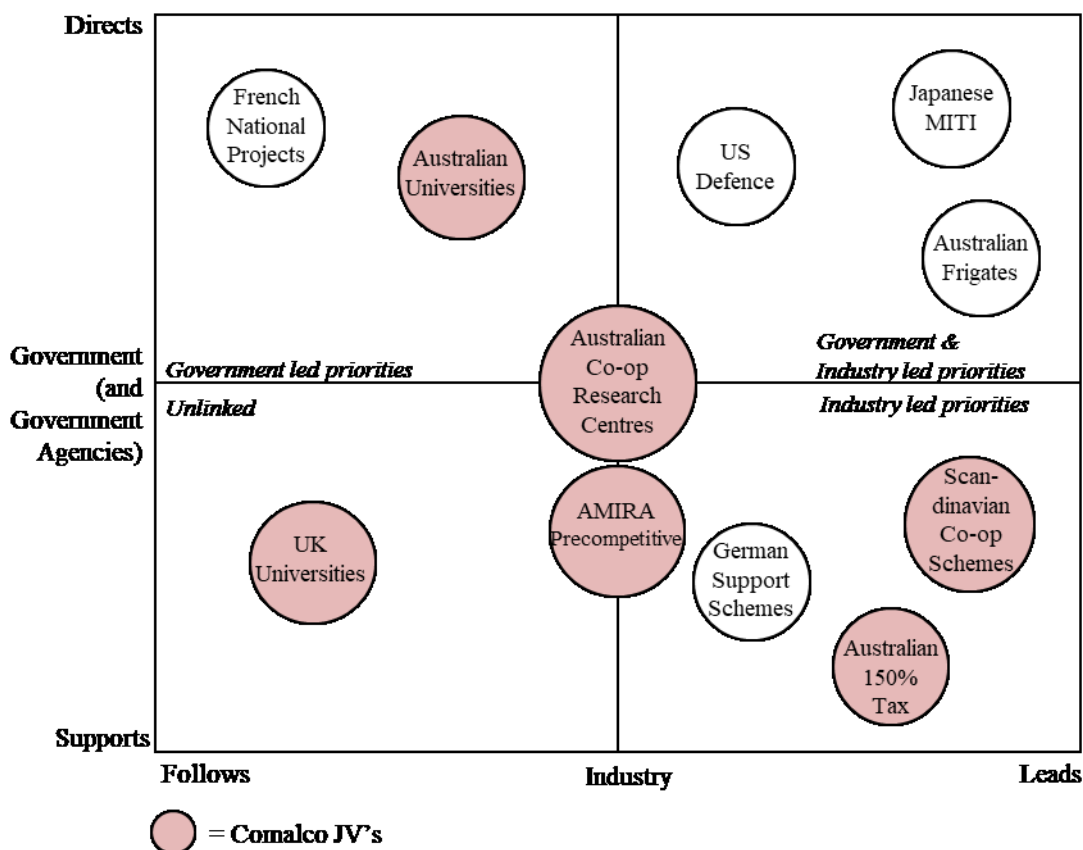


Figure 1. Style of interactions between government and industry.

### 3. Methods to Assess the Underlying Value and Direction of Joint Ventures

#### 3.1. Industry Attractiveness

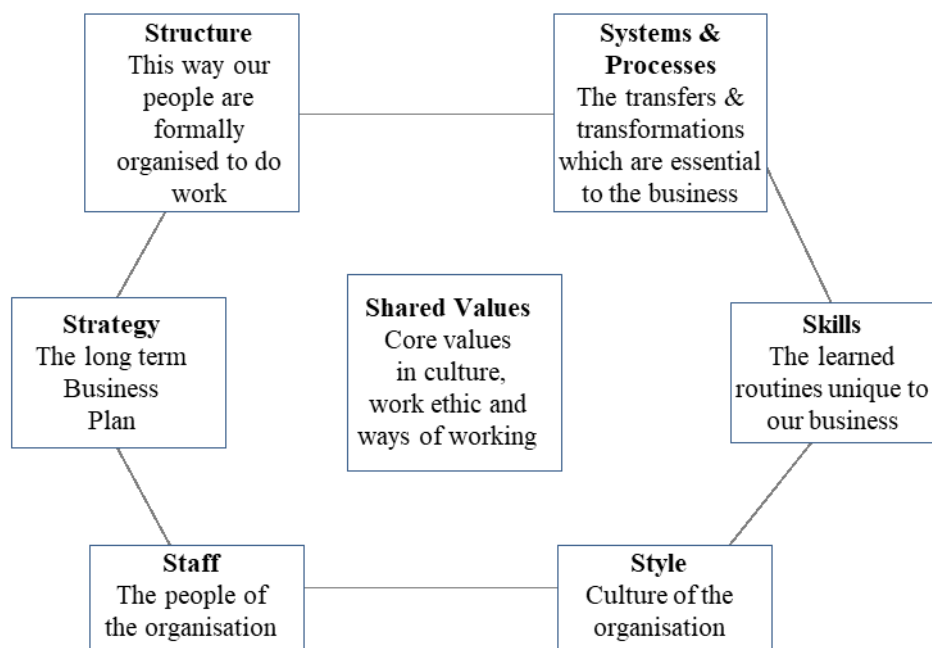
A context for industry attractiveness needs to be established. This includes growth prospects, relative size of facilities availability of large blocks of energy included stranded power; nature of the cash cost curve; likely capital costs; control of raw materials, etc. Within this framework a future for existing JVs can be assessed using a variety of techniques.

#### 3.2. McKinsey 7S

A well-established concept of addressing whether an organization is working in harmony is to map out the 7S [14]. These define the “how” of the organization as shown in Figure 2.

The “hard” elements of Strategy, Structure and Systems are reasonably easy to identify, and management can sometimes influence them directly. The ‘soft’ elements of Shared Values, Skills, Style and Staff can be harder to describe, less tangible and more influenced by company culture.

At the heart of the organization is Shared Values. In a Joint Venture, the Shared values of at least three parties must be compatible and engender trust, integrity and working for a common goal. Over time concepts of shared values have changed. For many organizations these are focused by the leaders around making a profit, in accordance with the thinking of Milton Friedman of the Chicago School of Economics on a free market economic system [15, 16] and some general ethics.



**Figure 2. McKinsey 7S.**

Many companies have and continue to extend these values and extend the values into other areas, as shown in Table 4.

**Table 4. Different shared values.**

	Typical shared values
Majority	Short term profit, laws, general ethics
Enlightened companies [16]	Long term stakeholder values, good working conditions, money to charities, far sighted management practices, 100 % owned, reciprocal fairness.
Global companies based on information processing [Company web sites]	Diversity, best talent, quick adopters, product market focus, disruption.
Mineral companies [Company web sites]	Profit, transparency, social license, ways of working particularly job safety.

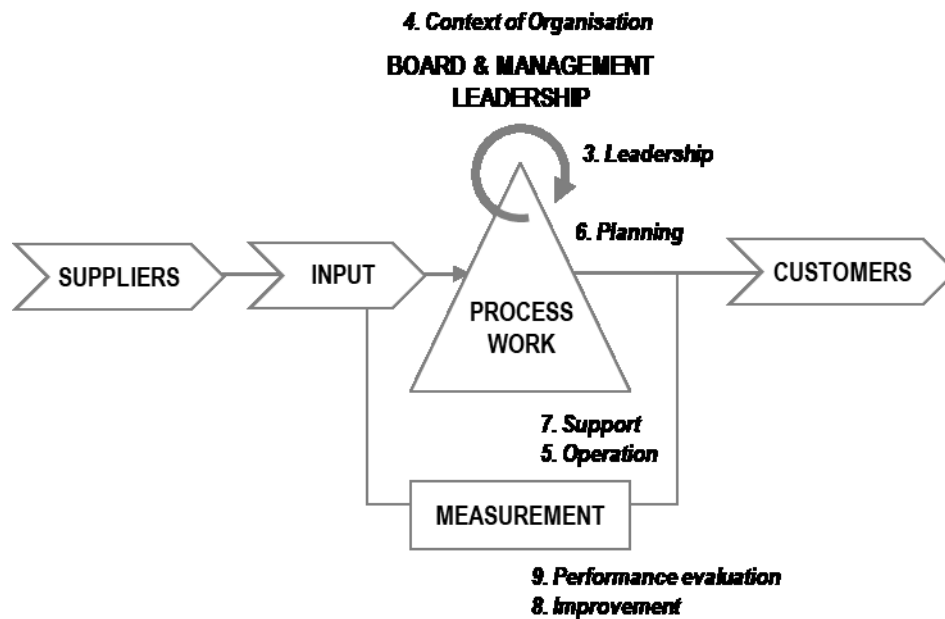
The more diverse the shared values are between the JV companies and the JV itself, the more difficult it is to work together so as to maintain trust and for the good of the JV. It is important to gain a detailed understanding of the JV parties Shared Values to identify areas of major conflict.

### 3.3. Supply Chain to Customer Relationship

These relationships describe the transformation process.

A recent ISO publication [17] outlines a process to assess the present state of a JV. In Para 3 to 9 it lists 7 key features with 139 associated questions to be asked in an effort to determine the current state of operation. However, it does not address the underlying issues covered in Section 3.2 above.

The 7 key features are mapped on a typical Supplier-Input-Process Work-Customer model in Figure 3.



**Figure 3. ISO44001 Framework 7 clauses mapped on a Supplier-input - Process work - Customer model.**

#### 4. Risk Management

Often a JV risk is managed within the JV through the JV Board. However as is apparent in the aluminium industry with a few major failures, ultimately the parent companies are exposed as well. At times the parent companies differ in their approach to risk, but do not have absolute control of investigation or management in the JV.

It is useful to assess the major risks from the company perspective that may not be well managed at the JV level as outlined in Table 5.

**Table 5. High level major business risks.**

<b>Alumina</b>	<b>Aluminium</b>
Tailings dam filling, rehabilitation and failure	SPL Disposal legacy issues
Pressure vessel management	Molten metal explosions
Energy supplies and delivery	Power outages, energy supplies, and delivery, types
Major industrial action	Major industrial action
Country issues and social licence	Country issues and social licence
High level fraud and blackmail	High level fraud and blackmail
Ability of plant to withstand major weather or earthquake effects	Ability of plant to withstand major weather or earthquake effects
Obsolescence and rehabilitation costs	Obsolescence and rehabilitation costs
Overall staff experience in management and technology and career path through key roles	Overall staff experience in management and technology and career path through key roles
Avoid single and multiple fatalities	Avoid single and multiple fatalities

#### 4.1. Review the Balance Being Spent by the Joint Venture Board between Strategy and Governance

A likely trend between strategy and governance and age of the business is shown in Figure 4 [6].

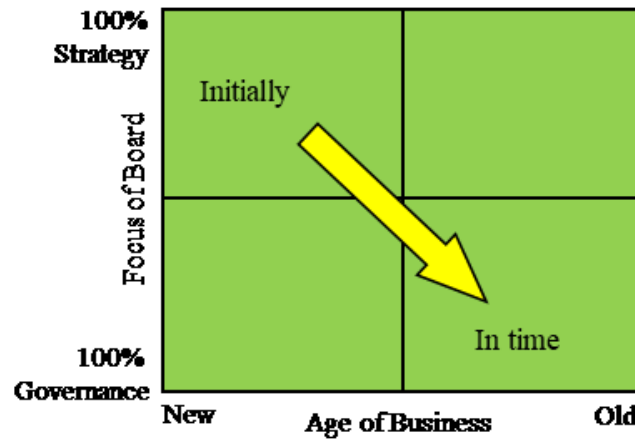


Figure 4. Likely Trend between strategy and governance.

This balance suggests that when the strategic input of the board becomes modest, it is time to dissolve the JV, as little value is being created, as shown in Figure 5. Typically, this is when the Board time is spent much more on governance than on strategy.

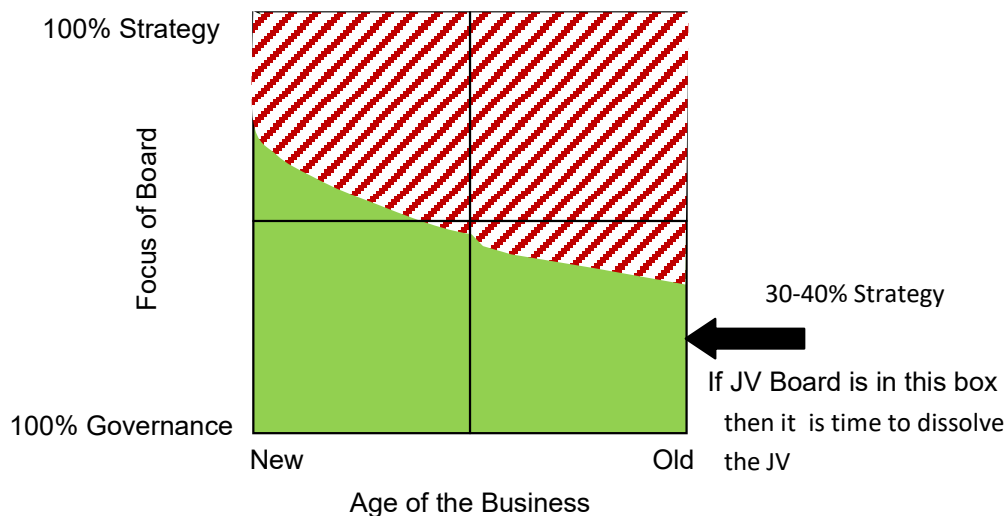


Figure 5. Decision point based on governance and strategy focus.

As a benchmark, Rio Tinto report [18] that their Board spent 43 % of Board time on strategy in 2010.

This model may provide a basis for each JV partner to evaluate their future participation.

#### 4.2. Balance within the Joint Venture

The relative contributions of each Partner over time can influence the stability of the JV. Some examples of relative contributions within JVs are shown in Figure 6.

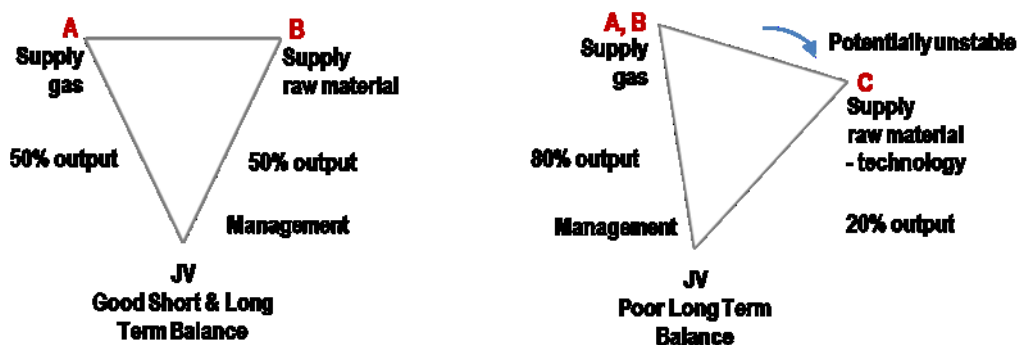


Figure 6. Relative contributions and resulting balance for particular joint ventures.

#### 4.3. Strategic Fit of the JV within the Company Portfolio

The size of the JV management effort required by a particular participant, the likely longer term prospects the risk and reward may not be attractive. This should be part of the Company long term plan.

#### 4.4. Possible Future Relationships between Joint Venture Parties using Game Theory

Game theory is a branch of mathematics that tries to predict how players in a game are likely to act [19]. The philosophical basis was presented by the Nobel Laureate Dr. John Nash, and is captured in the 2001 film, “A Beautiful Mind”. The theory is a systematic way to analyze various choices and dilemmas companies and individuals face.

One example is called the ‘Prisoner’s Dilemma’ and involves two prisoners who are arrested. They face the choice of informing on each other in exchange for a lighter sentence or saying nothing in exchange for a lighter sentence in the hope that the other prisoner will also say nothing and potentially both getting off. The result is what is called the Nash Equilibrium, in that both parties will take what is the best strategy – the one with the best likely payoff for themselves as an individual, which is betrayal. However, there may be a better win-win way for both.

The case of the JV parties trying to exit a below average JV has many similarities. Working through facilitators, it might be possible to jointly examine options of alternative decisions and probabilities that may lead to a win-win situation.

### 5. Options for a Change in Joint Venture Structure

#### 6.1. Base Information

As a start of any review of options a range of scenarios need to be presented by the JV, with party inputs, to establish likely cash operation costs, including sustaining capital. These projections then need to be tested by each company against possible revenue streams and likely costs for closure and rehabilitation.

The Parties then might consider some of the options:

- Rebalance of the Portfolio
- Reduce the number of parties
- Sell to another JV party for cash
- Sell to another JV party and negotiate a supply contract
- Sell the entire JV to another party

- Sell the entire JV to a (Government) power supplier
- Spin off some JV(s) into another Company and separate from the main company
- Shut.

## 6. Conclusion

A case study and a range of assessment tools are provided to assess options to simplify complex JVs.

## 7. References

1. Shyam Kumar, Are Joint Ventures Positive Sum Games? The Relative Effects of Cooperative and Non-Cooperative Behaviour, *Strategic Management Journal*, John Wilson & Sons Ltd, 2010, 32-54.
2. Gillian Triggs, Selected Annotated Bibliography of Joint Venture Articles and Books, *Australian Resources and Energy Law Journal*, (22) 2003, 239-240.
3. John Stuckey, *Vertical Integration and Joint Ventures in the Aluminium Industry*, Harvard University Press, 1983.
4. TK Das, (editor). Management Dynamics in Strategic Alliances, *City University of New, Information Age Publishing Inc*, 2012.
5. Louis Chain and Vishal Ahuja, Longer Term Supply Contracts – Time for Review, *Australian Resources and Energy Law Journal*, 2006, 149-174.
6. Anthony Kjar, Joint Ventures – Their Utility Overtime – Some Observations from the Aluminium Industry, *Journal AusIMM* No.4, August 2013, 78-81.
7. Anthony Kjar, Engineering in a Tolling Consortium, *Institution of Engineers, Australia, General Engineering Transactions*, 1977, 9-12.
8. Anthony Kjar, Joint Ventures - Old Risks and New Challenges, *Proceedings of 33<sup>rd</sup> International ICSOBA Conference*, Dubai, 29 November – 1 December 2015, Paper KN05, *Travaux* 44, 49-57.
9. Gordon Grieve and Peter Lodge, Recent developments in the Techniques of Achieving a Successful merger in the resources Industry, *AMPLA Year Book 1997*, 485-503.
10. Frank Strahan, Sir Maurice Mawby (1904-1977), *Australian Dictionary and Biography*, Vol. 15, MUP 2000.
11. Maryam Mohamed Al-Jallaf et al., Evolution of CD20 Reduction Cell Technology towards Higher Amperage Plant at DUBAL, *Light Metals 2009*, 451-454.
12. Jim May, AMIRA International – Celebrating 50 Successful Years, *AusIMM Journal*, April 2010, 76-78.
13. David Smith and Anthony Kjar, Australia in the International Research Sphere, *Search*, Vol. 23, No. 5, June 1992, 142-143.
14. Steven ten Have et al., Key Management Models, *FT Prentice Hall*, 2003.
15. Clayton Christensen, The Innovators Dilemma, *Harvard Business Review Press*, 2016.
16. James O’Toole, *The Enlightened Capitalists*, HarperCollins, 2019.
17. International Standard ISO 44001, Collaborative business management systems- Requirements and frameworks, *ISO*, 2017.
18. Rio Tinto, *Annual Report*, 2010, 114-116.
19. Steven Tadelis, *Game Theory, An introduction*, Princeton University Press, 2013.