

An industry-oriented and fair gain sharing allocation rule

Robert Boute

Tom Van Steendam

The topic of today:



Cost/GHG reduction main reason for collaboration

Authors\Aims	1	2	3	4	5	6	7	8	9	10	11	12	Total
Bititci <i>et al.</i> 2004	X				X								2
Crujssen 2006	X		X	X			X	X					5
Mason <i>et al.</i> 2007	X									X			2
Crujssen <i>et al.</i> 2007	X	X				X			X				4
Lehoux <i>et al.</i> 2009	X	X	X										3
Bahinipati <i>et al.</i> 2009	X										X	X	3
Leitner <i>et al.</i> 2011	X	X	X	X									4
Total	7	3	3	2	1	1	1	1	1	1	1	1	

Legend: 1= Cost Reduction; 2 = Customer Service; 3 = Increased responsiveness; 4 = Social relevance (especially environmental issues); 5 = Value Creation; 6 = Improved productivity; 7 = Growth; 8 = Innovation; 9 = Improved Market Position; 10 = Better resource management; 11 = Reduced Supply Risk; 12 = Networking

Pomponi et al. 2013

- => Cost allocation rule = vital element of collaboration

Tons of rules & methods out there, ranging from relatively easy to highly complex

- We split the costs equally
- We allocate the costs based on the volume
- ...
- Game theoretic Shapley Value
- Nucleolus with linear programming

No agreement on sharing mechanism
= showstopper of collaboration

Review of gain sharing rules

- Detailed recent overview of different rules and their advantages/drawbacks:
 - *Guajardo, M., & Rönnqvist, M. (2016). A review on cost allocation methods in collaborative transportation.*
- We discussed & assessed the usability of these methods in detail with Nextrust participants.

Shapley Value

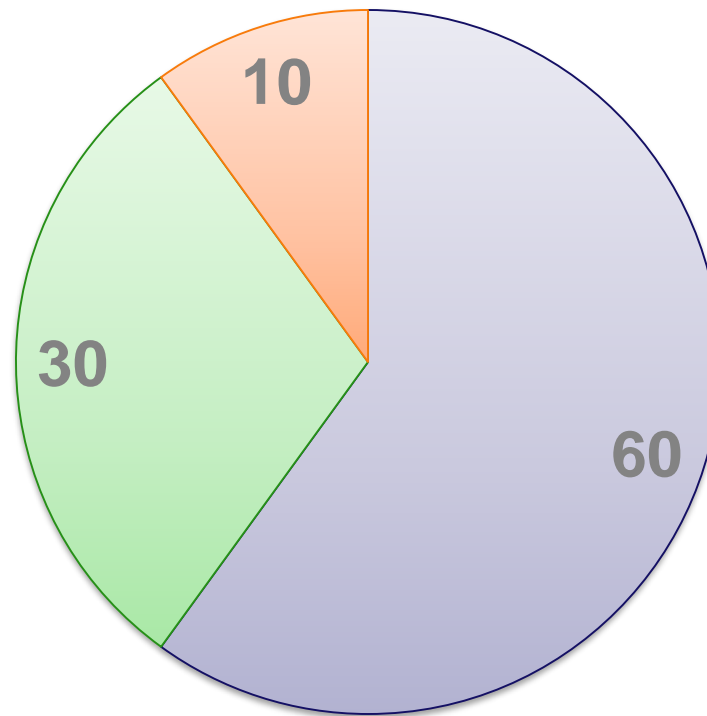
allocate the gains to each company proportional to its marginal contribution to the partnership.



The allocation rule should:

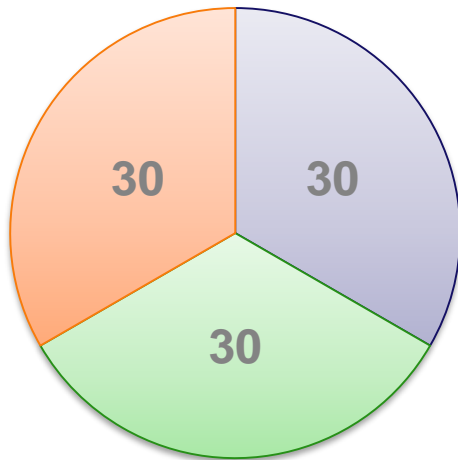
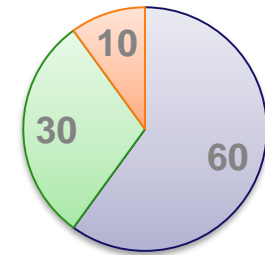
- Be fair in terms of rewards
- Be transparent and understandable
- Ensure a win-win for all parties involved, regardless of company size, market power or timing of entering the coalition

Example



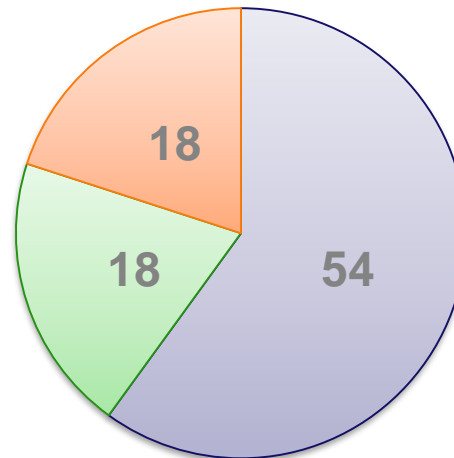
■ Company A ■ Company B ■ Company C

Suppose 10% cost reduction How to split these costs?



■ 1 ■ 2 ■ 3

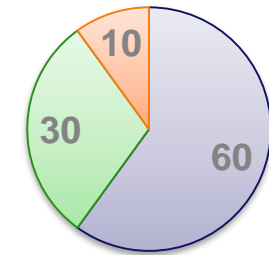
Egalitarian



■ 1 ■ 2 ■ 3

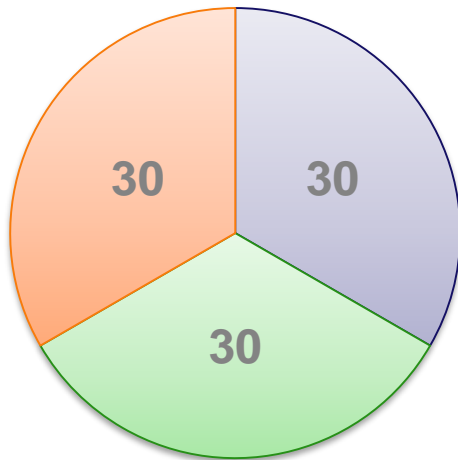
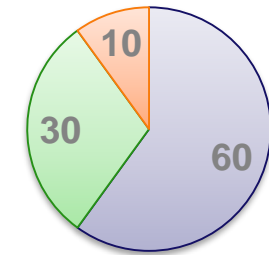
Volume-based

Linear Rule



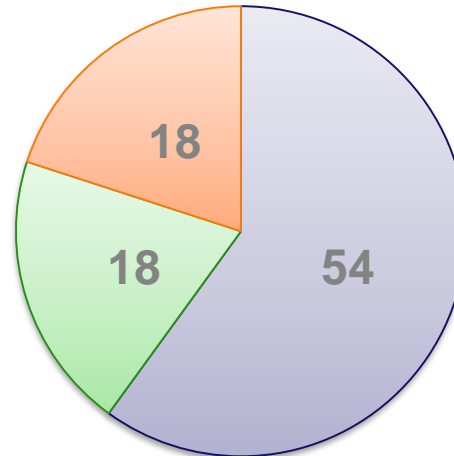
Each company pays part of the collaboration cost, based on its relative cost before the collaboration

Suppose 10% cost reduction How to split these costs?



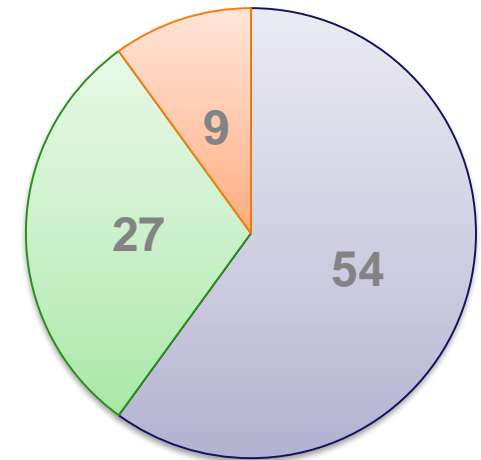
■ 1 ■ 2 ■ 3

Egalitarian



■ 1 ■ 2 ■ 3

Volume-based



■ 1 ■ 2 ■ 3

Linear Rule

Why not the Shapley value?

$$\phi_i(v) = \sum_{S \subseteq N \setminus \{i\}} \frac{|S|! (n - |S| - 1)!}{n!} (v(S \cup \{i\}) - v(S))$$

Advantages of Linear Approach

- Takes into account volume, size, synergies *and* previous efficiencies, ...
- Industry-oriented & pragmatic – ‘if you can’t explain it...’
- Similar outcomes to Shapley for 2 players, though much more manageable with many/changing partners in the collaboration
- No need for hypothetical calculations (cfr Shapley)
 - *What would/could be the gains with(out) company X?*
- Trust enabler – transparency leads to long term trust

Teaching case

- Teaching case that shows
 - the complexity of allocating the gains & costs
 - how different rules lead to highly different outcomes
- Based on real-life case
- Quantitative & qualitative learnings
- Available on Harvard Business Publishing

B-KAY TECH: HORIZONTAL COLLABORATION IN LOGISTICS

Robert Boute, Tom Van Steendam, and Stefan Creemers wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Brandon Kay had been working at B-Kay Tech, a multinational company that distributed electronic consumer goods in the mid to high-end market and had around 800 full-time employees, since 2005. With its headquarters in Brussels, Belgium, the majority of its operations were in Europe, though B-Kay Tech was also active in North America and Eurasia.

Kay had started with the company as a planning analyst in the Belgian office in 2005, and between 2008 and 2016, he was project manager in the supply chain office. During that period, he successfully established several supply chain improvement programs, with one of his major achievements being the vendor-managed inventory collaboration agreement he had set up with the company's two biggest retailers in 2012.

The agreement with the retailers resulted in higher delivery order stability, which helped B-Kay Tech to improve the planning of production and transport, in turn resulting in better resource planning and shorter delivery lead times. Service levels rose over the following years, while at the same time, inventory levels were reduced, not only in Kay's own warehouses but also in those of the retailers.

Owing to this collaboration agreement, Kay was able to achieve significant supply chain savings for the company over the years, which in part led to his promotion to supply chain director at the start of 2017. In order to impress B-Kay Tech's vice-president of Operations and Supply Chain, Kay wanted to devise a new breakthrough innovation project. He had heard about a different type of supply chain collaboration—horizontal collaboration—that involved partnerships with companies that operated at the same level in the supply chain; these companies could even be (potential) competitors. The idea behind horizontal collaboration was to bundle the partner companies' shipments in the same transport, so that any available space in one company's truck hauls could be utilized to transport shipments for other companies, reducing the overall number of trucks required. With the logistics team responsible for the greatest part of the company's carbon footprint, this shift would not only affect B-Kay Tech's bottom line, but would also help the company to reach the stringent 2020 sustainability targets set out by management.

Kay discussed this idea with his vice-president, who agreed that it could be a breakthrough project and signed off on it—with the stipulation that first results be visible within the year, and that Kay looked at more than