

Transformation  Innovation in the Ecosystem

The €100 billion opportunity

Transforming Electromobility Partnership Performance



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Executive Summary

Innovative vehicle technologies are strongly required to meet climate and environmental targets and the development of electric cars has been one of the most radical innovations by the automotive industry for reducing global CO₂ emissions. However, the course of electromobility over the last few years has been discouraging: strategies were scrapped, launch plans revised, and government subsidies have been cut back. As a result, several electromobility partnerships have been dissolved or have failed to meet expectations. Therefore troubled partnerships need to transform themselves.

Arthur D. Little's new study on current electromobility partnerships reveals that only a minority display strong performance and that many risk failure. Based on consultations with more than 40 experts and company representatives associated with electromobility partnerships established in Europe, North America and China, we found that crucial fundamentals for success are often established during the ramp-up phase.

Errors made in the ramp-up phase resulted in failures to meet product launch plans, not meeting expectations on innovation output and poor product performance. We also found that more mature partnerships are often struggling to manage stakeholders, either due to disagreements over levels of contribution to the joint effort, or an insufficient focus from senior leadership to gain and retain strategic direction.

For stakeholders, a proactive stance is crucial. As one senior executive from a global automotive original equipment manufacturer (OEM) put it: *"We seem to be unlucky every time."* However, based on our study, bad fortune is not the sole factor. Rather, by analyzing top performing partnerships, we found that applying the right methodology and taking the required fundamental steps to enhance partnership performance increases the likelihood of transformation and positive returns. Failure can sometimes be the best platform for innovation.

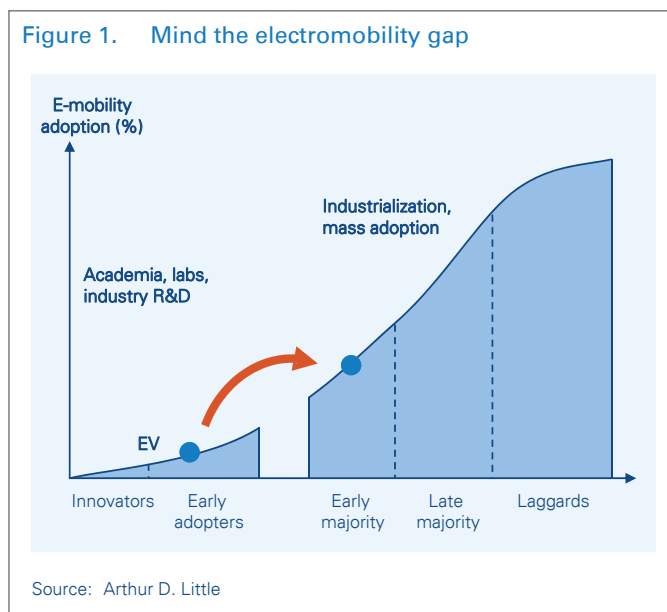
"Understanding current partnership performance, leveraging strengths and building new ones will be 'make or break' for partnership transformation. No partnership is too big to fail", says Petter Kilefors, Partner at Arthur D. Little.

The Electromobility Despair

The need for an innovative electromobility partnership

In 2009, when Arthur D. Little published its report on “*The coming transformation of the automotive industry*”, there was an abundance of optimism in the market for the growth of Electric Vehicles (EVs¹). In our report, we remained cautious, noting that several key enablers to realize the growth potential were not in place. With the benefit of hindsight and actual sales of EVs remaining modest, with a global market penetration of only 0.14% by the end of 2012². It is evident that electromobility has not yet progressed into mass adoption. (Figure 1).

Figure 1. Mind the electromobility gap



The reasons behind the lack of mass market adoption boil down to unsatisfactory battery performance, insufficient charging infrastructure and high retail prices. The result is a dilemma where utility companies refrain from developing and deploying charging infrastructure before a critical mass of EVs are on the road, when at the same time, more extensive charging

infrastructure is a necessity for automotive manufacturers and not least consumers to make substantial investments in EVs. Government support has played an important part in this previously, yet in the face of austerity, industry players need to be innovative if growth is to be achieved. Partnerships with OEMs and energy companies (such as Vattenfall and BMW) can be one solution. Other more niche approaches include Tesla’s setting up of super charging stations on the US west coast. In both cases the relative success is yet to be proven.

These challenges are an acute reminder of how industry convergence requires today’s leaders to rethink old boundaries. Competencies and technologies from previously separate industries must be combined in order to succeed; such as utilizing power electronics for charging and infrastructure, ICT to integrate EVs into other city transportation systems and chemical engineering for battery development. Part of the challenge lies in realizing the potential benefits from sharing key technologies, whilst managing the shifting balance of value creation. For instance, automotive manufacturers are facing a new dimension of fundamental changes in how to add value when it comes to EVs - this is because EV batteries make up a significant part of the total cost of the vehicle constituting as much as half of the retail price. This shift also impacts the value distribution in the profitable-after-market, on which most OEMs are reliant today. On top of this comes challenges in meeting changing customer demand, where young urban customers in particular are increasingly less inclined to own a car. Clearly, to succeed, companies must be able to innovate both technology and business models, including the profitable after-market.

It is clear that, owing to the expansion into entirely new technology areas that are outside of core competencies, successful partnerships are crucial in the domain of electromobility. Together, partners in the ecosystem can benefit from opportunity premiums (new and/or improved innovation outcomes) and time premiums (time-to-market). It is not surprising therefore that we today find several types of partnership; both cross-industry and single-industry partnerships exist at varying investment levels (Figure 2).

¹ The defined segment of EVs comprises plug-in hybrid electric vehicles (PHEV), range extended electric vehicles (REEV) and battery electric vehicles (BEV).

² IEA 2013: Global EV Outlook.

Figure 2. Examples of EV partnerships¹⁾

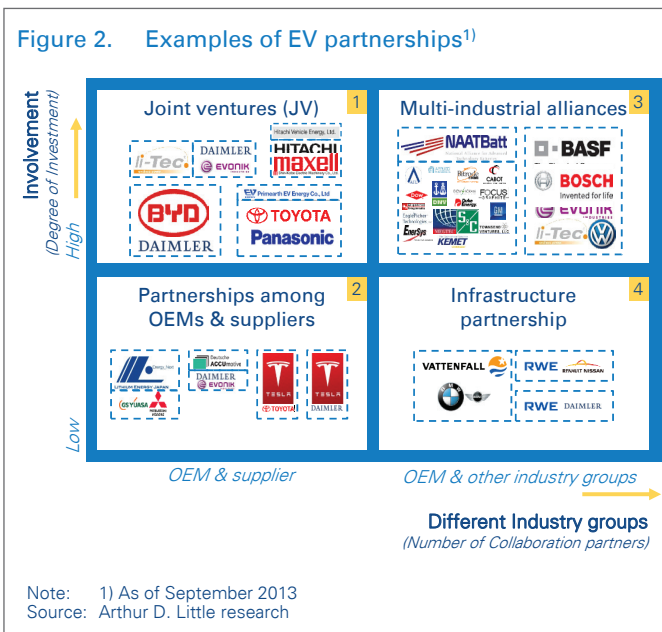
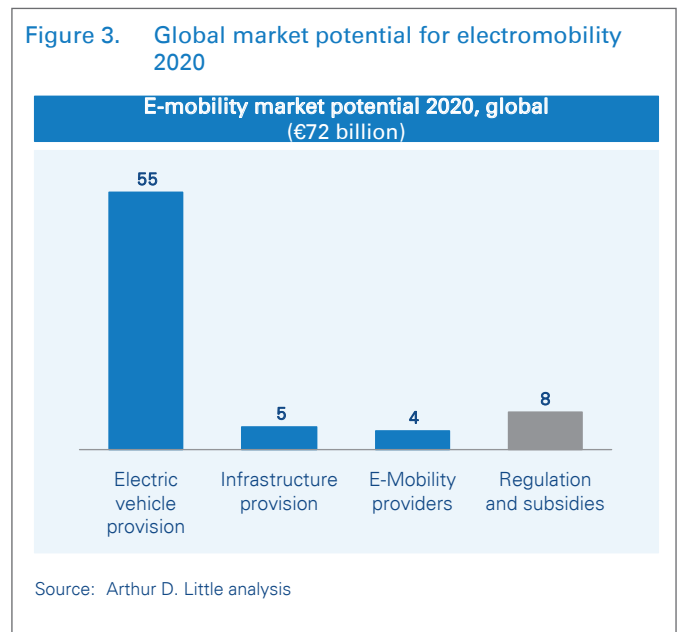


Figure 3. Global market potential for electromobility 2020



The €100 billion opportunity

It is therefore alarming, that we find a majority of partnerships to be underperforming. For instance the joint venture between Johnson Controls and Saft Groupe, launched in 2006, was supposed to provide lithium-ion batteries for hybrid vehicles, but was dissolved in 2011 due to irreconcilable differences of opinion regarding expansion plans. Another example is the joint venture between Samsung SDI and Robert Bosch GmbH, SB LiMotive, founded in 2008. This partnership also aimed to develop lithium-ion batteries for electric vehicles but was dissolved due to very poor performance, resulting in a decision to move innovation efforts in-house.

The rewards for those organizations that can successfully overcome these partnership challenges are considerable. Recently, Arthur D. Little estimated the global market potential for electromobility by 2020 to be in the realm of €72 billion (Figure 3).

This figure would mean EVs having a 2% share of global passenger car sales that year. Still, considering that a variety of market forecasts generated over recent years predicted an EV share of 5%, 10% or even higher by 2020, this forecast should be considered as conservative and the actual opportunity could well be in the €100 billion value range.

Evaluating Electromobility Partnerships

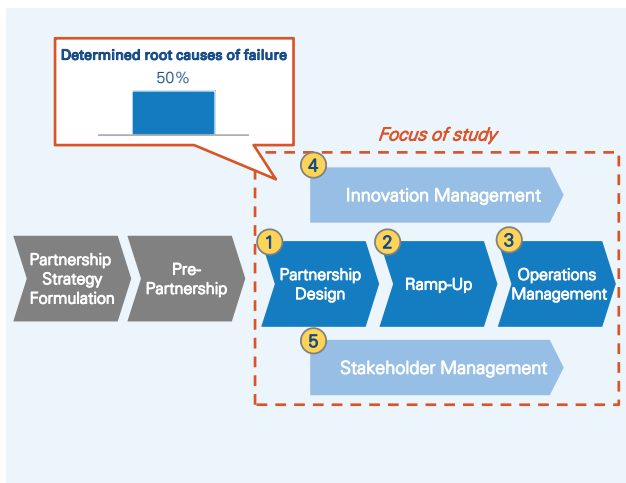
To answer the question of why so many partnerships do not meet expectations and what can be done about it, Arthur D. Little recently completed a comprehensive survey based on consultations with over 40 experts and company representatives associated with electromobility partnerships established in Europe, North America and China. The survey was based on an analytical framework, separated into five different areas reflecting the key phases that partnerships are typically formed and developed around. Overall, we find that more than half of failures for partnerships occur after they have been signed (Figure 4).

positions are effective from the beginning. This results in better business development performance and helps secure sufficient investment and resources from stakeholders.

Case example:

A joint venture was formed for the development, production and sales of electric vehicles. However, the defined strategy did not specify the target customer segment and the target regions to be entered. A thorough market analysis was carried out later – the results required an updated product strategy which meant adjustments in the design of the joint venture’s first electric vehicle, in turn driving up costs and lengthening the time to market. Given the impact on the business case, shareholders responded by cutting back planned investments in the joint venture.

Figure 4. Framework for assessing partnerships



Source: Arthur D. Little

1. Partnership Design

During the partnership design phase, the partnership management elaborate the governance structure of the partnership, appoint key managers and detail business plans. In more than 60% of the cases evaluated (post-signing) we identified insufficiencies in the initial designing of the partnership. Successful partnerships define a comprehensive and detailed planning for implementation, continuously aligning it and involving their stakeholders at all stages, assigning partnership management roles early and ensuring that key

2. Ramp-Up

In the ramp-up phase key business processes are initiated and “flagship projects” are staffed and initiated. Core and support processes are also detailed and launched. Budgeting and financial planning becomes operational at this point. For stakeholders outside the partnership management, monitoring and supporting ramp-up activities is important. In this stage, we found that fewer than half of the partnerships investigated had employed a pre-defined methodology during the ramp-up phase. Our study shows that the applied ramp-up plans are often deemed as insufficient in a variety of relevant aspects (e.g. resource allocation, guidance for policy, implementation schedule).

Using proven ramp-up methodologies is crucial in order to handle complexity. Successful partnerships clearly set ramp-up approach and speed, assigning responsibilities and milestones. Also, they start capturing synergies from the outset, using a clear plan for how to generate identified synergy potentials, and take critical decisions upfront to provide a clear path early and avoid later conflicts.

Case example:

A partnership was established for the production of battery types for BEV and hybrid electric vehicles. The partnership was lacking a comprehensive ramp-up approach and failed to assess the required resources for specialized functions (e.g. for series development or production planning). Delays were experienced in the hiring of skilled employees and deadlines could not be adhered to, which set back the start of production. Consequently the partnership's most important customer, an automotive OEM, had to reduce the production volume of a vehicle series requiring the battery.

3. Operations Management

During the operations management phase the partnership needs to execute, control and continuously improve business processes. About one third of the partnerships assessed showed significant weaknesses in the execution of the core business processes. Most of the identified causes are the result of a need to understand the unfamiliar ways of working in partner organizations, or missing, limited, or conflicting integration of processes into the stakeholders' organizations. Successful partnerships follow a process-oriented approach, providing far more robust processes and a higher chance of success. Moreover, they ensure adequate levels of expertise, identifying and filling expertise gaps in order to assure effective operations, and implement continuous improvements by creating a system for continuous review and development of processes of operational functions.

Case example:

The partnership was established for the R&D and production of battery types and battery related equipment for EVs. Due to undefined processes (e.g. in the R&D area) the applied quality processes were only partly standardized and adequate. Therefore risks identified during the R&D cycle were not resolved. Following the start of manufacturing a very high rate of production and product failures

occurred, forcing the joint venture to change some components and to revise production. Subsequently, the joint venture missed its key near term target to provide an adequate number of batteries to an automotive OEM which then had to limit its BEV series production with a resulting decrease in sales.

4. Innovation Management

We also find that partnerships that proactively manage joint innovation processes are systematically performing better in terms of identifying solutions and making them effective. Effective partnerships achieve high level sponsorship from stakeholders and successfully leverage expertise of partners involved to manage effective transfer of knowledge and expertise in addition to the sharing of technology. Arrangements for "open innovation" within the partnership are clearly defined, in terms of setting out ground rules for collaboration, and identifying consistent sources of external stimuli. Ideas are clearly linked to products through effective idea generation and consolidation processes – involving all the partners contributing from the perspective of their domain of expertise and then jointly operating a Stage Gate process to move the ideas towards launch.

Case example:

A partnership was formed for the R&D, manufacturing and sales of BEV battery cells. The joint venture's management identified strengths and weaknesses with regard to its know-how capacities, systematically leveraged strengths and planned innovations for its products and its production. As a result, one of the shareholder's know-how in chemistry resulted in battery cell components superior to its competitors. To set up a sound manufacturing process, the joint venture assessed other industries and identified adequate processing techniques e.g. from consumer goods processing companies.

5. Stakeholder Management

Stakeholder management requires proactivity in efforts from the partnership to ensure that long term support endures and adequate resources are allocated throughout all phases. However, for around half of the cases in our survey, we identified at least one of the partner companies that failed to execute active monitoring of its partnerships, such as through systematic periodical reviews. In some cases the lack of monitoring resulted in conflicts or delays of planned investments and business activities. In order to ensure a sustainable and solid cooperation, the relevant business functions of all parties need to be involved on a regular basis and strategic projects in the partnership must be endorsed and sponsored at the highest level. Successful partnerships also ensure sufficient decision power for negotiation and setting strategic direction.

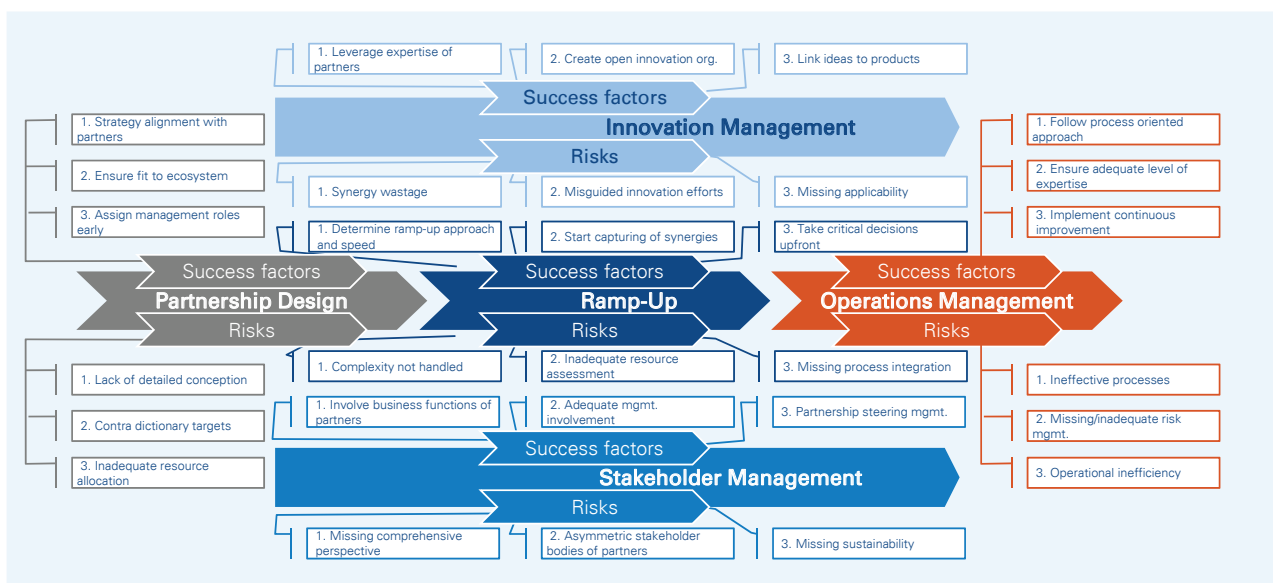
Case example:

An alliance was formed for joint procurement activities and the manufacturing of an EV model. Company 1 set up a steering committee coordinating all cooperation activities on a corporate level while covering all relevant functional areas. Company 2 delegated the cooperation activities to its single business units. This resulted in misalignment in the interests of the shareholders. Due to escalated complaints from representatives, company 2 stopped the extension of cooperation activities for extended period which delayed investments and led to a failure in achieving the cost saving potential.

A few years after the first movers of electromobility decided on partnerships to set up their business models, the performance of the involved key players has varied tremendously.

Assessing performance we found that each part in the partnership framework is associated with different success factors and risks (see Figure 5 for extract).

Figure 5. Top success and risk factors along the partnership management lifecycle



Source: Arthur D. Little

Finding the Right Way Forward

To improve partnership performance, companies should start by assessing current partnership performance, challenges and opportunities through a 'Partnership Performance Audit'. This involves analysis of core and support processes, organizational performance and innovation management. Based on understanding current performance, objectives need to be clearly set with appropriate actions defined and initiated.

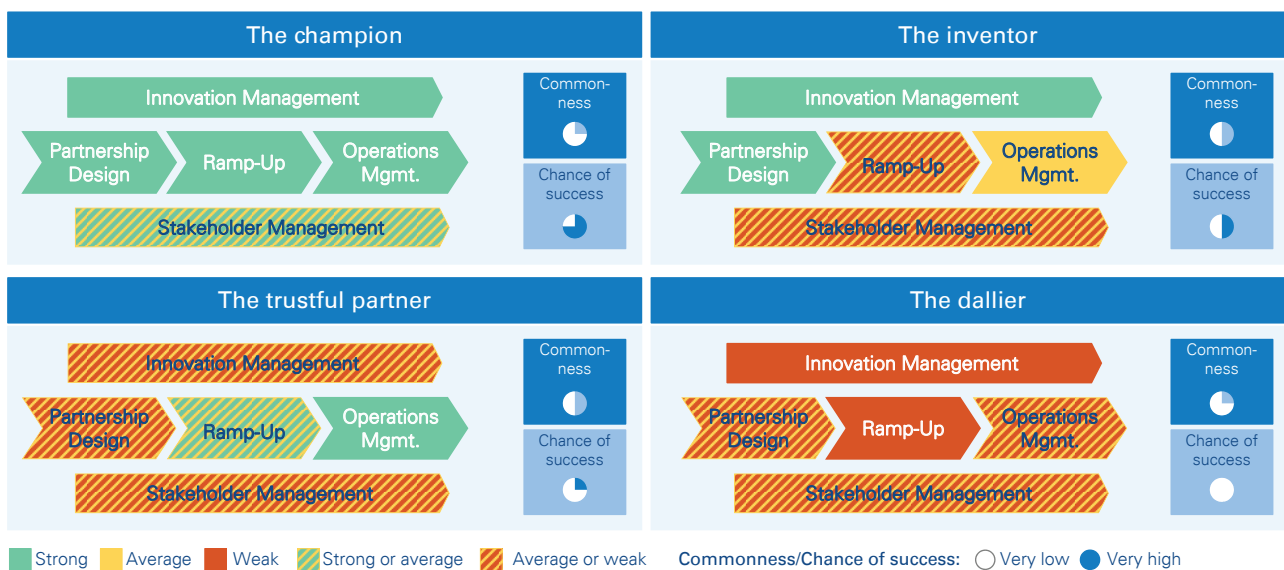
In our study we found that the assessed industry players can be categorized based on their performance into four key categories (see Figure 6). Only the "champion" type shows an overall strong performance in all relevant areas, and it is only this type of partnership that we estimate has above a 50% chance of meeting or exceeding its targets. The more common "inventor" type show strong performance in design partnerships and in creating and applying new solutions. However, the inventor achieves only average or even weak performance in most other areas.

The "trustful partner" is the most common type found in our study and displays strong performance during the ramp-up and

operation phases, but suffers from inadequate contributions towards partnership design at the outset of the collaboration. Thus, success not only relies on the assets of one player but also on the complementary assets of its partners. The "dallier" type is not applying innovation management sufficiently and demonstrates weak performance during ramp-up. As a weak, or at best average, performer in other areas, this type is consistently unsuccessful in partnership performance.

In addition to understanding current partnership performance along the analytical framework, root cause analysis and benchmarking are additional tools to provide a comprehensive understanding. If several areas are displaying average or strong performance, but one or two areas are only achieving average or weak performance (e.g. the inventor) the partnership is likely generating some results already. Nevertheless, significant additional value can be unlocked through working with partnership excellence. If one key area is performing weakly and several are average or weak (e.g. the trustful partner), actions should be taken to drive change and "qualify" partnership capabilities either through focused actions or a

Figure 6. Electromobility partnership performance types



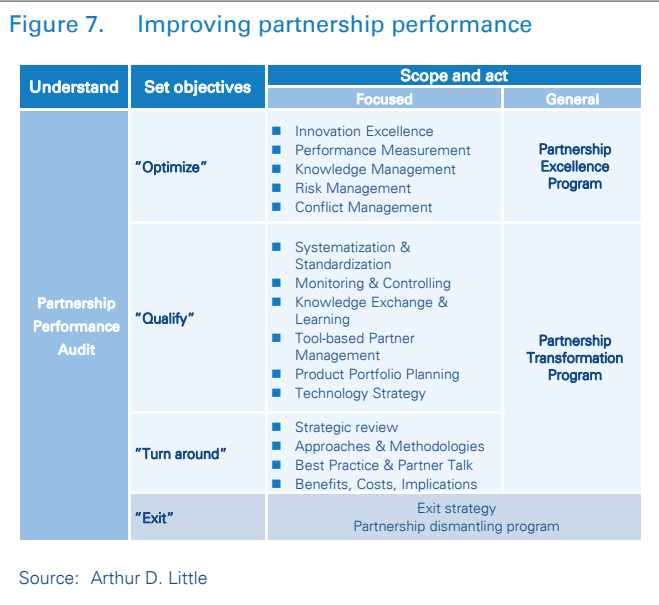
Source: Arthur D. Little research

comprehensive transformation program. The details of the transformation program will strongly depend on the partnership strategy (pre-signing) as well as the role in the ecosystem: government, key component suppliers, OEMs or infrastructure providers each need an adopted, determined approach. In our project experience, however, review and transformation of partnership design is often the core of the program. As shown above, in more than 60% of the cases evaluated we identified insufficiencies in designing the partnership in the first place. Critical success factors are vital to be successful yet must be given special attention in particular in this high-performance, innovative environment. Refining the partnership design, e.g. of a partnership for lithium-ion battery cells, requires a systematic project management linking transformation know-how and innovation competence, supporting and preparing the following steps for partnership design transformation:

1. Conduct continuous strategy alignment workshops with all stakeholders. Workshops should be prepared by individual interviews and meetings and documenting investment and resource plans as a core deliverable. Effectiveness can be increased bridging cultural gaps of international partnerships systematically.
2. Review the ecosystem including consideration of players outside the traditional scope of the automobile industry. Transparency of all current and future players is vital in order to assess the partnership fit as well as to define the opportunity and time premium targets realistically.
3. Assign early effective management roles, in particular in three-way partnerships typical in high-performance lithium-ion battery development. Monitor leadership systematically, also regarding cultural differences.

If two or more key areas are showing weak performance (e.g. the dallier), overall results are clearly lacking and comprehensive transformation measures should be taken to reinvent itself and turn around partnership performance through a holistic transformation program. This Partnership Transformation Program covers actions required to close the capability gaps identified within the audit, but also revised funding plans in order to deal with financial pressure, as well as actions to ensure management buy-in to drive the change.

In the most severe cases, parties may even find an exit strategy is preferable and a dismantling program needs to be put in place to ensure that intellectual property and know-how is secured and that financial impact is limited (Figure 7).



Concluding Remarks

Despite the recent period of enthusiasm, the path to success in electromobility is yet to be proven. While leading players are on the right path to fulfill their electromobility strategy, we found many of the current electromobility partnerships are not meeting expectations, or even failing. Neither investment level nor industry background prove to be the main rationale behind why partnerships fail to achieve the targeted opportunity premiums or innovation outcomes. Rather, it proves to be common mistakes. As the hype fades in the face of business reality, stakeholders cannot afford losses due to underperforming partnerships. Assuming responsibility for the performance of existing partnerships and taking the necessary actions to improve transform is a necessary first step, both to protect investments and to grow the electromobility ecosystem. This step is the prerequisite for customer confidence and the subsequent mass market demand - the €100 billion opportunity is there to be grasped.

We believe the top performers in electromobility partnership will shape the future industry landscape. Accelerating change and applying the “champion” type best practices significantly increases the likelihood of success, whereas less structured partnerships are running a high risk of failure. Apart from deploying the right high-performing set-up, it will take courage, discipline, creativity and patience from all stakeholders to succeed. Simply put, finding the magic mix of transformation and innovation will be “make or break” for partnership success.

“It’s certainly not the most gifted who will win, but the most determined”, says Rosa Meckseper, Principal at Arthur D. Little.



Improving Partnership Performance

Partnerships are key to innovate the electromobility ecosystem. However, the course of electromobility over the last years has not met expectations. Arthur D. Little's new study on electromobility partnership performance reveals that only a minority of the current electromobility partnerships display strong performance. The study also identifies success factors and risks during different stages of the partnership and what can be done to improve partnership performance. Stakeholders need to be proactive and take the required steps to improve partnership performance.

Arthur D. Little

As the world's first consultancy, Arthur D. Little has been at the forefront of innovation for more than 125 years. We are acknowledged as a thought leader in linking strategy, technology and innovation. Our consultants consistently develop enduring next generation solutions to master our clients' business complexity and to deliver sustainable results suited to the economic reality of each of our clients.

Arthur D. Little has offices in the most important business cities around the world. We are proud to serve many of the Fortune 500 companies globally, in addition to other leading firms and public sector organizations.

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