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## The making of an innovative multinational firm: Chinese capability development through the acquisition of MG-Rover

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Discussion Paper Series



Title: The making of an innovative multinational firm: Chinese capability development through the acquisition of MG Rover

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Discussion Paper: 2013-04



**The making of an innovative multinational firm:  
Chinese capability development through the acquisition of MG-Rover**

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## **Abstract**

This paper examines the transfer, replication and adaption of knowledge, assets and capabilities in MG Rover from the British workforce to the new Chinese owners and employees at Nanjing Automotive Corporation (NAC). The study explores the intra-organisational processes adopted to integrate knowledge, innovation-related routines and networks. We identify distinctive mechanisms for both ‘discrete’ transfers and ‘cumulative’ flows of knowledge and capabilities, with different kinds of impact on the innovative capacity of the recipient firm. With the more recent take-over of NAC by SAIC the MG-NAC restructuring is examined as part of the broader evolution of a large, innovative and multinational Chinese car firm. The study also provides insights into the changing complementarities between Western and Chinese manufacturers and lessons for managers regarding effective alignment with evolving competitors.

Key words; take-overs, inter-organisational processes, knowledge flows

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## **Introduction**

In this paper we are interested in how organisations integrate both knowledge and the routines and processes that manage and develop knowledge, following international acquisitions. The resource based view (RBV) of the firm holds that competitive advantage can be achieved through obtaining ‘valuable, rare and imperfectly imitable and non-substitutable assets’. In the past the common assumption was that such assets could be acquired. Buying another firm automatically meant appropriating its means for adding superior value to products and processes. The theoretical foundations of Penrose and Williamson underpinned the dominant view in both mainstream strategy and international business studies (Chen, 2005) that internalisation (hierarchy) versus externalisation (market) is an all-or-nothing ‘binary’ trade-off.

But we know empirically that mergers-and-acquisitions (M&As) are very often unsuccessful (Meyer, 2008) and studies have shown that substantial organisational learning is required to leverage the potential synergies from combining the assets of two firms (Kale and Singh, 2007). Nevertheless companies do grow successfully through acquisitions and with sufficient financial resources firms can arguably short-cut some steps in the more gradual process of internally developing necessary competences.

This is highly relevant in the context of China where there currently exists a combination of: (1) high levels of Government ownership and funding; (2) Government policies that target specific industry sectors for development and support national champions within

these industries, and; (3) unprecedented inflows of foreign direct investment (FDI) in manufacturing leading to a wide range of local partnerships and joint-ventures with multinational firms invested in China which provide routes to capability-development. There is also a strong internationalisation agenda, at the government and corporate levels, as evidenced by the growth in outward FDI from China (Buckley et al., 2007) and the rise in outward M&A by Chinese firms.

Some Chinese firms will follow in the footsteps of the more successful multinational (or ‘latecomer’) firms from other emerging economies such as Samsung, Acer, LG, and Hyundai (Bell, 2006; Hobday et al., 2004; Figueiredo, 2003; Mathews, 2002). This prompts some relevant questions regarding the mechanisms by which such firms develop particular kinds of capabilities to move from being innovation imitators and dependent recipients of product technologies, processes and practices to be lead innovators and the independent source of these components of competitive advantage.

Our empirical focus is the development of innovative capacity within a Chinese auto manufacturer, the Nanjing Automotive Company (NAC), following its buy-out of the iconic British firm MG Rover. The research examines two phases in the evolution of this company under Chinese ownership. In the first phase it considers the transfer, replication and adaption of knowledge and routines from the British workforce to the new Chinese owners and employees within MG Rover. The study explores the intra-organisational processes adopted to transfer both technological and tacit knowledge and to develop innovation capabilities. Here there is evidence of both *discrete* knowledge transfer and



*cumulative* knowledge development processes. In the second phase, following the acquisition of NAC by the larger Shanghai Automotive Industries Company (SAIC), we observe a growing emphasis on the leverage of complimentary assets and capabilities in order to build a self-sustaining collaborative knowledge platform.

We build on existing research by bridging micro-level studies on knowledge integration in project teams (Lampel et al., 2008) with research on broader organisational restructuring and international shifts in competitive advantage. This includes observing the effects of integrating the knowledge networks of two firms based in different countries. Our analysis also encompasses the longitudinal dimension, observing the acquisition process over time across a series of projects involving different work teams. A final aim is to differentiate between the more permanent integration processes that follow acquisitions from more temporary inter-organisational knowledge transfers and collaborative, inter-firm knowledge creation processes (Easterby-Smith et al., 2008). Whilst the Chinese have shown an ability to ‘imitate’ (brands, products, perhaps even production systems) to some degree, we need to distinguish between imitation and innovation as a source of competitive advantage. Through these dimensions of the study we specifically contribute to the current literature by demonstrating the heterogeneity of learning processes and capability outcomes in acquisitions (Kale, 2010).

The study shows how the processes of selection and retention of knowledge and routines at the micro-level are the building blocks of the evolving innovative capacity of the firm overall. The choices made at this level reveal the strategic intent of the firm in terms of

the kinds of capabilities it values and how it is acting to distribute these around its internal and external networks. The central case study examines capability transfer at the level of the NAC-MG M&A, but uses a specific project example (the ‘warranties’ project) to reveal patterns of learning at the micro-level. We then connect this to broader evolution of SAIC, which has grown to become the largest automotive producer in China.

Insights from the study also have some practical value for managers, whether their strategic aim is to develop better ways of innovating (e.g. through acquisitions) or to limit the degree to which innovation-related capabilities, as a source of sustainable competitive advantage, can be learned by rivals.

## **Theoretical Framing**

Prior studies of acquisitions have shown that successful integration enhances performance (Zollo and Singh, 2004) but organisational fit is required to realise the potential synergies from merging two enterprises (Barkema and Schijven, 2008; Colombo et al., 2007; Cartwright and Schoenberg, 2006). Most studies tend to use fairly high-level measures to analyse correlations between firm or acquisition characteristics with performance or value-creation across panel data sets. However, recent research has tried to look at the longer-term sequential effects and associated path-dependency following acquisitions. Anand and Capron (2005) have examined these patterns in terms

of what they term ‘acquisition based dynamic capabilities’ (this study is focused on the processes that underlie ‘reconfiguration’, in their terminology).

There remains an acknowledged shortage of detailed analyses of integration processes and the organisational restructuring that accompanies the combining of capabilities and routines from different organisational contexts and changing contingencies (Barkema and Schijven, 2008; McEvily, Eisenhardt and Prescott, 2004). This matches the acknowledged shortage of detailed insights into the general origin of routines and capabilities (Felin and Foss, 2009; 2005) and the ‘need for a better understanding of the origins of capabilities’ (Zollo and Winter, 2002: 339). Similarly, “the emergence of absorptive capacity from the actions and interactions of individual, organizational, and interorganizational antecedents remains unclear” (Volberda et al. 2010). In a review of the field as part of an introduction to a special issue on M&A in the *British Journal of Management*, Cartwright and Schoenberg (2006) call for a ‘greater recognition of the process and organizational dimensions of acquisitions’ which is where our paper is positioned.

We draw upon research which examines organisational learning approaches at the micro-level (Hong et al., 2006), whilst linking the fields of knowledge management and dynamic capabilities (Easterby-Smith and Prieto, 2008). We analyse the processes by which both knowledge and the associated collective learning routines are adapted to suit the new organisational context of the merged firm. The selection, retention and adaptation of both knowledge and learning routines give rise to ‘new combinations’ and

the potential for innovation. Context is important because the value of such product or process capabilities, whether in the form of an embodied transfer or a cumulative flow of learning, is very much dependent on the absorptive capacity and the ancillary technological, market and economic conditions of the recipient individual or firm. Path-dependency is important for explaining the longer-term effects of cumulative flows of capability, which we associate with indigenous innovative capacity.

A growing literature on the mechanisms of inter-organisational knowledge transfer and learning has evolved since Ring and Van de Ven (1994). Intra-organisational knowledge integration has also received considerable interest over a long period of time (Van Wijk et al., 2008; Collinson, 1993). Studies in both areas have developed concepts and frameworks that apply in the context of acquisitions, but there are also distinct differences.

In theory, acquisitions represent the appropriation of the value-creating assets, knowledge and capabilities of the acquired enterprise. Much of the work done using panel data to compare firms views ownership as a straight proxy for the ability to leverage the competitive advantages of the acquired firm. In some cases it may well be a good (or the only available) proxy, but the total (the combined firm) is rarely equal to the sum of the two halves. The integration process itself will result in a loss or a change in some of the assets, capabilities and advantages of the individual firms, pre-merger. In practice, the transfer of assets involves adaptation and reconfiguration in a new organisational context. Some associated knowledge and capabilities, embodied in managers and employees, are

‘transferred’ along with the physical assets, much is not. Experts are temporarily contracted to provide several kinds of support and are the main conduit for the transfer of knowledge and routines which embody the practices for on-going value-appropriation in the new organisational setting. They also bring access to other sources of knowledge, supporting the process of integrating networks from both sides of the merged organisation. In other words, ownership is just one amongst a range of ‘isolating mechanisms’ that allow the source of value creation to capture the value created (Lepak et al., 2007; Lepak and Snell, 1999).

Studies of the effects of transfers of assets, technology, knowledge or capabilities, via inter-firm alliances or joint-ventures, on firm performance, also often rely on correlations using proxy measures (Macher and Mowery, 2009; Buckley et al., 2007; Zhao, Anand, and Mitchell, 2005; Beamish and Dhanaraj, 2004; Lane et al., 2001). Again, level of ownership is often seen as a measure of asset or organisation integration. We focus on the mechanisms and processes by which the recipient firm improves its independent ability to innovate (specifically and measurably; product and process) via intra-organisation or inter-organisation transfer and interaction.

Analyses have also focused on differentiating between different kinds of knowledge transfer and the complementarities between source and recipient firm, often building on the widely-referenced concept of absorptive capacity (Cohen and Levithal, 1990). Buckley et al. (2009) recently used the terms ‘knowledge accession’ and ‘knowledge acquisition’ to compare complementary and supplementary knowledge transfers in

strategic alliances. They propose that as knowledge accession entails knowledge ‘amalgamation’, rather than organisational learning, transfer costs are lower and trust is easier to establish than in the case of knowledge acquisition. Our study provides empirical detail to illustrate their concept of knowledge acquisition and challenge their suggestion that knowledge transfer (of any kind) can take place without any organisational learning.

Evolutionary approaches emphasise the selection and retention behaviour of individual experts and groups of specialists underlies the process of cumulative learning at the aggregate level of the division, firm or groups of firms. Zollo and Winter’s (2002, p.343) ‘variation-selection-retention’ cycle can be used to examine the mechanisms by which certain routines are adapted and adopted in the recipient organisation. There strong links with work by Smith and Tushman (2005), Sidhu, Commandeur and Volberda, (2006) and more recently Westney (2009). “Retention occurs when selected variations are preserved, duplicated, or otherwise reproduced so that the selected activities are repeated on future occasions or the selected structures appear again in future generations” (Aldrich 1999: 30). Kogut (1995) has applied this in his focus on multinational enterprises (MNEs), where he argues, retention processes shape the MNEs capacity to extend its organisational systems, processes and practices across borders. We extend this to better-understand inter-organisational transfers of capabilities in the context of acquisitions.

## **The Study**

Our on-going research examines a range of partnerships between foreign firms and their Chinese counterparts in China-based alliances, joint-ventures and buyer-supplier agreements. A set of in-depth case studies across a range of industry sectors take specific projects, divisions or operations in China as the unit of analysis, rather than the overall firm. We focus on collaborative innovation to understand the current scope and future implications of joint product or process development projects, technology-sharing, training and joint-learning activities within these partnerships.

The company case studies were developed through interviews with managers, engineers, scientists and plant-level personnel. Over 100 interviews were held both in the home country location of the firm (UK, Mainland Europe or the USA) and in China. Many of the largest UK investors in China are included in the sample which covers more than 30 joint-projects in 20 multinational firms in the pharmaceuticals, telecoms, aerospace, automotive, industrial manufacturing, FMCG manufacturing and research and high-tech manufacturing sectors. Alongside in-depth, interview-based case studies two questionnaire surveys were conducted. One was conducted in association with D&B Huaxia, a market survey and research company in China. This provided 320 individual company responses from the China-based operations of a range of multinational firms. The second surveyed the membership of the China-Britain Business Council (CBBC). Whilst compiling the company case studies the research team also interviewed a range of policymakers, consultants and representatives from Government agencies based in the

UK and China. These included the DTI, UKTI, CBI, British Chamber of Commerce in China and CBBC

Key questions were, for example: what kinds of assets, resources, capabilities and knowledge were exchanged in the partnership? Were the strategic trade-offs planned or emergent? What did each side learn that contributed to specific aspects of innovation performance? What aspects of this learning were seen as reciprocal or non-reciprocal and intended or unintended? Related to this evolving process of exchange and learning was there a distinctive change in the relative specialisation of the two partners (and did this amount to a move along or between industry value chains)?

### **East Acquires West: The MG Rover Take-over by the Nanjing Automotive Company**

Our focus here is on the story after the take-over of the British firm MG Rover by the Nanjing Automotive Company in 2005 and the subsequent developments since NAC was acquired by SAIC Motor in December 2007. The first acquisition allows us to make a detailed distinction between the physical assets, comprising the assembly lines and other production equipment, and the intellectual assets such as key personnel, design material and the warranty documentation that was transferred to China from Longbridge. The second acquisition highlights the potential for taking advantage of complimentary capabilities within a larger company with a significantly greater span of external relationships. We see these as part of the process of developing in-house capabilities for



improving the production process in the medium-term, and in the longer term building a platform for sustained innovation at the forefront of the industry.

The research is based on meetings with senior members of MG-NAC in China and the UK, plus visits to the new MG plant in Nanjing during June 2007 and to the original Longbridge plant in November 2008. The visits included lengthy formal interviews with managers including a senior (foreign) advisor, the Chinese head of MG operations in the UK, and numerous shorter conversations with foreign and Chinese employees at the two plants. The majority of conversations were in English, which were recorded and transcribed. The comparison between the sites has enabled us to understand exactly which physical assets have migrated to China, and which have stayed behind. Following these visits we were able to clarify a number of further points through email exchanges with two of the UK informants whom we met in China, and Chinese informants whom we met in the UK. This has been supplemented further by reviews of UK press reports on the development of MG.

Our approach involved identifying improvements in the innovative capabilities of the merged enterprise, across the areas of R&D, design, product and manufacturing processes, as indicators of these “new combinations”. We then explicitly traced the initial sources of the knowledge and capability underlying the improvement and explored the integrative mechanisms that led to them. To achieve the required depth of analysis it was necessary to focus on specific transfer and learning projects (see the ‘warranties project’ below) and extrapolate from these to the level of the overall firm.

## **NAC + MG**

In 2006 NAC moved the production facilities for power train and body shop from Longbridge in the Midlands of the UK to Nanjing, capital of China's Jiangsu Province. This represented two thirds of the production facilities at Longbridge. The equipment inherited from MG Rover contains the hallmarks of successive groups of owners of the company: the power train machinery is the oldest, and dates back to the British Leyland days (it still has BLMC stamped on it), and they have a program for replacing this machinery at the rate of 10 percent per annum; the body plant is almost entirely automated and uses ABB robots purchased by BMW when it owned the company; and the final assembly line is completely new and was built by NAC. The equipment is now installed in a purpose-built factory within the new technology development zone of Nanjing.

The plans of NAC are ambitious, in terms of investment, production, quality and marketing. The overall investment put into the new company totals \$2.25 billion, which significantly dwarfs the original purchase price of \$80 million. Production and marketing plans are incremental: in 2007 the plan was to produce 13,000 MG 7s (based on the Rover 75/ MG-ZT) and 3,000 of the sports car (MG-TF), for the Chinese market. Significant investment is being placed into improving the quality of MG vehicles. For example, all cars produced will conform to the highest European emission standards (Euro IV by 2010 and Euro V two years later).

Over the short-term we observed a technology transfer and training process which focused on adapting plant equipment and production systems in the new context of Nanjing, including connecting with a new set of related suppliers, contractors and customers. In the medium-term we saw the evolution of complementarities between three specific groups: design and engineering specialists, managers and plant-level employees. The first were based in the UK, where the plan was to develop the remaining legacy of MG-Rover at Longbridge into a design and technology centre of excellence. The second two groups were based in Nanjing, where the local Chinese employees and ex-MG Rover employees worked together to establish both the plant and technical design capabilities.

Over the longer term we see the continuing development of a large network for product and process innovation which connects the Longbridge plant and its local affiliates (such as its Leamington Spa-based design centre), NAC's automotive divisions in China and those of the Shanghai Automotive Industry Corporation (SAIC) which merged with NAC in December 2007. The addition of a range of assets and capabilities from SAIC, some gained through prior alliances, JVs and mergers (such as PATAC; the automotive design, engineering and development centre created with JV partner GM), has created a global 'differentiated network' as a platform for sustained innovation. This links the advantages of cheap labour and a growing market for autos in China with the more advanced assets and capabilities of western automotive and engineering firms.

## **Transfer, Learning, Selection and Retention from the Individual Employee to the Overall Firm**

Figure 1 describes a simple four-stage process to illustrate the transfer and learning processes at NAC, following its take-over of MG. The early stages are dedicated to the transfer of assets and equipment and adapting these to fit in the new organisational and local context. Later stages include local problem-solving to improve the product and production processes and (still evolving) locally-initiated design and R&D activities to become a source of superior products and innovative knowledge, routines and capabilities.

Figure 1: Post-Acquisition Transfer and Learning over Time and at Various Levels of Aggregation; about here
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On the left of Figure 1 a simple scaling denotes different levels of aggregation and units of analysis, from the micro level of the individual employee to the macro level of inter-firm networks. The processes of technology transfer and capability accumulation can be observed at all these levels with obvious links between levels. The ‘warranties project’ discussed below provides an insight into collective learning at the team level and links to specific examples of how individual plant operators, engineers and managers developed knowledge and capabilities through the transfer process. Certain routines were also adopted, most in adapted form, at the new plant in Nanjing. Some involved a small number of specialists, others incorporated almost all plant-level personnel (such as health and safety working practices) and still others were diffused beyond the Nanjing-based

plant to other parts of the organisation. At a later stage this process extended across SAIC, particularly through the exchange of personnel from different joint-ventures.

The overriding objective at NAC was to manufacture MG vehicles in Nanjing of a better design, higher quality and at higher levels of productivity than that achieved at Longbridge. The combination of existing NAC practices with new ones from MG resulted in a wider range of knowledge, routines and capabilities than managers in the merged enterprise could apply. NAC selected and retained and sub-set that appeared to be most likely to provide these advantages in the new setting.

### **Discrete Transfer and Cumulative Learning**

We observed two distinctive kinds of transfer and learning processes, with different mechanisms and outcomes, in this merger as well as in many other alliances and joint-ventures in our overall study. The first are ‘discrete’ transfers, the second are ‘cumulative’ learning processes. We define discrete transfers as the intended or unintended relocation or replication of an asset (or the rights to use an asset) with embodied knowledge, which may have temporary exploitable value for the recipient. Examples are equipment, products, patents, licenses, brands, blue-prints or design specifications. Intended transfer mechanisms include the sale of equipment, products or technology; the licensing of designs, patents or brands or the agreed exchange of these as part of a joint-venture or collaborative venture. From the perspective of the source firm, unintended transfer mechanisms include copying, stealing or reverse-engineering, or

simply the use of patented technology, a design or a brand name by a recipient firm without agreement, compensation or reciprocity.

Cumulative flows are characterized by a process of learning disembodied knowledge which may accumulate into a value-adding capability. Education, training and mentoring as well as learning ‘by-doing’ or ‘on-the-job’ through interaction or imitation are examples of capability transfer mechanisms. Cumulative flows are most relevant when they result in measurable improvements in the capacity of the recipient to innovate. This tends to result from the transfer over time of a combination of individual skills, expertise and knowledge together with improvements in relevant organisational capabilities of the recipient firm. These distinctions are summarized below in Figure 2.

Figure 2: Discrete Transfers and Cumulative Learning; about here
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In the NAC-MG case there were numerous obvious examples of discrete transfers, including the plant line equipment and tooling, ancillary test and maintenance equipment, IT systems and customised software, components, prototypes and design specifications, plus the warranty data, discussed below. NAC initially employed around 30 senior British engineers in Nanjing to set up the machinery on the production lines, and to train the local Chinese engineers on the peculiarities of the MG production systems. Although the UK engineers were notionally contracted (generally for one to two year periods) to transfer knowledge and capabilities to the Chinese engineers, several of them commented

to us that this rapidly evolved into something different. In many cases, they felt they had passed all their knowledge across to the Chinese engineers within the first two to four weeks of their visits, and they then found themselves working with the Chinese to develop and improve both the production process and the design of the vehicles. With regard to the production process, the Chinese have been keen to improve the efficiency of elements of the production system and instigated a programme of upgrading all the older equipment in the plant.

According to our respondents more than 200 Chinese have been sent for observation and training activities in the UK and more than 400 British staff have been to China since the project began. The main overarching objective has been to transfer and adapt manufacturing processes (including equipment and the associated plant floor routines) and the automotive components that are manufactured at the plant. But in addition to efforts to adapt to local conditions (such as materials or the local supply chain) NAC has focused on product and process improvement. High-priority areas have been the cooling and transmission systems and the power-train technology.

The patterns of recruitment and temporary secondment of former MG personnel by NAC provides a key indicator of the 'volume' of transfer and learning activity and of the specialist areas of product or process innovation NAC has focussed its efforts on. There have been extensive internal movements of personnel in order to consolidate this knowledge transfer. Approximately 130 Chinese engineers were transferred from other parts of NAC (the company had two major joint ventures with Volkswagen and Honda at

this time). These are all experienced engineers who are able to bring knowledge and capabilities acquired from other multinationals into the process of developing and producing the MG.

Here we have a wide range of examples of cumulative learning; however, the overall volume of transfers and interactions only provides part of the picture. Although there are parallels with other accepted methods of measuring knowledge transfer. In a much-cited paper, Bresman et al. (1999) used ‘frequency of communications between individuals in the acquirer and acquired units’ and ‘frequency of visits and meetings’ in relation to knowledge transfer in acquisitions. These still remain fairly weak proxies for the overall learning process. For our purposes another level of qualitative analysis is necessary. The transfer of the historical records of warranty claims associated with the MG models previously made and sold in the UK and Europe provides a more detailed example of collaborative learning through a redesign project. NAC explicitly made this an in-house training exercise, but it is representative of other projects during the post-acquisition period.

### **The Warranties Project**

A warranty claim is made by a customer for ‘repair or replacement of, or compensation for, non-performance or under-performance of a component or product, as provided for in its warranty document’. Automotive firms and suppliers routinely analyse large data sets of past warranty claims for the purpose of re-design and process improvement, as well as



warranty cost forecasting. A large database spanning almost 20 years was included in NAC's acquisition of MG and was used by NAC managers and engineers to identify systemic problems with the original design. Engineers examined common complaints to trace key problems with previous MG design specifications in order to make improvements alongside the customised installation of the new plant equipment. Once key problems were identified blueprints and design specifications for the NAC-made MG model were revised. Changes were specifically made to the head-gaskets, cooling systems and transmission system on the basis of the warranty claims records.

There are two significant outcomes of this process. The first is the redesign of some key components and systems making the final product more reliable, durable and/or cheaper. This combines process and product innovation, focused on a specific range of solutions to defined problems. The second is the learning process that took place whilst this redesign was explored and implemented. Rather than externalising the innovation activities, by contracting the redesign out to an automotive engineering design firm, or leaving the UK team to do this at Longbridge where more advanced contract firms were available to support such a project, NAC explicitly made this an in-house training exercise. The Chinese personnel involved learnt more than simply how to solve the specific problems they were presented with, they learnt about specific routines that could be applied to experiment, explore and solve these kinds of problems more generally. They also learnt about where certain kinds of knowledge (from specialist design houses, R&D contractors etc.) could be found; via the 'know-who' networks of the British engineers involved in the training.

So, the discrete transfer of the warranties database gave rise to cumulative learning focusing on the priority areas signalled by the track-record of past product and component failures. We can position these in our framework depicted in Figure 1. Box 1 in Figure 1 represents process-improvement capabilities learned by individuals. An example is the capability to modify a cylinder head gasket, which requires an engineer to understand the relationships between airflow, fuel-injection systems (and positioning) and the piston timings. A common fault with cylinder head gaskets in the old MG models was identified in the warranties database. The cylinder head was significantly re-designed (the first major change in over 20 years according to one respondent) to make it more efficient. The overall project, including the re-engineering of the production line to manufacture a different design of cylinder head, involved a team of specialists, including some ex-MG engineers.

Box 2 in Figure 1 denotes the more advanced capability to initiate product and process innovations. Alongside the immediate problem-solving capability the Chinese team of engineers and plant managers learned how to explore the options for making ongoing improvements in cylinder-head performance and durability. Improved performance means achieving better emissions at higher power levels, while maintaining reasonable fuel efficiency, so this is a key aspect of product innovation in the face of evolving emissions standards. Again, this includes the routines and capability to source relevant knowledge elsewhere, through newly-learned-about networks.

Some of these routines were adopted as they were learnt, for example, by some Chinese engineers involved in longer-term product development planning. They used these new capabilities to create estimates of the scope, costs and feasibility of incremental improvements in future head gasket re-designs. Some were used once or briefly. For example, the actual process of searching through the database and prioritising problem-areas for attention was in itself a learned routine for a select group of Chinese design engineers. Once the priorities were selected this process was no longer needed. However, these engineers have the capability to resurrect these same routines to analyse other databases in the future should the need arise (these can be seen as ‘latent capabilities’; Collinson and Wilson, 2006). Finally, other routines were not adopted, either because an acceptable local alternative was already in place, or because they were seen to be less important in the local context and therefore less of a priority in dedicating time and resources to learning efforts.

So, returning to one of our central questions, which routines were retained and why? The warranties project example provides an illustration of this at the micro-organisation level. The first priority for the project team was to learn how to analyse the warranties database and to select and prioritise a set of design faults that could be fixed, resulting in a measurable impact on the performance (therefore sales) of the redesigned MG.

Individual Chinese engineers developed new knowledge about how to redesign the particular type of head gasket in the MG model. Retention at one level was therefore driven by the immediate priorities of the project team. But these engineers also learnt a

set of routines and knowledge relating to the overall head gasket redesign process, relevant to future product development projects. We view this as a newly-learned capability for (more independently) initiating and managing one element of new product development (Box 2 in Figure 1), albeit limited in this example to a specific component and sub-set of design innovations. Finally, some capabilities, routines and knowledge are not selected. These are excluded by one or more decision-makers as inappropriate in the new organisational context or inferior to existing capabilities in the recipient organisation.

We note that selection and retention was driven by the ‘learning aspirations’ (to use Winter’s terminology) of the individuals and project teams we examined. These had a strong role to play in determining which capabilities would be activated and which would be ‘stored’ for potential future use. At the micro-level there were strong incentives for Chinese engineers to develop not just more knowledge and expertise but specific kinds of capabilities that would enhance their own technical credibility and thereby their value (position, career) in the immediate context of their company department. The target of their learning behaviour was in turn strongly influenced by a series of priorities, from the immediate and most relevant for them as individuals (a focus on improved head gasket design as an outcome of the warranties project), to more general strategic goals, including; improving this particular car model for the Chinese market and improving the firm’s overall level of innovation capability. These come from group-level sources of agency further up the micro-macro hierarchy and amount to an overarching ‘strategic intent’ of the firm.

It is also worth noting that a number of UK-based engineers had wanted to make improvements to the gasket-head design for some time. We could say that their agency was misaligned with the organisational context (in Gottschalg and Zollo's, 2007, terms) of MG in its cash-strapped past. They were motivated and capable of creating these kinds of innovative improvements prior to the take-over, but were and were only able to do this in new organisational context.

Learning on the job, dedicated training and plant visits to the UK and elsewhere as well as the selection of priority projects were all staged for the purpose of 'knowledge articulation' making Chinese employees more aware of the causal links between their actions and particular performance outcomes. Causal ambiguity, in Zollo and Winter's (2002) terminology, was a feature of the learning process. Much of this appeared to be associated with the re-location of equipment and processes into the Chinese context. But we have no direct empirical comparison to validate this observation. Some causal links that were predictable in the UK plant context were less so in the Chinese context. This change of context therefore gave rise to a re-evaluation of accepted routines by the 'source' agents, the engineers and managers from the UK side of the merger. This also influenced the process of differentiating between active, latent (Collinson and Wilson, 2006) and excluded capabilities, routines and knowledge.

## **From Micro to Macro: the Evolution of NAC and SAIC**

There are several interlocking stories here: firstly the transfer of knowledge and capabilities initially from the UK to China followed by the co-creation of knowledge between China and the UK; and secondly, following the SAIC acquisition, the wider building and leveraging of specific kinds of knowledge and capabilities across the whole group.

There is clear evidence of new innovation capabilities at several levels, relating to Figure 1. Within NAC (and the NAC Pukou plant when ownership moved to SAIC) three sets of indicators represent evidence of learning: (1) productivity and quality levels within the plant initially reached, then exceeded those in the original MG-Rover plant in Longbridge; (2) R&D and development projects led to the replacement and upgrading of faulty components in previous models; (3) new car models were launched, with design adaptations for new emissions regulations and for the China market. These new products include the MG6, MG7, the Roewe 350 sedan (with a 1.5-litre engine developed by SAIC) and the MG3SW (the MG Zero super-mini). The latter is based on a new automotive platform with a wheelbase of 2.5 metres and features a Macpherson strut front suspension and a torsion beam rear axle.

Since the purchase of NAC-MG by Shanghai Automotive (SAIC) in December 2007 it has been possible to discern new patterns of strategic leveraging on account of the scale of the combined group. There are three ways in which this leveraging is now being

achieved. Firstly there are the natural *economies of scale*. Between 2006 and 2008 the firm's operating income grew from less than US\$3 billion to over US\$15 billion and its assets grew from US\$12 billion to US\$16 billion (SAIC 2009 Annual Report; <http://www.saicmotor.com/english>). This means that NAC, as a part of SAIC, now has much stronger bargaining power with suppliers, a wider pool of technical expertise to draw upon and financial strength to invest in large-scale R&D initiatives.

Secondly, there is the extension of the *internal knowledge economy*. There is an emphasis on learning from joint ventures and redistributing knowledge around the company. Across the larger group there are now more opportunities for accessing and sharing knowledge, and this has been formalised into an international counterparts system whereby senior engineers and managers are attached to their counterparts within joint ventures or periods of six months to a year, and knowledge obtained is then shared with others in the company.

Thirdly, access to the larger group has enabled *greater co-specialisation* within the R&D function. The R&D facility that was established in Nanjing will now focus on improvements in the product and manufacturing processes, since they are located on the primary manufacturing site. Meanwhile the 250 employees in the R&D function based in Leamington Spa will move to the Longbridge site and specialise in providing engineering and design expertise for the MG TF and former Rover 75. The work on future technologies, platforms, design and styling will be concentrated in Shanghai, partly at

PATAC (SAIC's Pan Asian Technical Automotive Centre). These provide for a range of enhanced 'combinative capabilities' (Kogut and Zander, 2003; 1992).

At the level of the overall firm we can note simply that the sales revenues and market share of SAIC have continued to rise. It sold 1.05 million units and earned revenues of \$14.4 billion in 2005. Revenues reached \$18 billion in 2007 and then grew to \$22.6 billion following the merger with NAC. In 2009 SAIC Motor sold 2.72 million vehicles. It is 25<sup>th</sup> in a list of the top-50 car producers in the World, 7<sup>th</sup> amongst the 20 Chinese firms in this list (OICA, 2010).<sup>1</sup> Tracing or measuring the specific causal links between corporate success at this level and the learning processes we identify above, at the project and plant levels is beyond the scope of this paper.

## **Conclusion**

The empirical research described in this paper aimed to examine deeper processes of integration, specifically search, selection and retention of innovation-related routines in corporate acquisitions. It led us to explicitly differentiate between what we term 'discrete transfers' and 'cumulative capability flows' in acquisitions. Evidence of these distinct types of learning was found across other case studies in our programme of research, across collaborative UK-China partnerships and joint-ventures, as well as acquisitions. We have focussed on a single example in this paper in order to provide the rich detail

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<sup>1</sup> China is now by far the largest producer of automobiles, with 44 percent of production by local brands. Auto manufacturing in China has grown 21 percent per year on average between 2002 and 2007. Although the leading producers globally are Toyota, GM, VW and Ford, there are now 20 Chinese firms in the global top-50 (compared to three Indian firms).



required to understand how micro-level processes connect with broader effects at the plant and firm levels, over time.

We view discrete transfers as one firm exploiting the ‘end products’ of another firm’s variety-generation, selection and retention processes. Transfer and learning processes which support cumulative capability development which in turn builds the innovative capacity of the recipient firm, signify the development of the recipient’s own in-house variety-generation, selection and retention processes and capabilities. That is, an in-house capacity to generate, select and retain new routines and knowledge appropriate to the recipient firms own, unique context and independently of another source firm (the innovation originator). In innovation studies terms the recipient firm learns to explore as well as exploit (Raisch et al. 2009).

The warranties project provides a specific and detailed example of this, showing how personnel in the recipient firm used a problem-based search for technical solutions to extend their independent capabilities for problem-solving beyond the context of the original project. Additional time and effort was invested in order to learn how to search and select as opposed to simply applying the solution put forward by visiting ex-MG engineers.

Through our longitudinal study of the NAC-MG acquisition we trace a series of value appropriation stages: (1) acquisition and (discrete) transfer of assets; (2) learning to set-up and operate assets to achieve immediate asset complementarities between merged

organisations; (3) learning to improve processes and products (initially problem-solving) through the integration of routines and processes for search, selection and retention of new knowledge; (4) learning to initiate innovation (connect technological and market opportunities; integrate different expertise for technology / design-driven innovation; engage in R&D), which benefits from the integration of networks leading to a new range of opportunities to access complementary knowledge *and* routines internationally. There are useful parallels with Hobday and Rush (2007) and other stage-models of indigenous technological capability.

Our aim was to examine processes of learning over time whilst connecting these to the development of innovative capabilities at several levels of analysis, as depicted in Figure 1. This proved difficult, given the complexities of ‘proving’ causal relationships between (1) learning at the (warranties) project level; (2) improved productivity and quality plus new product designs at the plant level, and (3) the rise of SAIC as a major player in the global automotive industry.

We have however, shed some light on the ‘new combinations’ that acquisitions can create, encompassing the above stages which, over time, underpin the innovative capability of the newly-merged enterprise. The NAC-MG warranties project provides detailed illustrations of these and the evolution of SAIC overall has certainly involved elements of all, although we cannot accurately determine to what degree.

Context is important because the specific value of the knowledge and routines comprising each capability varies according to the technological, strategic, and market conditions of the recipient firm, as well as the skill set (absorptive capacity) of the personnel involved. Patterns of selection and retention of knowledge and routines at the micro-level, and therefore the long-run evolution of the recipient organisation at the aggregate level are directly driven by these processes. These empirical insights complement the conceptual work of Buckley et al. (2009), Easterby-Smith and Prieto (2008) and Pandza and Thorpe (2009). In terms of the latter in particular, who adopt a process perspective to demonstrate how creative search, strategic sense-making and experiential learning are complementary, we provide an empirical illustration of these concepts. The evidence shows how, as hypothesised by Pandza and Thorpe (2009), our Chinese recipient firm invested to improve its creative search and strategic sense-making capabilities as part of the asset transfer process, specifically in order to develop its own independent innovation capabilities.

Stepping back we can see that sustained competitiveness requires not just the acquisition of brands, assets and technologies, but the capabilities to create new brands, assets and technologies; to innovate. For ‘latecomer’ firms in emerging and developing countries the competitive challenge is to catch-up whilst reducing dependence on more developed enterprises as sources of innovation. The discrete vs. cumulative distinction is important for understanding the longer-term effects of different kinds of transfer/learning on indigenous, independent innovative capacity in recipient firms.

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Figure 1: Post-Acquisition Transfer and Learning over Time and at Various Levels of Aggregation

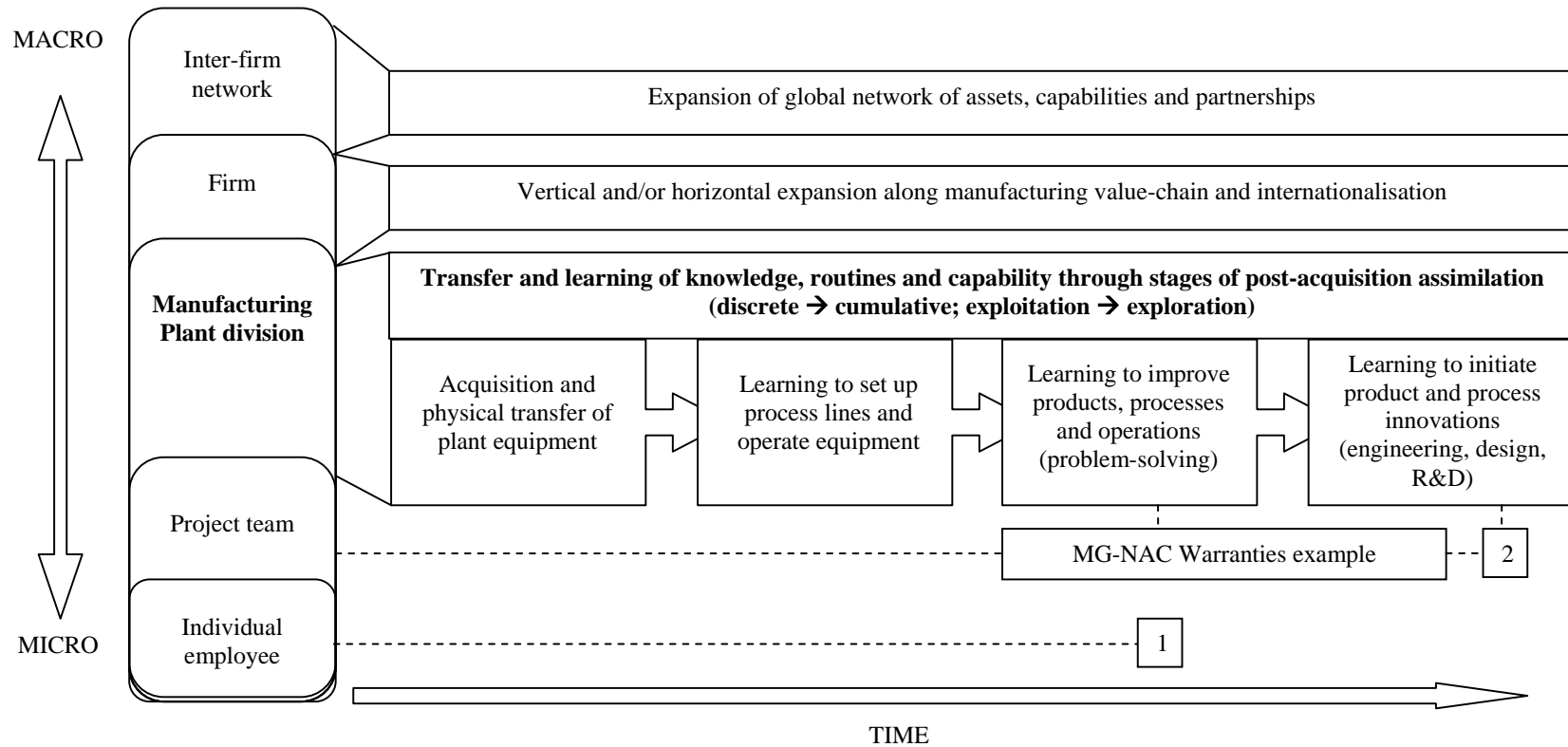




Figure 2: Discrete Transfers and Cumulative Learning

	<b>Discrete transfers</b>	<b>Cumulative capability learning</b>
<b>Characteristics</b>	One-off transfer or spill-over of an object or asset with embodied knowledge which may have temporary, exploitable value for the recipient	A process of learning disembodied knowledge which may accumulate into a value-adding capability
<b>Mechanisms</b>	Buying, stealing, copying or reverse engineering, being given	Education, mentoring, training, learning: by-doing, on-the-job, through interaction or imitation
<b>Generic Examples</b>	Equipment, IT systems and software, products, patents, licenses, brands, blue-prints, design specifications	Technological capabilities, organisation skills, project management techniques, quality improvement routines
<b>NAC - MG Case examples from this study</b>	Manufacturing plant, assembly lines, moulds, machines. Process documentation and specifications, technical drawings and plans. IT systems, database of warranty information. MG brands, patents, licenses etc.	Hands-on training for Chinese employees to develop capabilities in managing, maintaining, adapting and improving capital equipment and processes, by British engineers and plant managers. Warranties project to identify priorities for improved products. Joint-redesign and engineering of head gasket and cooling and transmission system for improved performance, through plant visits and joint project teams (over 200 Chinese sent to UK and over 400 British sent to China).

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