Technological catch-up by component suppliers in the Pakistani automotive industry : a four-dimensional analysis.

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Abstract

This qualitative paper reports findings of an investigation into buyer-supplier interaction in the Pakistani auto-parts industry. We conceptualize technological catch-up by Pakistani suppliers in four relatio-spatial dimensions with international joint ventures (IJVs) as mediating gateways between dimensions. A critical realist lens is deployed to connect macro-level constructs with micro-level concepts and expose the interplay between agency (micro-level) and structurally constraining (macro-level) conditions inherent in a late-liberalising emerging economy. Key findings are that catch-up occurs in four temporally overlapping dimensions in which, different macro-level governance mechanisms and firm-level orientations transform and affect the degree of catch-up. The findings support an optimum pathway for catch-up from an apprentice like transactional state in Dimension one to a fourth dimension in which relational interaction with foreign suppliers becomes lightly mediated by the IJVs gateway.

Keywords

Critical realism, Catch-up, emerging markets, knowledge transfer, B2B relationships

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1.0: Introduction

In this paper, we ask how the catch-up processes of locally-owned suppliers in a late liberalising emerging economy are affected by the dual networks of co-located international joint ventures (IJVs) involving local and advanced economy (AE) partners. Studies examining catch-up processes in emerging economy (EEs) firms have focused on so-called BRIC economies; less attention has been paid to EEs that have undergone later liberalisation (which we will abbreviate to LEE). Domestic firms operating in LEEs have been argued to suffer even greater resource structural constraints than BRIC economies (Chittoor et al., 2009). Against this backdrop, the challenge for domestic firms in LEE countries to catch-up technologically is significant (Zhao, Anand, & Mitchell, 2005). In this paper, we refer to catching-up as an LEE supplier's ability to bring improvements and efficiencies into its products and processes and thus move up the value chain. Such catch-up is underpinned by the capture or creation of new resources, knowledge, skills and competences. (Lamin & Livanis, 2013; Malerba & Nelson, 2011; Mudambi & Swift, 2012). One important facilitator of acceleration in a catch-up process for EE firms is their interaction with co-located AE firms. The positive benefits of co-location with AE investors on catch-up by EE suppliers have been the subject of only limited inquiry (Inemek & Mathyseens, 2012; Kumaraswamy et al., 2012). In particular, the opportunity for micro-level (i.e. dyad, firm or individual agent) studies in the industrial marketing tradition to add additional insight to the more macro-level studies (i.e. country, region or industry) grounded in Economic Geography (EG) and International Business (IB) disciplines has not been fully harnessed (a point alluded to by Meyer, 2004; Peng, Wang, & Jiang, 2008). More specifically, in a spectrum of relational to transactional interaction between MNEs and local actors, the substance of many macro-level findings have focussed on the transactional end of the spectrum and the resources that form

the content of such transactions (Mesquita, Anand, & Brush, 2008; Zhou & Xu, 2012). In comparison, the impact of micro-level relational proximity between co-located MNEs and EE firms on catch-up has received more limited attention (Lorenzen & Mudambi, 2013; Mudambi & Swift, 2012). McDermott and Corredoira (2010:309) for instance call for "greater focus on the types of inter-firm relationships that can facilitate or impede one's access to knowledge resources," and such impediment due to a lack of relational proximity would seem to include the extent to which knowledge is purposefully protected. Alongside relational factors, the dynamics of knowledge and technology protection and transfer may be of great significance in understanding how and why catch-up occurs for certain LEE suppliers, and not for others. The investigation reported in this paper has focused on a single local sub-industry, the Pakistani auto parts industry, but as an entity embedded in a global supply-chain via interaction with foreign (Japanese) investors.

The analysis of many factors discussed in this literature is beset by unhelpful dichotomies − resource-based vs. relational, local vs. international, knowledge protection vs. knowledge transfer are examples. In order to break with the assumed atomism in much of this work, in this paper we undertake a critical realist analysis (Bhaskar, 1978, 1993) and instead visualise problems as multi-dimensional but essentially holistic. In these terms we see LEEs as structurally constrained and foreign investors as agents capable of enabling catch-up and thus disrupting and positively transforming structural/institutional conditions.

The contribution we therefore seek to make in this paper is in several parts. We identify specifically the neglect afforded to the impact of the dual networks of foreign and domestic investors in IJVs (much work studies FDI generally, regardless of mode) and we seek to understand how these dual networks impact on catch-up outside the IJVs - in our case on

domestic suppliers who interact with these co-located IJVs. We study this matter in the context of Pakistan and therefore also address the empirical neglect of late-liberalizing emerging economy contexts. In deploying principles drawn from dialectical critical realism, we challenge many of the atomistic underlying assumptions in the current discourse. Instead, our central contribution in this paper is to identify the micro and macro-level factors that enable catch-up in four temporally overlapping relatio-spatial dimensions as mediated by the dual networks of IJVs. As a counter to static notions of catch-up, our findings are dynamic and processual in nature. The review of literature in Section 2 will reveal further where neglect exists at macro and micro-levels of consideration and where the unhelpful dichotomies we speak of are apparent. Before presenting our findings in the last half of our paper, we will explore how a critical realist lens helps to avoid atomism.

2.0: Conceptual background and framework

As we attempt to develop a *multi-dimensional* contribution, we divide our literature review into three sections. Each sub-section concludes with a conceptual proposition and we end Section 2 by proposing a conceptual framework (Fig 1) in which these three propositions are juxtaposed to reveal four sets of tensions (which we will reveal as four relatio-spatial dimensions) in which the central mediating factor is posited to be the dual networks of IJVs.

2.1: Foreign investors and catching up

Some scholars have discussed EEs as suffering from institutional voids defined as weaknesses in market and political mechanisms, often mediated by network (relational) forms of governance (Khanna & Palepu, 1999). The influence of foreign investors can help to

offset institutional voids and link embedded local networks into a global economy. Lamin and Livanis (2013:580) suggest that "critical to the catch-up process is to identify, acquire and use externally generated knowledge". Alongside catch-up generated externally from local institutions; resource transfers from AE investors to local LEE firms have been argued to be an important driver of, and benchmark for catch-up (Corredoira & McDermott, 2014). However, the results of a significant body of macro-level research into the impact of spillovers from foreign direct investment (FDI) on local firms across all economic contexts is mixed, some reporting positive catch-up effects (Blalock & Simon, 2009; Keller & Yeaple, 2009), some reporting uncertain or negative impacts on local firms (Altomonte & Pennings, 2009; Humphrey & Schmitz, 2002).

An important element in catch-up is the enhancement of learning. Scholars have identified two main strategies for organizational learning: exploration and exploitation (March, 1991). Exploration involves actively seeking new knowledge that will add to an organization's dynamic capabilities (Teece, 2014). On the other hand, exploitation is the process of seeking new ways to improve existing organizational capabilities and use existing knowledge to increase organizational effectiveness (Andriopoulos & Lewis, 2009). Several authors have identified that EE firms are initially more inclined to catch-up in terms of developing imitative exploitative strategies (Awate, Larsen, & Mudambi, 2012; Sun & Lee, 2013) or incremental-exploitative innovations that are developed for the needs of existing customers or markets (Benner & Tushman, 2003). In fact, for an LEE firm the interaction with an AE investor may initially resemble an apprenticeship (Herrigel, Wittke, & Voskamp, 2013). Little is yet known about an LEE supplier's movement from incremental-exploitative innovations to exploratory innovation due to interaction with AE investors. Lorenzen and Mudambi (2013) suggest that catch-up can be achieved along two dimensions, through value

creation and through value capture. The former relates to achieving technological catch-up, the latter to capturing greater value from existing operations, such as through incremental efficiency improvements. More radical innovations in LEE firms can be later achieved through value co-creation with foreign investors (Benner & Tushman, 2003), and are manifest as the generation of new designs, creation of new markets and development of new channels of distribution (Abernathy & Clark, 1985). Such innovations require new knowledge or departure from an existing knowledge base (Benner & Tushman, 2003; Levinthal & March, 1993). To date, little research has yet been conducted on the dynamics of learning in LEE-AE dyads (Sun & Lee, 2013). We propose in this paper to examine the evolution of innovative capabilities in an LEE supplier through interaction with an IJV and the nature to which the AE investor acts as a local knowledge governor in an LEE context.

Conceptual proposition 1: That IJVS act as an important mechanism for the transfer of knowledge, skills and technology to LEE suppliers.

We next move to consider whether this proposition can be considered as having a spatial and a relational dimension.

2.2: Foreign investors and dual networks: a spatial dimension?

In this paper we are interested in local and international spatial dimensions as geographically distinct but relationally connected dimensions within which foreign investors play a crucial *gatekeeping* role (Giuliani, 2011; Graf, 2010), undertake a *flagship* firm role (Rugman & D' Cruz, 2000), or become an *anchor tennant* in a cluster (Agrawal & Cockburn, 2003). Knowledge, resources and communication can flow through this *gate* and can facilitate catch-

up. However, due to the relative resource asymmetries (local to foreign) and relatively few alternative sources of advanced knowledge available to local agents, foreign investors become significant macro-level governors of catch-up. A gatekeeping role effectively centralizes network connectivity around a foreign investor and in an LEE, introduces certain asymmetries into resource flows (Lorenzen & Mudambi, 2013; Sun & Lee, 2013).

A number of authors have discussed the interplay between local and international geographic dimensions on an LEE firm's potential to catch-up (Bathelt, Malmberg, & Maskell, 2004; Lorenzen & Mudambi, 2013; Storper & Venables, 2004). For instance, the association between these geographic dimensions has been discussed as the interplay between a regional buzz and a global pipeline (Asheim, Coenen, & Vang, 2007; Bathelt, 2007; Bathelt et al., 2004). Lorenzen and Mudambi (2013) also speak of connectivity between a cluster and the global linkages of lead firms within a cluster. However, this work, grounded primarily in the EG and IB, is new and limited in empirical insight − perhaps due to the methodological challenges inherant in linking macro and micro-level factors. Key questions seem to remain with regard to gatekeeping in global pipelines, particualry when an anchor tennant is evident in a local environment where significant resource asymetries are apparent.

Rather than examining the general effect of foreign investors on catch-up, in this paper we focus on the specific effects of home/foreign international joint ventures (IJVs). A unique aspect of IJVs is the dual and joint nature of the networks of the partners and the dual embeddedness of the IJV in its global and local context (Figueiredo, 2011, Meyer, Mudambi, & Narula, 2011; Zhao, Anand, & Mitchell, 2005). At a start point, a local IJV partner may have their local networks, the foreign investor their international networks. The extent to which local and international networks evolve to become *joint* and *shared* has not been the

subject of significant scrutiny. Equally, the degree to which this evolution affects catch-up by local suppliers has also escaped significant study (Sun & Lee, 2013). We posit that both local and international dimensions contain macro and micro-level factors that enable the process of catch-up.

Conceptual proposition 2: That the dual networks IJVS can be examined at local and international geographic dimensions and the impact of these dimensions on catch-up by LEE suppliers distinctively explored.

2.3: Relational or transactional interaction: a relational dimension?

Industrial marketing (IM) scholars have developed significant insight into micro-level interaction between buyers and suppliers. However, buyer-supplier studies that contain an international dimension still seem limited (Seppanen, Blomqvist, & Sundqvist, 2007). IM scholars would seem well placed to develop multi-level insights that make a link to the more macro-level concepts reviewed above and more micro-level concepts (Hakansson & Waluszewski, 2013). We posit that relational factors between an IJV and LEE suppliers play a significant yet under-acknowledged role in catch-up, and a role which poses a significant challenge to notions of ubiquity when studying the effect of spillovers by foreign investors on catch-up by local agents. Relational proximity would seem to be a prerequisite for knowledge transfer and the quality of knowledge transferred is in itself a driver of relational proximity (Park, Vertinsky, & Lee, 2012). Geographical with relational proximity would also seem to facilitate face-to-face contact (Nam, 2014) and thus better enable knowledge transfer. The potential of micro-level study is therefore to distinguish effects at the level of the firm, the dyad or perhaps between individuals in the dyad. Indeed, Lorenzen and Mudambi (2013:26) suggest that "a theory of cluster global linkages that integrates both pipelines and personal

relationships is warranted," and studies integrating macro and micro insights seem to respond to this call.

The impact of firm-level *orientation* between AE investors and LEE suppliers has seldom been examined alongside more macro-level *governance* mechanisms (Foss, Husted, & Michailova, 2010; Lin et al., 2010; Zhang & Zhou, 2013; Zhou & Xu, 2012). For instance, is it ever concievable that trasactional governance may exist at a macro-level with a relational orientation by one interactant as a micro-level? Views seem divided, where Gopalakrishna, Pillai and Sharma (2003) ask whether relational and transactional orientations can co-exist, Zhang and Zhou (2013) suggest that combinations of governance mechanisms are problematic. We feel that examining governance as a macro-level issue and orientation as a micro-level issue may provide unique insight.

Similar to the governance literature, research examining strategic orientation also reflects a transactional-relational spectrum (see for instance Gopalakrishna Pillai & Sharma, 2003; Sin et al., 2005) and *relational* in both notions is discussed as consisting of bonding, empathy, reciprocity, communication, shared values and trust (Sin et al., 2005; Zhou & Xu, 2012). The contraposition to *relational* is often discussed as *transactional* (Gopalakrishna Pillai & Sharma, 2003; Sheth & Shah, 2003) and which can include notions of short-term orientation and non-relational forms of governance/orientation such as through contractual or power-based mechanisms. Whether MNEs are content to merely exploit local value capturing opportunities or whether their orientation is towards value creation would seem to be a major factor in enabling or constraining knowledge transfer and the resultant catch-up of LEEs supplier firms (Lorenzen & Mudambi, 2013; Mariotti, Piscitello, & Elia, 2010).

Alongside questions of knowledge transfer it would seem pertinent to also consider anti-leakage tactics by investor firms (Jiang et al., 2013; Perri & Andersson, 2014). Yang et al. (2013) discuss ambidexterity by technologically advanced firms in managing the simultaneous tension between knowledge protection and transfer. Whilst free-riding by recipient firms has been noted (for instance Silkoset, 2013), the advantages gained by an LEE firm in terms of catch-up is not guaranteed by passive geographic co-location alone. Hence we perceive a need to examine the orientation of AE investor firms to their LEE suppliers when explaining supplier catch-up. In fact, Lorenzen and Mudambi (2013) recently make a distinction between the existence of global linkages and their functioning for some specifically positive effect, such as catch-up. There would therefore seem to be a local dimension in the dynamics of LEE firm catch-up, manifest through face-to-face contact, and an international dimension that links local relations to the knowledge transferred in through the dual networks and global linkages of an IJV that local suppliers interact with locally.

Conceptual proposition 3: That a relational-transactional analysis can be applied to examine both orientation (micro-level) and governance (macro-level) in the interaction between IJVs and local suppliers, and the impact on catch-up distinctively explained.

Taking these three conceptual propositions discussed in the above sections, we propose the following four quadrant framework with which to undertake a multi-level analysis of the catch-up process of LEE firms (Fig. 1). Two dimensions of analysis; non-relational to relational (Prop. 3), and local to international (Prop. 2) are posited; and an IJV is positioned as a mediator in the centre of the model (Prop. 1), fulfilling a gatekeeping role. The arrows in the centre of the model denote the impact of this mediating role of the IJV on what therefore become four proposed *relatio-spatial* quadrants in which catch-up occurs. We therefore propose the four *quadrants* as separable for the purpose of research, but as inseparable and

co-existing relatio-spatial *dimensions* in practice.

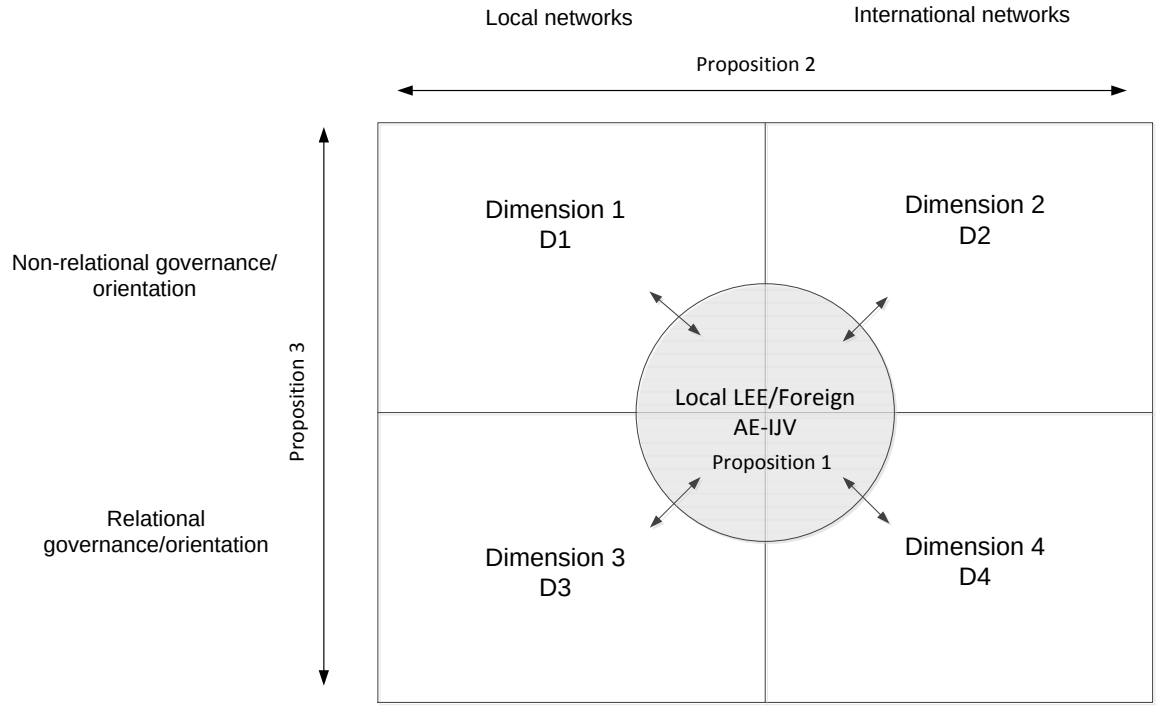

Fig 1: Four relatio-spatial dimensions in IJV mediated buyer-supplier interactions.

Our conceptual framework therefore brings together our three conceptual propositions and provides four *quadrants* of analysis which will later discuss and defend as being better seen as four *dimensions*. Our route to making this distinction lies in the deployment of a critical realist lens, which we will discuss next.

2.4: Critical realism

In discussing the interplay between macro and micro-levels, debate seems to firmly enter the structure/agency debate, implying the existence of generative mechanisms that are, in the short-term, beyond agential mediation, but long-term are prone to reproduction and transformation due to agential influence. Approaching concepts from the preceding sections

through a critical realist lens; catch-up would seem to reveal itself as having underlying generative mechanisms, in that no single supplier could choose (in the short-term) to change how governance dynamics affect them. In particular, such generative mechanisms seem profound in the unique institutional context of LEEs to AE exchanges characterised by significant knowledge and power asymmetries. In contrast, one actor in a dyad (at a micro-level) can choose an orientation towards its exchange partner and at times there may be a mismatch between orientations that over the longer term affects the nature of the prevailing governance mode, but may at times be in tension with that governance mechanism. To fully understand catch-up would seem to demand consideration of both agency and structure and the way knowledge governance is reproduced, disrupted and transformed by agency; and multi-dimensionality in terms of how governance affects agency.

Led by work by Easton, critical realism (CR) has been deployed as an analytical framework by a small but growing number of industrial marketing scholars (i.e. Easton, 2002, 2010; Ehret, 2013; Harrison & Easton, 2002; Peters et al., 2013; Ryan et al., 2012) although to date this discussion is largely conceptual. The principles of critical realism allow for insight into the interplay between agency and underlying causal mechanisms (structures), but more importantly treats agents as being capable of reproducing, disrupting and transforming these causal mechanisms. The actions of agents are in this process constrained and enabled by such mechanisms. The approach conceptualised in the early work of Bhaskar (1978), such as in the transformational model of social activity (TMSA) are those that have been largely assimilated into industrial marketing thought. The later, arguably more complex and more controversial principles of *dialectical* critical realism (Bhaskar, 1993; Norrie, 2010) have not yet been suitably acknowledged in IM scholarship. There are several tenets of dialectical critical realism (DCR) capable of providing support in gaining an understanding into our problem

areas. Firstly, the notion of diffracting dialectic – a process of "breaking down and differentiating what may otherwise appear a unitary phenomenon – and a process of opening it up to a broader scrutiny and understanding in a more holistic way" (Norrie, 2010:70). Second, the concept of a multi-layered reality, and sub-totalities that allows reality to be broken down for the purpose of analysis without losing sight of a coherent whole. We apply the principles of CR and DCR in our review of literature and in the empirical findings. This approach also allows an analysis to break with either-or dichotomies and atomistic assumptions and instead see reality as dialectic in nature. A novel relational framework for examining catch-up can therefore be envisaged with which to undertake a diachronic relatio-spatial analysis of catch-up by EE firms due to geographic co-location with AE investors. The value in such a framework would be to use it to examine the institutional specificity of certain investments in certain economic settings, and in particular specific modes of investment.

3.0: Research context and data collection procedures

In Section Three we will outline both the research context and the procedural aspects of the investigation. We begin with outlining the background to the automotive industry in Pakistan.

3.1: The automotive industry in Pakistan

The automotive industry plays a vital role in the development of many local economies in terms of it being a valuable source of revenue generation, human resource development and, most importantly, technology transfer through vertical supplier relationships. In Pakistan, the automotive industry at time of writing employs approximately around 192,000 workers and

contributes around 4% to the GDP. The industry was liberalized during the 1990s, and has attracted major Japanese assemblers, such as Toyota, Suzuki and Honda. The auto-parts industry evolution started during the 1980s and the period from 1985-2005 was termed as the *preparation* phase as the industry received full protection from the government in the form of local content programs. From 2005-2012, the *development* phase of the industry was evident, during which local content requirements were relaxed and the assemblers required to pay higher import duties on foreign components as well as having additional duties levied on locally developed parts. The third phase, so called *global era* started in 2012. The industry in Pakistan has three major auto assemblers (Suzuki, Toyota and Honda) operating in the market through joint ventures types of arrangements.

3.2: Methodology

Our research approach is based on a hybrid (multi-site and multi-source) methodology (after Harrigan, 1983). This inductive study is based on a firm-level data collected through semi-structured convergent depth-interviews (O'Leary, Rao, & Perry, 2004) with the fifty top tier Pakistani component suppliers supplying to three IJVs operating in the automotive clusters of Lahore and Karachi, Pakistan. The study was conducted in Lahore and Karachi, Pakistan − the two main auto clusters, and the location of the three IJV's assembly plants. By applying this dyadic approach, we address deficiencies in current literature relating to research that considers data from both sides of the dyad (Praxmarer-Carus, Sucky, & Durst, 2013; Zhang & Zhou, 2013). The interview data was coded and analyzed by using the suggestions of Miles and Huberman (1984). Through this coding process we summarized and coded the individual interview data to capture catch-up by local suppliers. During the analysis of the data, we constantly engaged with the data, emerging theory and the literature (Eisenhardt & Graebner,

2007) and consulted additional documentary resources. To aid the exposition of the interplay between macro and micro-level constructs, we deploy both a narrative and visual process-mapping theorizing strategies (Bizzi & Langley, 2012; Langley, 1999; Makkonen, Aarikka-Stenroos, & Olkkonen, 2012).

Examining the context of EEs presents certain methodological challenges which we address through the deployment of a critical realist lens. Malerba and Nelson (2011: 1647) point to the nature of some of these empirical challenges when examining EE contexts when they note:

> "What is actually achieved invariably diverges in certain ways from practices in the countries serving as models. In part, this divergence reflects the fact that exact copying is almost impossible, and attempts to replicate at best get viably close. In part, it reflects modifications required to tailor practice to local circumstances. The organizational, managerial, and institutional aspects of productive practices often are the most difficult to replicate, and the most in need of adaptation to indigenous conditions, norms, and values."

The thrust of these comments would seem to be even more emphatic in an LEE context. Hence, studies that aim for broad generalizability or transferability of findings may fail to achieve those aims in a way that is useful for practice. In contrast, the reading we aim to provide is a detailed micro-analysis but within a macro (structural/institutional) context. This approach allows for practioners, primarily in other LEE contexts, to identify which micro-level findings resonate best with local conditions. The framework and approach we present, if deployed to other EE and AE contexts may provide value when informing practice in similar

economic contexts. As a significantly underexplored economic context, our aim in this paper is however to inform practice in an LEE context.

4.0: Findings

In this section we present our findings in four sub-sections, each corresponding to one of the four quadrants of Fig.1, and in each sub-section we explore the mediating role of IJVs. We will explain further in Section 5 how these four *quadrants* amount (through a critical realist lens and from a supplier's perspective) to four relatio-spatial *dimensions* of catch-up. Our approach to identifying such dimensions of catch-up is influenced by Corredoira and McDermott's (2014) recent assertion that knowledge transfers amount to key benchmarks for defining catch-up, and we therefore see dimensions as a form of benchmarking.

4.1: Catching-up in Dimension One (D1)

In the focal cases, a liability of localness (Jiang & Stening, 2013) appears to exist for Pakistani suppliers and their relative dependency and negative resource asymmetry they experience therefore form the imperative for a catch-up process that is most profound in D1. Value creation is a form of catch-up which allows local firms to improve their product in the global market place and from D1 we characterize this value creation as a process through which the final finished product, through joint action moves towards competitive parity with other manufactured product in the local market. The innovative capabilities deployed to these ends in D1 by local suppliers are exploitative/incremental and not underpinned by dynamic capabilities; hence the knowledge captured by Pakistani suppliers in D1 seems non-re-deployable beyond the focal dyad. In D1, transfer of codified knowledge by the IJVs to

suppliers seems to involve low to medium technology, of a level consistent only with achieving home market focussed value creation. The following comment seems to confirm this situation.

> *These assemblers have also acted as a main source of low-medium complexity parts' technological knowledge transfer to Pakistani auto vendors.* [Suppliers firm 13]

Findings also support the selective and strategic nature of the transferred knowledge. The assemblers frequently refer to the unreliability of contractual arrangements in the Pakistani environment and instead seem to adopt a high degree of direct control over knowledge and technology transfers. Within this control orientation (Zhang & Zhou, 2013), the primary benefit of co-location on the part of the assembler would seem to be the ease through which local suppliers can be monitored.

> *We have to look what kind of technology we can transfer to our components suppliers, after all it is a decision which our company takes on a component to component basis, and for this depending on the nature and type of the component, we make the decision whether to transfer the technology for that particular component or not.* [Assembler firm 1]

The comment points to a lack of ubiquity and indeed selectivity in catch-up potential by suppliers based on the micro-level orientation of the IJV. Pakistani suppliers in D1 have a limited partnership portfolio increasing their dependency on the assemblers. The relative

knowledge asymmetry is evident in the fees charged by the IJVs for certain knowledge transfers.

> *There is a cost attached to the transfer of information … sometimes Tier One suppliers charge us a cost or we have to pay to the mother OEM.* [Supplier Firm 1]

Suppliers speak of the value of these knowledge transfers in terms of catch-up, but their comments also seem to support a proposition that they are firmly a transactional form of knowledge transfer, in that the knowledge and technology transferred seems dyad specific. They also express a sense of *creaming-off,* in that suppliers are rigorously screened and discarded, and this is particularly apparent in D1.

> *Technology transfer requires time and effort and it is a costly process. We carefully consider our cost against future benefits, as cost and benefits are always attach to such transfer.* [Assembler Firm 3]

Whilst in this dimension, suppliers do not experience a relational orientation on the part of the buyers. The following supplier comments:

> *Somehow, we feel that our client is not serious enough to build long term partnerships with our firm, and we have low level of interaction with our client.* [Supplier Firm 11]

> *So far, our clients are looking only at their side and taking care of their*

needs and requirements without having any sympathy for us. [Supplier Firm 40]

The same respondent also indicates that the extent of assistance is directly related to cost efficiency (value capture) in the focal transaction, rather than helping the supplier's competences and cost-base more holistically.

We have also received no assistance to control manufacturing and inventory costs. [Supplier Firm 40]

The contraposition to a relational orientation is a transactional orientation (Sin et al., 2005). A transactional orientation is evident as short-termist and arms-length interactions with local Pakistani suppliers. There is some evidence of this orientation on the part of the assemblers in the way that certain suppliers are cherry-picked and others rejected. However, to characterise the assemblers orientation as intentionally transactional seems unsustainable − whilst interactions seem to outwardly be arms-length, substantial dyad specific investments were made by the assemblers, confirming a long-term orientation. Hence, we prefer to characterize buyer orientation in D1 as a *control* orientation. A valuable insight is made by Hedaa and Ritter (2005) who suggest a synergy must be made between one partner's desired orientation and another partner's delivered orientation. In this sense, there seems to be a reciprocal imbalance, with Pakistani suppliers offering a relational orientation but receiving (at least in D1) a control orientation in return.

Catch-up in D1 can be visualised in terms of dyad-specific, specialist knowledge. Technological catch-up is achieved by suppliers in this dimension, but the control orientation

of the IJV constrains the nature of this catch-up to those improvements that contribute directly to efficiencies applied to products supplied to the IJV. The following respondent speaks of such catch-up, but of a degree within which product or market diversification has not yet been achieved.

> *We are moving along the value network, though still we have a lot of ground to cover, but it all depends on our clients and the nature of their help. If they provide on-going help and continuous assistance, our firm will be in a position to develop and launch new… or enhance existing products for the current* [Pakistani] *market.* [Supplier Firm 5]

We find that D1 is characterised by limited departure from existing knowledge bases by suppliers and that suppliers whilst in this dimension are focussed on value capture (supporting findings by Benner & Tushman, 2003, Levinthal & March,1993). We find little evidence of knowledge leakage captured by local suppliers in D1. Whilst in D1, the IJVs seem ambidextrous in simultaneously managing knowledge transfer whilst protecting against unintended leakage (building on findings by Yang et al., 2013). Indeed, the knowledge transferred from the IJV to local suppliers has, in many cases, a transactional cost. While a relational orientation is evident on the part of suppliers in D1, this seems non-reciprocal on the part of the buyers. The network centrality of the IJV seems profound with local suppliers needing the IJVs as gatekeepers to other local institutions. We find in this dimension that whilst the dual networks (Meyer, Mudambi & Narula, 2011) exist, they are not yet fully utilizable by the local suppliers for the purpose of catch-up; that is that the networks are not yet joint and shared (we develop here the contention by Lorenzen & Mudambi (2013) that there is a distinction between the existence and functioning of networks. We choose to

characterize the governance mechanism deployed by the IJVs in this dimension as *control-orientated* governance.

4.2: Catching-up in Dimension Two (D2)

In visualizing D2 we begin to consider that catch-up on the part of Pakistani suppliers is affected by the IJVs connection to other global actors. We find that interaction between Pakistani suppliers and foreign actors remains in D2, firmly mediated by the IJV gateway. Hence the IJVs' control-orientation continues to be apparent. However, there is a clear perception that the heavily mediated connections to overseas Tier One suppliers have been beneficial in terms of catch-up.

> *We plan to produce assemblies, develop required skilled manpower and most importantly, acquire manufacturing technologies through these assemblers and their network global first tier suppliers.* [Supplier Firm 6]

These mediated buyer-supplier-supplier interactions seem to involve little direct contact between foreign and domestic suppliers. Transfers still have a price-tag but seem to afford Pakistani suppliers more scope to adapt technology for use beyond the needs of the assembler.

> *If we want to modify or adapt the technology we have to pay for this adaptation to the assemblers' or their business partners... I mean their Tier One suppliers in Japan.* [Supplier Firm 30]

The control posture of the assembler remains evident, with attempts by them to tie-in access to higher-technology knowledge transfer with the surrender of equity in the supplier firms. Governance in this dimension was through contracts grounded in Japanese law.

> *The assemblers don't really want to transfer the high precision components technology to local [Pakistani] suppliers and the assemblers want the local suppliers to get into joint venture arrangement with their Tier One suppliers based in Japan to acquire such capabilities... we lack financial resources for establishing such arrangements* [Supplier Firm 36]

A key factor is the lack of trust between the IJV and the local Pakistani suppliers, and the subsequent fear of mutual opportunism seems to therefore constrain the transferability of trust to other overseas supply-chain partners. The same respondent continues.

> *To be honest, these Tier One suppliers based in Japan and other developed countries are reluctant to go into a JV with local Pakistani suppliers due to the fear of losing their value and piece of the pie.* [Supplier Firm 23]

The comments hint at factors beyond economic efficiency that underpin the preference of the IJVs' foreign partners for suppliers from Japan over potentially equally capable Pakistani suppliers. It suggests that at a point in relational time and space, foreign investors are more focussed on utilizing local efficiencies to penetrate the domestic market, rather that using

local assets to harness opportunities outside of Pakistan. The data indicates that assemblers operate governance mechanisms which affect the suppliers' product and process upgrading. In this sense it is apparent that the foreign IJV partners are acting as gatekeepers to global pipelines. We can suggest here the existence of a *gated* global pipeline, which exists in the terms proposed by Bathelt, Malmberg and Maskell (2004) but functions under the control-orientated governance of the IJV. Dual networks in D2 are not yet joint and shared.

4.3: Catching-up in Dimension Three (D3)

Using a critical realist lens, we find accounts in the responses of respondents of market and relational governance, and control and relational orientations that are temporally overlapping and which are co-managed by individual assemblers. We find that the assemblers are ambidextrous in respect of being able to simultaneously manage transactional and relational orientations in the same time and space. Those suppliers that reach D3 report that they maintained a relational orientation through D1 interactions, even when faced by a control orientation by the buyer. We find support for the assertion of Mesquita, Anand and Brush (2008) that greater levels of dyad specific investments invariably lead to relational governance, although we find here that this was achieved by an orientational shift, and thus a new relational-relational orientation balance at the dyad level. A dimension shift in catch-up by the suppliers therefore seems to simultaneously occur at this point. However, the assemblers' control orientation seems to be supplemented rather than supplanted by a relational-orientation and as such, orientational ambidexterity does seem to occur within a single dyad as well as across a portfolio of local suppliers. This finding builds on questions posed by Gopalakrishna, Pillai and Sharman (2003) as to whether relational and transactional orientations can co-exist.

A perceived link between relational proximity and favourable knowledge transfer is also apparent in many of the respondent suppliers.

> *To launch state-of-the-art products for this market* [Pakistan] *or to develop new parts for the foreign market we need to have strong two-way relationships based on mutual understandings and sharing* [of] *the benefits.* [Supplier Firm 34]

It is equally apparent from the perspective of the buyers, that a propensity to release greater levels of knowledge to the suppliers is predicated on an informal assessment of trustworthiness and perceived relational proximity.

> *Through our routine business interactions we find out more about our suppliers* [....] *If we are satisfied with* the *suppliers this increases the relational norms between us and the suppliers. This helps with the smooth transfer of technology to the selected suppliers, as there could be unintended consequences of technology transfer.* [Assembler Firm 3]

The comments seem also to underpin the lack of impact that D2 has in progression to D3. Instead, the stubborn and initially non-reciprocated maintenance of a relational orientation by suppliers led in a number of cases to reciprocal trust at a local dimension. We propose this 'stubbornness' to be a form of dynamic capability in suppliers (after Teece 2014). We therefore find significant support for the role of face-to-face contact in the development global pipelines in which dual networks become gradually joint and shared (developing work

by Storper & Venables, 2004, Zhao, Anand & Mitchell, 2005). It seems also apparent that in D3, having gained relational proximity, suppliers gain more vicarious knowledge and greater unintentional transfers. Leakages seem to be of less concern to the assemblers here, apparently due to a reduced fear of supplier opportunism. The knowledge exchanged still seems significantly dyad specific, although of a higher technical standard and therefore closer to the point where the technology is re-deployable to value creation outside of product supplied to the focal IJV.

> *We need the on-going assistance of the assemblers and government to develop the capability, and then we can start thinking about the international customers and markets.* [Supplier Firm 16]

The speed of technological catch-up therefore seems to significantly accelerate in D3 with additional support for organizing, coordinating, and managing processes evident. The knowledge gained seems to be beyond the governed control of the IJV, conforming to a characterization of leakage. Knowledge transfer in D3 allows the suppliers to undertake more exploratory innovations.

A further benefit to suppliers in D3 is greater contact to local institutions. Somewhat paradoxically, suppliers report that assemblers have more influence with domestic institutions than small Pakistani supplier firms, potentially supporting their anchor tenancy (after Agrawal & Cockburn, 2003).

> *We* [suppliers] *are not part of the policy making as our assemblers have good relations in the power corridors and they formulate policies that*

are beneficial for them instead for the local suppliers. [Supplier Firm 32]

This aspect of a IJVs dual network in an LEE has not been previously well noted and greatly supports the existence of a significant liability of localness (Jiang & Stening, 2013) for Pakistani suppliers. In D3, the IJVs seem to act as gatekeepers not only to foreign, but also to local resources.

D3 therefore seems to mark the beginnings of a global pipeline, albeit still gated, and linked to strengthening stocks of relational capital locally. Our findings support the reciprocal relationship between relational proximity and learning posited by Park, Vertinsky and Lee (2012). Catch-up in this dimension significantly accelerates and exploratory learning is evident.

4.4: Catching-up in Dimension Four (D4)

The final dimension we examine is relational interaction at an international spatial dimension. It seems apparent that this dimension is temporally dependent on suppliers first creating relational proximity in D3. Indeed, one respondent reports that a period of fifteen years had passed before reaching D4. However, there seems little in D2 that leads to an easier transition to D3 or D4, supporting the importance of relational proximity locally. Having posited the notion of a *gated* global pipeline, we further note a phenomenon which seems specific to IJV gatekeeping; that the gateway has two gates. The first gate facilitates only access for the supplier to the domestic (Pakistani) IJV partner. The second gate offers access to the foreign (Japanese) IJV partner, located in Pakistan. The following respondent seems to identify the effect of this double gate.

Developing relationships with both the Pakistani side of the client and Japanese side is the key to receive technology. Our firm has developed good understanding not only with the local managers of these assemblers but also with the Japanese managers. Japanese managers then can talk to their parent [company] *and their Japanese-based* [suppliers] *to transfer the required parts drawings and technology* [to Pakistani suppliers]. [Supplier Firm 21]

Passage through these two gates seems to be dependent on a supplier attaining the appropriate level of relational proximity with both domestic and foreign joint venture partners. When achieved, the Japanese IJV partner seems willing to accept Pakistani supplier - Japanese supplier triadic interactions. In facilitating, this interaction, the IJV initially appears to maintain some degree of a control orientation but in our proposed D4, unmediated supplier-supplier interaction also takes place. The following respondent notes this effect.

We have been able to set-up joint collaboration with one of our automaker's global supplier based in Japan, and this help and knowledge coming from this supplier has been useful for us to bring necessary improvements in our components and even production processes. Some of our local suppliers are only connected with automakers and we are in a far better position than these suppliers to bring changes to our components and processes as we can talk directly to our clients as well as their network suppliers. [Supplier Firm 47]

At D4, a number of the suppliers speak of the ability to diversify away from dyad specific innovation and develop new products both for the Pakistani market and for other overseas export markets. The following respondent links D4 interactions with this type of market and product diversification.

> *We have started exporting the parts to Middle East, this has all come along through the close collaboration of our clients and my visits to Japan and attending other exhibitions abroad and it was through these visits and observing the processes personally that has helped my company to think out of the box.* [Supplier Firm 2]

Whilst being a heavily rhetorical term, *thinking outside of the box* we have interpreted to mean that the firm has attained redeployable knowledge and technology. A significant factor for learning for suppliers in D4 seems to be the diversity of learning that has occurred through multiplex networks ties within and outside Pakistan.

> *When we can combine the diverse and variety of ideas then we can be able to develop much advanced capability.* [Supplier Firm 29]

However, since the relationships examined in this paper are relatively new, the full extent to which firms in D4 can develop advanced capabilities and exploratory innovations is not fully revealed in this study. There is however some early evidence of the most advanced supplier's developing ambidexterity (Simsek, 2009) in managing exploitative alongside exploratory innovative capabilities. It is also clear that D4 is defined by a decreasing dependency by the same supplier's on a single assembler, and also by an increasing willingness to transfer

knowledge to these suppliers by the assembler. By D4, trust by the assembler in some Pakistani suppliers in D4 was significant enough for them to accept unmediated contact with Japanese Tier One suppliers (creating un-gated global pipelines). Dual networks in this dimension become fully joint and shared in the sense proposed by Zhao, Anand and Mitchell (2005).

5.0: Discussion and Conclusions

We propose that the four relatio-spatial dimensions of catch-up proposed here challenge some of the dichotomistic assumptions that underpin existing findings in respect of governance and orientation. Deploying a critical realist framework has allowed us instead see catch-up in dialectic and processual terms, but additionally, we see this process as progression through four dimensions of a single journey in which macro-level factors influence, and are in turn influenced by more micro-level interactional factors. However, through a critical realist lens we have also identified a diffracting process in which different overlapping generative mechanisms may co-exist. In the proposed notion of an optimal pathway is an implication that relational proximity needs to be achieved locally with a local IJV partner, and then the foreign IJV partner, before full access to the dual network of the IJV is achieved and an un-gated global pipeline becomes fully functional.

The suppliers in D1 seem to have achieved only a limited catch-up confined mainly to labour intensive parts and competency in routine basic tasks of component design. Local suppliers in D1 are still at an early phase of catch-up and this dimension resembles an apprenticeship for suppliers (after Herrigel, Wittke, & Voskamp, 2013). Many had remained in this dimension for a number of years; others were rejected from the supply chain here. Assemblers

maintained a control posture in D1 and had a high sensitivity to leakage. Knowledge transfers were those that are dyad specific and which had limited redeployablity. Similar to findings by Sun and Lee (2013), we find that the most technologically advanced and most efficient firms from D1 are not those that necessarily advance to D4. Instead, those firms that seemed patient and maintained a relational orientation in the face of a control- orientation by the assembler in D1 seem to be those that advance to D3 and D4. D2 is characterised by a movement to indirect interaction (through a gated global pipeline) with Japanese based Tier One suppliers and this is facilitated through limited transactional interaction with the Pakistani IJV partner. However, greater transaction specific investments by the assembler reduce the chance of rejection from the supply chain for those suppliers that reach D2. There seems little temporal separation between D1 and D2. For many suppliers, D4 seems to be reached through D3 rather than through D2. An implication of conditions in D3 is that geographic co-location is of significant importance in developing relational proximity, and that relational proximity is the key that unlocks the gateway to unmediated global pipelines in D4 which seems, at least in these cases, to be heavily fortified against transgression by the IJVs until a high degree of relational proximity is established at a local level. In the optimum pathway that seems to emerge, relationships were first built with the domestic half of the IJV (first gate) and then with the Japanese part of the IJV (second gate). Relations with the Japanese parent were reached through the second gate in D4. The suppliers in D4 had developed, to some extent, both exploitative and exploratory capability − designing parts and bringing improvements in the existing and new parts design through their links with the IJVs, global suppliers and local training institutions. D4 appears to have the greatest impact on catch-up and at its most transformative allows direct agential interaction with foreign suppliers, thus breaking with the control orientation of the IJV. We represent this in Fig. 2 by showing overlap between D1 and D4. D4 therefore allows for unmediated interaction with foreign suppliers. Table 1

provides a summary of the key features of each dimension.

Table 1: The features of catch-up in the four dimensions needs dual network

	Dimension 1 (D1)		Dimension 2 (D2)
Assemblers' orientation to Pakistani suppliers	Control	**Assemblers' orientation to Pakistani suppliers**	Control
Suppliers' orientation to assembler	Relational	**Suppliers' orientation to assembler**	Relational
Dominant governance mechanism	Commercial governance: including transaction fees for knowledge transfer and training	**Dominant governance mechanism**	Commercial governance tie ups between other market suppliers and Pakistani suppliers facilitated by the IJV
Value type	Value co-creation	**Value type**	Value co-creation
Suppliers' innovative capability	Basic- apprentice like. Incremental exploitative.	**Suppliers' innovative capability**	Intermediate. Incremental exploitative.
Suppliers' knowledge	Substantially dyad specific, low to medium technology	**Suppliers' knowledge**	Substantially dyad specific , medium technology
Diversification potential (redeployable knowledge)	Very limited	**Diversification potential (redeployable knowledge)**	Limited
Suppliers' network connectivity	Limited: Network centrality held by the IJV both locally and internationally. Self-initiated learning and improvements	**Suppliers' network connectivity**	Isolation**:** Isolated from Japanese exchange partner in supplier-supplier-buyer triad and from head office of the foreign IJV partner.
Assemblers' protection from unintentional splliovers	High	**Assemblers' protection from unintentional spillovers**	High
Likelihood of exchange termination	High	**Likelihood of exchange termination**	Reduced due to greater dyad specific investment
	Dimension 3 (D3)		**Dimension 4 (D4)**
Assemblers' orientation to Pakistani suppliers	Relational	**Assemblers' orientation to Pakistani suppliers**	Relational
Suppliers' orientation to assembler	Relational (reciprocal trust and commitment evident)	**Suppliers' orientation to assembler**	Relational (reciprocal trust and commitment evident
Dominant governance mechanism	Relational	**Dominant governance mechanism**	Relational (reduced monitoring need by the assembler due to lower levels of opportunism expected by the supplier)
Suppliers; Value creation	Increasingly in-house. Value capture and creation	**Value type**	Value capture and creation
Suppliers' innovative capability	Advanced exploitative	**Suppliers' innovative capability**	Exploitative/exploratory: Ambidexterity evident
Suppliers' knowledge	Still dyad specific but of higher technological nature	**Suppliers' knowledge**	Higher levels of redeployable knowledge
Diversification potential (redeployable knowledge)	Improving, Significantly better than D1: Supplier's. report launching new products into Pakistani market not related to the focal dyad.	**Diversification potential (redeployable knowledge)**	Development of new product for international markets
Suppliers' network connectivity	Connections with both sides of the IJV. Connections through IJV to other local institutions.	**Suppliers' network connectivity**	Unmediated contact with overseas tier 1 suppliers
Assemblers' protection from unintentional transfers	Medium	**Assemblers' protection from unintentional transfers**	Very Low
Likelihood of exchange termination	Low	**Likelihood of exchange termination**	Low due to relational strength but reduced supplier dependent on assembler.

Using the principles of detracting dialectic, it is therefore possible to conceive the four proposed dimensions as sub-totalities. As such, in Fig. 2, we have isolated some of the causal mechanisms that affect catch-up in respect of each non-mutually exclusive dimension, and which provide definition to each dimension. In Fig. 2, totality is demonstrated in terms of multi-layered causality and a visual representation of an apparently optimal journey of a supplier through these four relatio-spatial dimensions is also visualised.

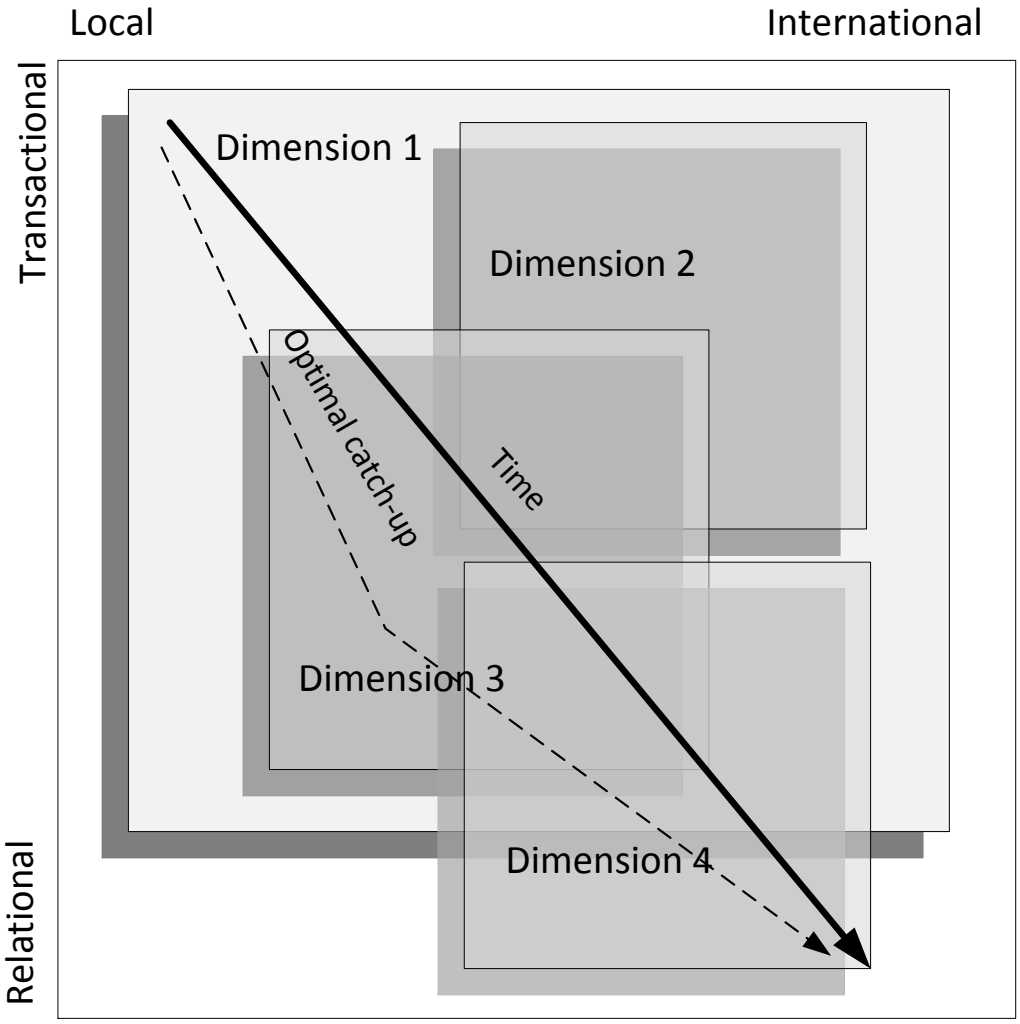

Fig. 2: Catch-up in four dimensions

The four dimensions therefore represent processual states, each of which have constituent

elements, but which elements do not necessarily absent themselves when achieving movement to (becoming) a subsequent dimension. Underpinned by this logic we see D1 as a base state, the influence of which remains constraining even after a dimensional movement by any given supplier. Each supplier is structurally coupled to other suppliers by the IJVs. A control orientation on the part of the buyers does not absent and instead co-exists alongside a relational orientation. An assumption in some research is that institutional weaknesses in EEs lead to a greater likelihood to rely on relational rather than formal forms of governance such as contracts (Zhang & Zhou, 2013) but the findings of this research, focussing on knowledge governance, reveal a more complex, and dialectic time and space dynamic. Dyad level orientations may exist alongside more ubiquitous governance approaches by IJVs to local Pakistani suppliers as a collective group, and these more macro-level (structural) factors may at times conflict with more micro-level (dyadic) factors. In other words, relational and transactional interaction may exist in a dyad at the same time, but in different dimensions. In this respect, consideration of different dimensions reveals a number of areas of ambidexterity on the part of the Pakistani suppliers in their management of interactions with the IJVs. Through a critical realist lens we see for instance a dimension where a control orientation − which, due to knowledge asymmetries, creates a commercial governance mechanism. This commercial governance does not absent itself but rather co-exists with a relational governance and reciprocal dyadic relational-relational orientation from D3.

The gatekeeping role requires some explanation in critical realist terms. The arrival of foreign investment in an EE is an agential intervention that is both disruptive and temporally transformative, breaking with the prevailing constraints of LEE structural/institutional constraints. However, due to the relative asymmetry between LEE suppliers and AE buyers, the speed of transformation (catch-up) is constrained by the orientation of the buyers. Using a

critical realist framework it is possible to see orientation as agency and governance as a generative mechanism determined by the relative orientations and governance approaches of the interactants. Our study further highlights that the identified orientational postures are dynamic in nature, IJVs shift from control orientation to relational orientation as they progress in their dyadic supply chain interactions. This finding is similar to conclusions drawn in respect of global value chain (GVCs) coordination and governance by Gereffi et al. (2005).

In performing a broader conceptual sweep of concepts than those only contained within current IM scholarship, we have broadly confirmed the value of assimilating literature from EG and IB disciplines. In using this inter-disciplinary literature to develop a conceptual framework we have demonstrated that an understanding of micro-level buyer-supplier interactions can answer more macro-level questions in respect of technological catch-up in emerging economies. Rather than the more aggregated conclusions drawn in EG and IB which often assume that spillover effects are locally ubiquitous, building on traditions such as the Industrial Marketing and Purchasing Group (IMP) within industrial marketing, this paper shows that the differentiated experiences by groups of suppliers in different relatio-spatial dimensions offers more nuanced insight into the generative mechanisms that positively affect catch up.

5.1: Practical implications

The practical implications are primarily for LEE suppliers. The conceptual framework allows a supplier (practitioner) to visualize the dimension of catch-up that they are in. The findings point to the importance of maintaining a relational orientation towards a foreign investor even

when faced with a control orientation by that foreign investor. The findings support the importance of developing relational proximity locally before developing relational proximity to foreign suppliers as part of unmediated supplier-supplier interactions. The findings also highlight the importance of unmediated international supplier-supplier interactions to maximize catch-up.

5.2: Limitations and further research directions

As a challenge to the positivist/interpretivist orthodoxy in the studies we have reviewed in this paper, we have visualized the macro-micro levels of catch-up through a critical realist lens. Studies presented through this lens allow for insight into agency and structure and we argue, allows a manager to better visualize how agency at a micro-level is constrained by local structures. Further, by visualizing which dimension of interaction they are in at a given time, they may be further able to recognize the transformation of those constraining structures in respect to their own ongoing situation. Due to high levels of heterogeneity in LEE contexts, this approach may provide more relevance to practice in LEEs than studies that aim for broad generalizability of macro-level findings (Malerba & Nelson, 2011 allude to concerns in this respect). Our approach allows practioners to better identify which micro-level activities are pertinent to their own local LEE context. However, this paper remains a single industry/ single country study. Further replication of this approach may identify that specific matters have broader transferability across LEE contexts, for instance, in exposing the degree of network sharing in IJVs at different stages of venture formation and the degree to which relational proximity is a precursor and outcome of meaningful knowledge transfer. Further use of the framework to study buyers and suppliers in different industries, and investors pursuing different modes of entry in LEEs would be highly beneficial. The most

promising sectors for early extension of our framework would seem to be those with proximate skills and technologies (i.e, agricultural engineering, motorcycle manufacture, aerospace or raw material extraction). However, we perceive the framework as being best deployed to study catch-up (rather than specific sectors); therefore our approach would seem to also have potential to be deployed to study areas with unrelated skills and technologies such as the services sector. Further, this paper reports on the interaction in which the buyer adopts an initial control posture; other investors may adopt a more CSR based approach which adopt an initially less controlling orientation towards knowledge leakages, seeing perhaps such leakages as socially responsible, in that leakages positively effect catch-up in less developed countries (as discussed by Fortanier & Kolk, 2007).

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