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**Managing product innovation diffusion within multinational corporations:
Leveraging global scale and local responsiveness**

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Abstract

How multinational corporations (MNCs) manage knowledge and engage in product innovation diffusion is a central theme of study within international management, and it raises the tension of balancing global integration and local responsiveness, which is the subject of this paper. It uses a qualitative research methodology based on a case study of a MNC from the pharmaceutical industry. We demonstrate the value of a funnel and network structure for diffusion which capitalises upon the global resources and scale within the MNC but which leverages resources within subsidiaries for both reverse and horizontal diffusion. We unpack an innovation diffusion funnel framework and demonstrate how a MNC can effectively utilise the extensive inputs within its ecosystem and transform them into product innovation through a production function process. We contribute by providing an understanding of what is required within the “transformation box” with its associated implications for how innovation is managed through both formal and informal mechanisms.

Keywords: product innovation diffusion, multinational corporations, managerial control mechanisms, innovation transformation functions

Article Classification: Research paper based on case study

1. INTRODUCTION

The relationship between headquarters and subsidiaries (HQS) and how multinational corporations (MNCs) coordinate their geographically dispersed sub-units is an important issue within international business (Kostova, Marano, & Tallman, 2015; Tomás-Miquel, Exposito-Langa, Belso-Martínez, & Mas-Verdú, 2018). Research has examined the role of global and regional MNCs headquarters (HQs), the role of the subsidiaries, and the characteristics, and drivers and factors that influence the HQS relationships (Ambos, Andersson, & Birkinshaw, 2010; Ciabuschi, Dellestrand, & Holm, 2012; Dörrenbächer & Gammelgaard, 2011; Mahnke, Ambos, Nell, & Hobdari, 2012). The MNC's challenge is how value is created across different product or geographic markets and how a balance is achieved between the “differentiation” and “integration” of its principal components (Menz, Kunisch, & Collis, 2015). How this is managed within innovation activities is a key issue and the paper therefore *examines the processes by which MNCs balance global integration and local responsiveness within product innovation diffusion*.¹ It uses a qualitative research methodology based on a case study of a MNC from the pharmaceutical industry.

To study these processes we explore issues arising from the interrogation of two research streams, namely HQS relationship theory, and the innovation and knowledge diffusion theory from the perspective of the dilemma of global integration versus local responsiveness. Firstly, the HQS relationship is characterised by a complex network between multiple stakeholders

¹ Innovation is a broad concept. The Oslo Manual defines four types of innovation: product innovations, process innovations, organisational innovations, and marketing innovations (OECD/Eurostat, 2005). The focus of this paper is on the first, namely product innovation. By diffusion we focus on the how, why, and at what rate new ideas and technologies spread within MNCs as regards product innovation.

whose objectives may not necessarily be congruent (Bos-Nehles, Bondarouk, & Labrenz, 2017; Dörrenbächer & Gammelgaard, 2011; Luring et al., 2017; Nohria & Ghoshal, 1997; Villasalero, 2014) and this raises the need for managing trade-offs between different stakeholders' objectives which may manifest as a trade-off between global integration versus local responsiveness (Davis, & Luiz, 2015; Meyer & Su, 2014; Yu & Cannella, 2007). Secondly, the HQs faces a liability of outsidership characterised by uncertainties in identifying what subsidiary initiatives to encourage or to constrain due to a lack of understanding of their subsidiaries' indigenous contexts and networks (Vahlne, Schweizer, & Johanson, 2012) and this is a problem when the global diffusion of innovation is centralised by HQ. How these tensions between integration and responsiveness manifest and are managed within the innovation activities of a MNC provide a valuable context for this exploration and is an important area of study given the role that MNCs play as regards innovation more broadly.

The study makes several contributions to our understanding of these complexities. We show the value of a funnel and network structure for diffusion which capitalises upon the global resources and scale but which leverages resources within subsidiaries for both reverse and horizontal diffusion.² As regards the latter, there is much to be gained from subsidiaries learning from other subsidiaries within the MNC network without being mediated through HQ. We examine an innovation diffusion funnel framework and demonstrate how the MNC effectively utilises the extensive inputs within its ecosystem and transforms them into product innovation

² Literally, a funnel refers to a tube or pipe that is wide at the top and narrow at the bottom and used for guiding liquid or powder into a small opening. We use the term to refer to the broadest level at which inputs into innovation are collected within the MNC and then channelled into product innovation as output. But this implies a unidirectional process and we demonstrate a networked structure for diffusion which capitalises upon resources across subsidiaries for both reverse and horizontal diffusion with the MNC making up an ecosystem of innovation.

through a production function process. Within this function we provide an understanding of what is required within that “transformation box” and its implications for how innovation is managed through both formal and informal mechanisms.

In what follows, we examine the literature on the MNC as a hierarchical versus a networked structure and how this affects the role of the HQ as it seeks to mitigate the tension between responsiveness and integration as it relates to innovation diffusion. We then present our methodology, followed by a discussion of our findings. The conclusion highlights both the theoretical and practical implications of our research and concludes with future research directions.

2. LITERATURE REVIEW

2.1 The multinational organisational structure

Over the past sixty years, the research related to MNCs’ organisational structure has evolved along two distinct but related perspectives. The first perspective considers the HQ entity as “the strategic apex” (Mintzberg, 1979, p. 25), the global centre of decision and policy-making, and the centre of coordination and appraisal of the MNC organisation comprised of quasi-autonomous, fairly self-contained geographical sub-units. The principal limitation of this perspective is that it does not fully account for the contribution of the subsidiary to the global organisation strategy in terms of its ideas, influence, operations and network (Kostova et al., 2015). Moreover, this perspective would not describe how some subsidiaries may acquire important roles within the MNC, such as “centers of excellence” (Frost, Birkinshaw, & Ensign, 2002, p. 997) or regional headquarters (RHQs) (Laudien & Freiling, 2011; Luiz & Radebe, 2016)

as a consequence of successful initiative-taking and innovations and technological development originated from a subsidiary and successfully diffused within the wider MNC (Ambos et al., 2010).

The second stream of research adopts a “bottom-up” perspective of “an internally differentiated interorganisational network” (Ghoshal & Bartlett, 1990, p. 603), in which each sub-unit is embedded in a distinctive context, and for any specific type of exchange relationship, has its exceptional organisation set. This network perspective is particularly suited for the examination of “internal roles, relations, and tasks of different affiliated units” versus the HQ, and of “how internal coordination and control mechanisms, such as performance appraisal and resource allocation, might be differentiated to match the variety of sub-unit contexts” (Ghoshal & Bartlett, 1993, p.101). This perspective reflects the complex nature of the MNC and can provide a valuable lens through which to survey such an organisation (Ghoshal & Bartlett, 1990).

2.2 The role of HQ and its subsidiaries: responsiveness and integration

Building on Egelhoff (2010), Vahlne et al. (2012, p.226) argue that the HQ has four parental obligations. Firstly, it needs to provide accountability to the firm’s shareholders and various regulators. Secondly, it is responsible for identifying and facilitating potential synergies and couplings among its sub-units. Thirdly, it has to deliver economies of scale, and lastly, it must ascertain and integrate substantial innovation into overall firm strategy. On top of this the HQ must also define policies and procedures, allocate resources, and develop a global strategy for the company (Luiz & Visser, 2014). The power of the subsidiary is, in turn, impacted by the dependency of the HQ on its contribution to the global financial bottom-line and to the unique

skills and competencies of the subsidiary that serves the global operations (Kostova et al., 2015; Michailova & Mustaffa, 2012). It is now widely accepted that subsidiaries no longer are merely passive recipients of HQ mandates and that they proactively develop their own local activities through the exploration of their own competences, thereby adding value to the global firm's business and becoming central to the overall competitiveness of the MNC (Andersson and Holm, 2010; Vahlne et al., 2012).

Leveraging global scale on the one hand, in a nutshell the *raison d'être* of HQ, and remaining adapted to local context (Li et al., 2018; Oesterle & Röber, 2017) on the other hand, as the essence of the subsidiary's competitive advantage, generates the struggle for subsidiary autonomy and leads to power battles between the HQ and subsidiary (Bjerregaard et al., 2016; Dörrenbächer & Gammelgaard, 2011; Mudambi, Pedersen, & Andersson, 2014). The process of HQ management in the global firm is characterised by ambiguity, consequent to the HQ not always being fully knowledgeable about the network and actions of its subsidiary. This liability of outsidership increases over time as the lack of commitment from the HQ to local context drives subsidiaries not to present promising projects to HQ in their embryonic development stage and instead to rely on their own funds and local networks for the execution of these projects: "A vicious circle thus accrues with HQ being an outsider and likely to be further marginalized in the subsidiaries' initiative taking" (Vahlne et al., 2012, p. 229).

The MNCs use a wide range of mechanisms to keep control of their subsidiaries, such as "the share of capital in the case of international joint ventures, expatriation, active participation in the board of directors, staffing key management positions, training and socialisation of

employees, technology transfer, and so on” (Jaussaud & Schaaper, 2006, p. 23). Two main streams of research described these control mechanisms. The first focuses on the study of centralisation of decision-making as well as the management control systems associated hereof (standardisation, written procedures, reporting lines) (Heredia, Colomo-Palacios, & Soto-Acosta, 2017). The second deals with “more informal and subtle mechanisms of coordination, such as lateral relations between managers, integrative mechanisms, socialisation, communication, reward systems and incentives to managers for individual performance” (Jaussaud & Schaaper, 2006, p.25).

Whilst these two approaches have been discussed in the literature, the practicalities of how this tension manifests and is reconciled within the MNC needs further understanding. Are these tensions seen differently at HQ, RHQ, or at subsidiary level, and, if so, how does it reflect the way in which these different organisational levels comprehend their relative advantages within the MNC? How do formal and informal control mechanisms play out at the diverse MNC echelons? And, given our focus, how does this manifest within the product innovation diffusion process?

2.3 Innovation diffusion within MNCs

The management of knowledge within MNCs is a central theme of study within organisation theory and the imperative of transferring and exploiting knowledge with a greater efficiency in the intra-corporate context than through external market mechanisms is one of the primary reasons why MNCs exist (Ferraris, Santoro, & Bresciani, 2017; Gupta & Govindarajan, 2000). This has resulted in the increasing internationalisation of R&D investment as well as its

geographical spread (González-Moreno, Díaz-García, & Sáez-Martínez, 2018; Guellec & van Pottelsberghe de la Potterie, 2001; Zhou, 2016). Understanding the MNC as "an international network that creates, accesses, integrates and applies knowledge in multiple locations" (Almeida, Song & Grant, 2002, p. 148) implies that knowledge diffusion cannot be treated as following a unidirectional flow trickling down from the parent company through subsidiaries (Cowden & Alhorr, 2013; Ho, 2014; Marin, 2006). Instead, innovation diffusion must be analysed in multiple settings: the conventional diffusion from HQ to subsidiaries and lateral diffusion among sister units (Mudambi & Navarra, 2004; Noorderhaven & Harzing, 2009; Yamin, Sinkovics, & Richardson, 2014), and reverse diffusion and knowledge transfers from subsidiaries to parent companies (Ambos, Ambos, & Schlegelmilch, 2006; Hadengue et al., 2017; Govindarajan & Ramamurti, 2011; Yang, Mudambi, & Meyer, 2008).

Research confirms the dual nature of innovation sources and typology of diffusion: "technology push", where technology is the source of innovation, and "demand pull", where the demand is the source of innovation (Di Stefano, Gambardella, & Verona, 2012). This implies two alternative sources of innovation to bring to market, namely, the external environment with the firm then attempting to absorb the knowledge internally, and internally generated competencies and then integrating the external knowledge (Di Stefano et al., 2012; Shaw & Luiz, 2018). How a MNC is able to effectively leverage these sources of innovation within its broader structure is an important potential source of competitive advantage but these need to be effectively capitalised upon which is not trivial in a complex global structure with competing sources of power.

Knowledge is also "sticky" and innovative practices do not therefore flow speedily and effortlessly within MNCs which often experience complications in conveying tacit and complex knowledge within it (Shaw & Luiz, 2018; Zander & Kogut, 1995). Thus sources of innovation often remain latent unless effective ways are put in place to make the most of these innovation sources within the MNC network and that barriers to this are addressed. Studies highlight the importance of motivation and “absorptive capacity” for transferring knowledge (Lew & Liu, 2016; Schleimer & Pedersen, 2013; Tan, Ramayah, & Popa, 2017; Wu, Wang, & Hong, 2015), as well as the social dimension, given that knowledge flows take place in the context of embedded relationships within social communities (Abu El-Ella, Bessant, & Pinkwart, 2016). Frost and Zhou (2005) argue that geographic and cultural distance can act as barriers to communication and understanding but these impediments to knowledge integration can be offset through the development of suitable and supportive organisational mechanisms.

We therefore need to better understand the formal or informal mechanisms through which innovation is diffused within MNCs and how this is affected by managerial control mechanisms. How a MNC is able to draw on the dispersed sources of innovation and the total assets within its network is fundamental to its success. But MNCs often default to a centralised approach which concentrates on extracting maximum innovation value from HQ and then focusing on transmitting that innovation downwards. For example, whilst R&D activities carried out by foreign subsidiaries is a crucial component of MNCs’ global innovation capability, studies have found that a persistent and disproportional allocation of R&D activities remain in firms' home countries (Belderbos et al., 2013). Belderbos et al. (2013) find that this home bias appears to increase with the degree of scale and scope economies in R&D, coordination costs of

international R&D, and the embeddedness of firms' R&D in home countries' innovation systems. Furthermore, when examining the geographic origin of innovations, there appears to be a concentration in industrialised nations and that technology then diffuses from industrialised nations to the rest of the world (Van Der Boor, Oliveira & Veloso, 2014). In the past decade, research has focused on “reverse innovation” or how innovation that originates within developing countries can be transferred to developed countries (Cowden & Alhorr, 2013; Govindarajan & Ramamurti, 2011). Indeed evidence that innovations increasingly originate in the developing world (often termed the South in international political economy discourse) and are “eventually transferred to the North is starting to challenge the North-South innovation-diffusion paradigm” (Van Der Boor et al., 2014, p. 1596).and appears to be flattening the geographical innovation paradigm. MNCs play an important role in this innovation diffusion process and how they leverage the full inputs within their ecosystem and productively transform these inputs into product innovations is an area of growing importance. This is especially so because MNC networks are rapidly expanding into emerging countries and these countries are increasingly moving up the technology value chains (Luiz, 2016).

3. RESEARCH METHODOLOGY

We adopt a qualitative research process using a case study design because it allows for a deep and systemic exploration of a phenomenon within its natural context, and for a thorough understanding of the particular and lived experiences of the participants (Yin, 2003). Given our research focus on the processes by which MNCs balance global integration and local responsiveness within product innovation diffusion, we selected a firm with an extensive

international footprint, a strong R&D focus, and a substantial R&D investment outside of its home country. The company examined, coded as Newco, is a pharmaceutical firm which operates in more than 100 countries with a sales value over \$3.5 billion and an annual investment in R&D activities of over 2.3% of its turnover – see table 1 for a more detailed breakdown on the company data and profile. The firm undertakes more than 50% of its R&D investment outside the geography of its HQ located in the United States. The global structure of the firm is organised around four regional business units which report to HQ: North America & Australia & New Zealand (NAAZ business unit); Europe Africa & Middle East, including East Europe and the Commonwealth of Independent States (CIS) countries (EAME business unit); Latin America (LATAM business unit); Japan, Asia and India (JAI business unit). This structure is managed through a matrix-type organisational design.

INSERT TABLE 1 HERE

The population constitutes individuals who have a stake in the product innovation diffusion process within our case study. In Newco, this process is the responsibility of the Global Head of R&D and receives support from the marketing and R&D teams of the entire organisation worldwide. The marketing function has the responsibility to define the company portfolio strategy and thereby influence the business cases for each product innovation project. The population is geographically dispersed within three perimeters: global; regional (e.g. a sub-region which can be one or two continents), or local (e.g. a country subsidiary). Purposive sampling was used to ensure that participants most closely involved with the research question were selected and also to ensure a range of views from different regions and functions. The

interview of the Global Head of R&D was the first interview which provided an opportunity to allow for a snowballing effect. The profile of the respondents is described in Table 2. Sixteen interviews were conducted - with four people from the global HQ, seven people from different RHQs geographically dispersed into the four regional districts of the company, and five people from local subsidiaries.

INSERT TABLE 2 HERE

The in-depth interviews were semi-structured which allowed the researchers to ask additional probing questions if a response was unclear or incomplete – see appendix A for the questionnaire. The interviews probed three central themes, namely the formal or informal mechanisms through which product innovation is diffused within the MNC, the relative exposure of the global HQ to local subsidiary context and how this affects diffusion, and how managerial control mechanisms balance global leverage and local responsiveness objectives.

The data was audio-recorded during the face-to-face interviews and qualitative observations were recorded on interviewees' behaviours and captured in the researchers' field notes. With a small number of interviews, where face-to-face interviews were not possible, video-conferencing was organised so that the behaviour of the respondents could be observed as well. The interviews were conducted between August and December of 2016.

The coding of the data followed a thematic analysis (Yin, 2003). The themes emerging from the interviews were compared with the theory identified in the literature review and triangulation provided by company reports both in the public and private domains. The data analysis followed the steps suggested by Zhang and Wildemuth (2009) for qualitative research

data analysis: preparation of the data, definition of the coding unit to be analysed, development of categories and a coding scheme, testing the coding scheme on a sample text, coding all the texts, assessing the coding consistency throughout the full text, and drawing conclusions from the coded data. We demonstrate actual coding and themes derived within our results section and illustrate these in figures 1 and 2 which provide first- and second-order constructs and their aggregated theoretical dimensions.

The credibility and dependability of our research was enhanced through triangulation with official company source documents, ensuring a diversity of respondents by regions and functions within the MNC, through the seniority and experience of the respondents, and by maintaining an audit trail of the research process and procedures (Yin, 2003).. Recorded interviews were transcribed and respondents were asked to confirm the veracity of the transcriptions. Where there was any uncertainty, the researchers contacted the respondents again for questions of clarification. We recognise the limitations regarding the generalisability of our results utilising a single case study and unpack the implications of this in our concluding section.

4. RESEARCH FINDINGS AND DISCUSSION

4.1 Origins and channels of innovation diffusion

Respondents identified two main streams of product innovation diffusion, namely, technology-push and demand-pull, which are generally associated with different managerial pressures. In technology-push, the innovation is generated centrally by the R&D facility and is then pushed down throughout the global organisation, whilst in a demand-pull situation, the innovation process is endogenous as the organisation responds to market needs. Newco has

historically sourced innovation mostly from demand-pull situations: *“Newco is innovating by making new solutions out of existing technology to answer unmet needs”* (Respondent 1 from HQ). Product innovation comes from a large population of employees exposed to the market demands around the world. The personnel who are usually responsible for product innovation are therefore in the field with direct contact with the market and the customers and they work in the field of sales, marketing and development. They also work in the laboratories on the industrial sites where new product recipes are engineered and the products are manufactured: *“Innovative ideas they can come from anywhere, by anyone, ideas can come from the far end of the Mali, for example. That is to say, the more tools we will have that will enable us to retain and evaluate these ideas ... the better it is. At the very beginning of the process, the funnel must be for me the widest possible”* (Respondent 15 from RHQ).

Multiple innovations are diffused within a complex network of semi-autonomous decision-making centres. Subsidiaries have the freedom to propose which product innovation they wish to initiate or wish to adopt. In this network, the RHQs play a particular role as the centre of coordination of R&D activities for a cluster of subsidiaries grouped per geographical districts. In contrast to research which finds mandate losses for RHQs (Kähäri et al., 2017), at Newco, the RHQs play a pivotal part not only in connecting subsidiaries to HQ but in ensuring that product innovation is relevant to the regions and that their voice is heard in the innovation diffusion process. The RHQs have the responsibility of gathering the needs and proposals from their subsidiaries and building a regional proposal of a set of projects and R&D budgets which would then be discussed at different forums during the year.

At the regional level, regional forums of subsidiary experts and RHQ representatives meet on a regular basis and focus on specific market segments relevant to their region. Ideas and concrete innovation projects are discussed within these forums and subsidiary experts are able to evaluate and select which innovations would be best adapted to their local context. At the global level, product category working groups discuss innovation ideas and projects. A formal global category meeting is organised once a year, where the company portfolio strategy is presented to the regional representatives and the key innovation projects are discussed. Each regional representative is then exposed to a number of global projects and are able to decide which global project is best suited to their districts. The global category working groups keep regular contact throughout the year by employing ICT tools which permits for continuing exchange of ideas and follow-ups on project execution: *“There are innovations coming from bottom-up and top-down. The main way which we diffuse innovation is through the category team - the group that we have to cross fertilize, share knowledge and bring new ideas from the global to the regions and vice versa”* (Respondent 3 from HQ).

Newco centralises its R&D budget decisions by means of an annual global and formal process which gathers the entire set of proposed R&D projects. The budget prioritisation process ranks all the R&D projects which include the innovation projects and determines which level of funding will be allocated per project and per district. To realise this prioritisation, every project, including the innovation projects must be provided with a business case. These business cases set out expected financial and strategic objectives and based upon this the projects are approved or rejected. The collection of this information has been standardised in a formal business reporting tool and the information is then stored on a web-based sharing platform. The approval chain of

these business cases usually starts at local or at regional level where the business cases are defined and receive a first local or regional approval. Approval at the global level during the R&D budget annual prioritisation process triggers the allocation of the funds to the districts and subsidiaries to execute the project.

Within the Newco global funnel management process, managers from RHQ and HQ give more attention to the biggest markets which allows for optimisation of the current resources and focuses on delivering the most significant financial impact for the company. However, respondents noted that there is a risk of losing out on smaller organisational innovations, which are not necessarily given much attention because of the intentional focus on bigger units and markets or because the criteria being used may prejudice smaller innovations: *“However, it was the criteria that was agreed upon and therefore implemented. So it’s an objective look when you’re making a decision on selecting projects. On the innovation diffusion, some of the great ideas may not show up, right? Because they’re small in nature”* (Respondent 2 HQ). Interesting nuances appeared depending on whether respondents were based at local level or at HQ. Those at subsidiary level stressed the strengths of the local organisations’ expertise and capacity to innovate: *“Newco is an upside-down mushroom where the strength is at the bottom building up to the top, I think that must be guarded like gold”* (Respondent 16 from subsidiary). Respondents at HQ highlighted innovations from the top and argued that the capacity to innovate at subsidiary level was more limited due to their capacity constraints. But even at HQ it was argued that ideas come from the bottom up through subsidiaries recognising opportunities in the local market reinforcing the demand-pull nature of their innovation: *“However, where it starts is really from the bottom up in a way, which is where the ideas come from, right? So I think a lot of our ideas*

come local – are local in nature and from – and they either are managed at the local or regional level initially or they’re picked up by the global team as a good idea that could be spread across the companies” (Respondent 2 HQ).

Respondents discussed the importance of cross-district product innovation diffusion, where innovation would transit from one district to another without necessarily involving the RHQ or the HQ. These cross-district innovation diffusions are founded on the similarity of the markets and existing relationships between managers and play a crucial role: *“There is more value in East-West cooperation than North-South. Brazil, Australia, South America, Africa, we tend to understand each other a lot more whereas in the northern hemisphere you have Japan, Russia, Europe, US and UK. In the northern hemisphere, they have snow and cold winters, whereas we have warm winters. It is like a partnership; you have to pick a partner that works for you”* (Respondent 12 from subsidiary in southern hemisphere). This raises an interesting conundrum for HQ in terms of whether the relationships and diffusion between subsidiaries need to be mediated through HQ and even HQ recognised the importance of not stifling cross-fertilisation: *“Because it doesn’t make sense if there is no benefit to having centralised decisions. That way we waste time. That is the problem. When you have a centralised case - decision making in really pragmatic projects, we lose a lot of time”* (Respondent 3 HQ).

The first set of diffusion characteristics was coded with an aggregate theoretical construct as “diffusion within a complex network of semi-autonomous decision centres” – see figure 1. This construct refers to the theory of the multinational as a network (Frost & Zhou, 2005; Ghoshal & Bartlett, 1990; Schleimer & Pedersen, 2013), where each subsidiary, each regional

district, each formal forum, represents a unit of semi-autonomous decisions centres linked together in a “living” network or ecosystem. The semi-autonomous entities are able to determine whether a particular innovation would make sense in their local context or not, while still requiring global approval to pursue any innovation project.

A few of the second order codes resonate with the literature regarding the social dimension as another key driver of knowledge integration, strongly supporting the assumption that knowledge flows take place in the context of social communities and embedded relationships (Abu El-Ella, Bessant, & Pinkwart, 2016; Tsai, 2000). Respondents identified geographical, cultural, and organisation distance as a barrier to innovation diffusion and emphasised the need to create time and space for exchange between people which have expertise related to market demand and ensuring that they connect through both formal and informal channels. The use of expatriates and inpatriates was one way in which knowledge was connected across the MNC and elements of distance managed (Maley & Moeller, 2018).

Another theoretical construct which emerged was related to the funnel concept - “creating a global funnel for locally-selected innovations”. Ideas are collected through this funnel which are then substantiated with business cases. At a global level, these ideas are then prioritised which results in a shorter list of innovation projects which will be supported within a finite source of R&D funding. That funnel diffusion process operates in parallel with the network diffusion mechanism with each mechanism displaying different characteristics. The funnel is unidirectional and formalised within an annual process, from proposed ideas to approved ideas, whereas the network diffusion process is multidirectional and informal, from multiple idea

generators to multiple ideas receptors. The global funnel is driven by financial performance indicators with an imperative of leveraging finite resources to maximise shareholders' returns. In turn, the network is driven by open disclosure of ideas and genuine expression of unmet needs from all the network participants. Within the network, unmet needs and innovation from the smallest organisational units can still be heard, provided that an adequate solution or unmet need exists and is communicated inside the network.

The global funnel best expresses itself within the annual R&D prioritisation process which takes place at a specific point of time in the year, while the network is dynamic and operates throughout the year within the normal business cycle dictated by the seasonality of the business. The network evolves along with the relationship network of managers and participants. There is a tendency for managers to liaise with peers that operate within similar markets which creates bonds which naturally reinforce innovation diffusion within similar markets. As innovation diffuses globally it contributes to the global integration objective, and since they are locally selected, they also contribute to the local responsiveness objective. The theoretical dimensions arising from the data and associated with the innovation diffusion process have been schematised in Figure 1.

INSERT FIGURE 1 HERE

4.2 Innovation selection criteria

An important second step in the product innovation process is that of selection and deciding which of the innovations to bring to market (Wilkinson & Thomas, 2014). The main formal tool of evaluation of product innovation within Newco is the business case which is the

formalisation of the projects' financial and strategic objectives, based on a number of facts and assumptions, which need to match the minimum company financial thresholds: *“trying to maximise our return on invested capital that is the biggest one but the other things we would look at are the max potential sales, max growth profit, and the products that are marketed. Also, the alignment to our GP segments, the IRR (the internal rate of returns) and the net present value of the project; those are really the key ones and sometimes there's a strategic element that products stand out with access to a market ... or partnering with a certain provider or another competitor or something”* (respondent 4 HQ). The thresholds are based on local internal historical benchmarks and on shareholder return on investment expectations. The financial objectives changed during 2016 from minimum profitability and critical size objectives to maximisation of return on invested capital and minimum profitability objectives. In the past, the strategic objectives of the company for the R&D prioritisation process were aimed at growing the global portfolio, but more recently are focused on growing inside globally selected market segments which also allows for regions and countries to invest in locally-selected market segments which has enhanced local responsiveness. No innovation project is allowed to be diffused unless it has been assessed and declared viable and this assessment is sanctioned by functional committees and by field experts. These functional committees represent experts in their functional fields, such as laboratory, manufacturing, supply-chain, marketing, and regulatory experts, while field specialists are close to the customers and are able to assess innovation from a demand pull perspective. The respondent 15 from RHQ explained it as such: *“On the innovative side, the main criterion for me is the technical merit. What technical benefit are we bringing? When a product is capable of differentiating itself technically, to bring*

something innovative and performing, then the surprises in term of business and success are often much larger than one might hope.”

The product life cycle is formalised with stage gates which coincide with decreasing threshold of risks. The earliest stage gate corresponds to a conceptual phase in which no specific solution has been identified and therefore correspond to the highest level of risk. The final stage gate corresponds to a product which is already commercialised which is aligned to lower levels of risk. For a project to pass a stage gate, several formal validity criteria need to be assessed and sanctioned by an internal control process involving several functional controls. The main benefit of these stage gates is to allow the company to engage the highest level of capital when the level of risk is at an acceptable level.

4.3 Managing uncertainty and information demands

Respondents indicated that the global and regional roles covered territories which are diverse and hence information asymmetries existed which affected the decision-making process at RHQ and HQ level. Within Newco, the global funnel diffusion process leads to the aggregation of ideas and projects being channelled and prioritised to one decision-point at the global level. This necessitates that information is well communicated and that projects are assessed and decisions made under conditions of uncertainty in relatively short periods of time. This is complicated by shareholder expectations and corporate governance requirements which make further demands on information and reporting so as to reach better levels of predictability and compliance: *“Our shareholder corporate governance requires us to have spending controls. It requires us to be able to track what we spend against the product that we are about to bring*

into the market place. We have to be able to measure the risk of not realising the expected revenue. We sign off on each individual project just as it has been reviewed and that we are still happy with it” (Respondent 1 from HQ).

The vast number of decisions that need to be made and the large territories spanned require a level of detailed information and understanding that is impossible to be handled at HQ level and automatically reduces the time available per decision and this necessitates capacitating regional and local units: *“When we’re dealing with over 100 countries where the practices are so vastly different ... it’s impossible for a global person to know everything. That’s why we need to find ways of creating this mechanism to filter what can be really absorbed and trusting that the regional team is doing the right job at the local level for the balance”* (Respondent 2 from HQ). Thus HQ limits the global management scope to the decisions that affect only significant proportions of the business globally as a means of increasing the pertinence of the decision-making and thereby better managing risk and uncertainty - leading to our second order construct of “adapting accountability to scope.” The theoretical dimensions arising from the data associated with managing uncertainty and information demands is schematised in Figure 2.

Informal relationship networks at the local, regional and global levels, that employees build with their peers, along with the multiple formal forums and working groups, contribute to building trust within the organisation and allows for delegating responsibilities to organisational sub-units and the facilitation of knowledge flows (see Bengoa & Kaufmann, 2016, Tan, Ramayah, & Popa, 2017). Our data demonstrates a good awareness of the liability of the outsidership of the HQ and the multiple formal and informal mechanisms that support the HQ

and the RHQ in their responsibilities while mitigating that liability. As already mentioned, the deployment of expatriates and inpatriates is one way in which information and distance between HQ and different subsidiaries is managed. Respondents recognised the need to build better systems and mechanisms to ensure greater transparency, compliance, and predictability to meet growing shareholder expectations for full disclosure which had triggered a decision to invest in improved formal global business reporting and project management tools within Newco.

An interesting point that was made, and surprisingly at both global and local level, was that selection biases could arise which would favour ideas and projects from the home country or countries which resembled it (developed countries) and that these needed to be mitigated against as they could stifle innovation. Examples were provided of “*shareholder home-country perception bias*” which affected the diffusion of innovation and particularly reverse diffusion because of these biases:

“So being a North American BU when your ownership is coordinated from North America, if North America is doing beautifully, ticking along and they are making good money, and it’s predictable and everything is rosy, then that actually has quite a significant impact on the way they perceive the rest of the business. It basically creates a filter through which they look at the rest of the world. So, if the South African scores ten out of ten in every matrix you could wish for, and North America is getting three out of ten, then when they look at South Africa they are probably going to give it a six or seven at best” (Respondent 1 from HQ).

“The leadership of these global market segments meetings is important. It must be open and respectful of smaller regions’ ideas. You know, some of the major nations of the world believe they are the only people that can innovate or have new ideas. So, you know, choosing the chairman can make or break this. Because in many cases, you will find that solutions are found not necessarily in the major markets” (Respondent 12 from subsidiary).

Li (2018) examines the determinants of foreign subsidiaries’ status within a MNE’s network and highlights various status categories including economic categories. Our research demonstrates this manifestation within the project selection process for product innovation within a MNE.

INSERT FIGURE 2 HERE

4.4 Balancing global integration and local responsiveness

Balancing the need for global integration whilst maintaining local responsiveness is one of the key challenges for MNCs and respondents argued that this balance starts with defining the respective roles and responsibilities of HQ and subsidiaries: *“So, it is how you actually place the decision making is what is important. In this way, you can actually bring the balance. It is not trying to run a business by consensus, it is placing the decision-making at the proper and the right level, and making sure that you involve the relevant function on that decision-making”* (Respondent from 8 HQ). Certain larger investments in R&D (over \$500,000 within Newco) had to be made and approved through a centralised budget process from HQ before funds could be committed at regional and local levels. But at the same time a measure of autonomy was granted

below that as long as accountability was maintained: *“They were trying to say, how can I help? So, in other words, they are saying to the region, ‘You are responsible for your P&L (profit and loss). You’re in total responsibility. There’s your envelope. There are your red lines’”*

(Respondent from 10 RHQ).

As observed earlier, “equating decision making to scope” is strongly correlated with the theoretical construct coded as “building organisational trust” and respondents made the point that building trust was important to facilitate knowledge flows and the delegation of authority downwards and allowing for the networked structure to come to the fore.

“If the trust is high in the other side then you assume that you’re going to do the job unless you prove otherwise. So instead of saying, ‘Well, you need to prove that you’re doing your job.’ You do it the other way around, you say, ‘I’m assuming you’re completely covering your job. You as a region are covering your area but you know, until you prove otherwise.’ I think that’s an important distinction” (Respondent 10 from RHQ).

“Trust level in organisations is crucial because if you have low trust you need a high level of control structure to command and control. And it puts the employees more or less in a sort of – I’d say in almost like a child-parent type of relationship” (Respondent 10 from RHQ).

Respondents made several suggestions as to how the balance between global integration and local responsiveness as regards innovation could be improved. The suggestions ranged from investing in systems to collect and formalise ideas from anywhere in the organisation, to allocating significant innovation funds to regions and subsidiaries that have a positive track

record and capacity to innovate in order to validate the “state of the art”. Respondents highlighted the importance of fast-tracking the ideation and early validation phase of innovation: *“Speed in the communication and the movement of information around the innovation is quite critical. People tend to sit on innovative ideas as they want to perfect [them]. Innovation is like a bird; once it’s hatched, you’ve got to make it fly as soon as possible”* (Respondent from 14 subsidiary). Suggestions were also made that the existing global and regional innovation meetings needed to be organised around demand-oriented strategic agenda, rather than an internally-oriented strategic agenda - in other words bringing the demand-pull sources of innovation to the fore. There was also a recognition of the importance of nurturing the organisational culture of the firm so as to encourage an innovative mindset and that this was affected by recruitment and incentive arrangements, organisational structure, and trust: *“So there has to be a culture within the organisation, which nurtures innovation. We have to recruit the right people. So, we have to have the right people in place. We have to have the right HR systems to support those people. So, through intrinsic and extrinsic motivation methods, financial compensation or other things which motivate people. Then we have to have the right structures in place, and then we have to have the right systems in place to support that process, which then you would hope engenders that trust within the whole organisation, to ensure that we’re optimising our investment”* (Respondent 14 from subsidiary).

5. CONCLUSION

Our case study reveals two main streams of product innovation diffusion, namely technology-push and demand-pull, together with a funnel and network structure for diffusion

with their associated control mechanisms. The funnel is unidirectional and formalised within an annual process of stages from proposed to approved ideas, whereas the network diffusion process is multidirectional and informal, from multiple idea generators to multiple idea receptors. For Newco, the network-oriented diffusion process mainly determines the ideation and early idea selection as people exchange ideas within these formal and informal forums, while the funnel process determines the final outcome of what will be implemented given the finite funds of the firm.

The research highlights the tensions that manifest within MNCs' R&D activities and its innovation diffusion processes as it imposes managerial control mechanisms that allows for global integration whilst permitting local responsiveness. Further tensions manifest between parts of the MNC in developed versus emerging countries which may result in selection biases and may stifle innovation. There is a danger that innovation and new knowledge is seen as the prerogative of the developed world and that emerging and developing countries do not possess the necessary capabilities (Luiz et al., 2017). The importance of reverse diffusion and diffusion laterally between similar markets is crucial and subsidiaries often gain more value from such lateral sharing which is not something that MNCs necessarily are geared towards, where often the focus is on ensuring that HQ directs the lines of communication. This reinforces the notion that knowledge flows take place in social contexts and that the building of social capital and the embedding of relationships is fundamental to building trust within organisations and in allowing for the delegation of responsibilities and the facilitation of knowledge sharing. This is especially important where MNCs cover large numbers of territories which are diverse leading to information asymmetries. The research points to dimensions of social capital - both trust

(informal) and rationalisation (formal structures and systems) practices within MNCs in the innovation diffusion process (Shaw & Luiz, 2018).

Figure 3 demonstrates the innovation diffusion funnel framework within our MNC and how it leverages the MNC ecosystem in its production function. Its production function draws on the MNC environment and context to better integrate local and global resources (Liu & Vrontis, 2017). These inputs are then transformed within its production function into innovative output for diffusion. This “transformation box” is further unpacked in figure 4 which highlights practical elements to increase the capacity of the HQ to manage uncertainty and thereby decrease risks associated with effectively converting inputs into innovation outputs.

Practical/managerial implications

It is essential that the roles and accountability of the respective entity of the global firm, HQ, RHQ, and subsidiaries are correctly defined and aligned (Luiz & Visser, 2014). In essence, the number and the scope of the decisions should be adapted to the level of information and the time available for each decision to be taken. Thus, the scope of global accountability should be limited to the decisions that affect only a significant proportion of the business globally as a means to increase the pertinence of the decision-making and therefore better manage risk and uncertainty. Formal business reporting tools should be in place to allow standardised and reliable reporting to the HQ. The element of organisational trust, built within informal relationship networks and several formal forums and working groups, constitutes a supporting factor for the management of uncertainty. We have demonstrated the importance of both formal and informal mechanisms/trust and rationalisation in effectively leveraging inputs into output in the

innovation production function. These include understanding the nature of the innovation diffusion stream (whether technology-push or demand-pull or a combination thereof); the respective role and accountabilities of the HQ, RHQ and subsidiaries with regards to innovation diffusion; an assessment of the level of reliability and predictability of the reporting to HQ; the nature of the innovation selection's financial and strategic criteria; the level of intra-organisational trust; and understanding the formal and informal mechanisms for innovation diffusion. These formal and informal dimensions include the use of expatriates to connect disparate parts of the MNC ecosystem, the training and socialisation of employees, and the utilisation of management structures and systems to effectively harness inputs and convert them into output in the innovation process.

INSERT FIGURES 3 & 4 HERE

Theoretical contributions

The study makes several contributions to our understanding of the complexities of the product innovation process within MNCs. First, we demonstrate the value of a funnel and network structure for diffusion which capitalises upon the global resources and scale but which leverages resources within subsidiaries for both reverse and horizontal diffusion. Existing research has historically examined unidirectional innovation diffusion processes, and more recently reverse and network innovation practices, and our examination of the detail of how this happens within a MNC illustrates the practicalities of managing these tensions. Second, we unpack an innovation diffusion funnel framework within a MNC and demonstrate how a MNC effectively utilises the extensive inputs within its ecosystem and transforms them into product

innovation through a production function process. Third, we provide an understanding of what is required within that “transformation box” with its associated implications for how innovation is managed through both formal and informal mechanisms. Lastly, we point to the value that subsidiaries have of learning from other subsidiaries within the same MNC without being mediated through HQ.

Limitations and suggestions for future research

The utilisation of a single company case study results in limitations in terms of the generalisability of the results to other sectors, and future research could extend our study to cases in diverse sectors to identify differences and commonality. Furthermore, our case involves a MNC headquartered in the developed world and analysing whether MNCs headquartered in emerging markets, adopt similar approaches to innovation diffusion is an important area for exploration particularly given our finding of shareholder home-country perception bias. Lastly, we identified the value of subsidiary interaction across the MNC ecosystem as regards innovation diffusion, but this leaves open the question of HQ involvement. Whilst formal processes may require HQ participation, the benefit of informal connections between subsidiaries from similar environments is that they may recognise innovative solutions that respond to contexts in demand-pull processes. Given that the latter was not a core theme of this study, we believe that this is a fruitful area for future research.

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Table 1: Newco at a glance: end of 2016 financial year

Total consolidated net sales (amounts in millions): \$3,585.9m
Gross profit (amounts in millions): \$1,507.7m
Adjusted EBITDA (amounts in millions): \$769.5m
Regional sales breakdown: North America 19%, Latin America 21%, EMEA 34%, Asia 26%
~2000 patents
~7000 product registrations
~60 formulation sites
16 R&D centres
Research and development (amounts in millions): \$84.4m

Source: Annual Report 2016

Table 2: Profile of respondents

No.	Position	HQ/RHQ/Subsidiary	Department	Business unit	Country of location
1	Global head of R&D	HQ	R&D	Global	USA
2	Global head of marketing	HQ	Marketing	Global	USA
3	Global marketing manager – product category	HQ	Marketing	Global	USA
4	Global R&D finance controller	HQ	R&D/Finance	Global	USA
5	Regional head of marketing – EMEA	RHQ	Marketing	EMEA	France
6	Regional marketing manager – product category – LATAM	RHQ	Marketing	LATAM	Brazil
7	Regional marketing manager – product category LATAM	RHQ	Marketing	LATAM	Brazil
8	Regional head of marketing - NAANZ	RHQ	Marketing	NAANZ	USA
9	Regional head of marketing – JAI	RHQ	Marketing	JAI	Singapore
10	Regional head of R&D – EMEA	RHQ	R&D	EMEA	France
11	Regional marketing manager - product category EMEA	RHQ	Marketing	EMEA	France
12	Subsidiary CEO – South Africa	Subsidiary	General management	EMEA	South Africa
13	Subsidiary head of marketing and development – Poland	Subsidiary	Marketing/development	EMEA	Poland
14	Subsidiary head of marketing – Australia and New Zealand	Subsidiary	Marketing	NAANZ	Australia
15	Regional head of development – EMEA	Subsidiary	R&D	EMEA	France
16	Subsidiary head of R&D – South Africa	Subsidiary	R&D	EMEA	South Africa

Figure 1: Analytical coding process to induce theoretical dimensions – formal and informal mechanisms for innovation diffusion within the MNC

Figure 2: Analytical coding process to induce theoretical dimensions – Managing uncertainty and information and the liability of outsidership related to innovation diffusion

Figure 3: An innovation diffusion funnel framework within the MNC - leveraging the MNC ecosystem in its production function

Figure 4: The “transformation box” through which inputs are transformed into output diffusion (middle part of figure 3)

Annexure A - Semi-structured questionnaire

0.1. Respondent role and responsibilities within the organisation.

1. Theme 1: By which formal or informal mechanisms is product innovation diffused within the MNC

1.1. Could you describe what product innovation generally means to this organisation?

1.1.1. What are the possible forms of product innovation? Who generally innovate?

1.1.2. What are the company strategic objectives related to product innovation?

1.2. Could you identify the stakeholders of product innovation diffusion and their respective roles?

1.2.1. Decision-makers; responsible; facilitators; consulted; informed.

1.3. Could you describe how product innovations generally diffuse within this organisation?

1.3.1. Where it originates? Where it lands? Through which channels?

1.3.2. Which channels would you say play the most important role for the organisation?
How so?

1.3.3. Decision making – centralisation vs decentralisation?

1.4. Could you describe the formal process of product innovation diffusion?

1.4.1. What are the criteria of product innovation evaluation and selection for diffusion?

1.4.2. Which are the tools? Structured reporting systems? Standardised information systems?

1.4.3. What are the key performance indicators? How is success of the diffusion process measured?

1.5. Could you describe the informal mechanisms of product innovation diffusion?

- 1.6. In times of budget constraints – what determines which product innovation projects are supported or stopped? Please elaborate.
- 1.7. When reflecting back on the previous questions, would you find the product innovation diffusion mechanisms of this firm to be relatively unique or relatively similar to the industry norm? Please elaborate and feel free to use other industry examples as benchmark.
2. Theme 2: Relative exposure of the global HQ to local subsidiary context
 - 2.1. Would you think that the geographical origin of product innovations plays a role in its global diffusion in this organisation? Please elaborate, feel free to use examples
 - 2.2. In your opinion, are there specific markets or regions which HQ is more knowledgeable about? In what sense
 - 2.3. How the relative level of knowledge of subsidiary local context could affect the HQ decision making process related to product innovation diffusion in your view?
 - 2.4. Could you describe the mechanisms that are currently taking place to enhance the knowledge of the HQ regarding subsidiary local context and local network?
 - 2.5. To what extent do you think that HQ is knowledgeable about the network and actions of its subsidiaries? How does this affect the process of innovation diffusion?
3. Theme 3: how managerial control mechanisms effectively balance global leverage and local responsiveness objectives
 - 3.1. Are there instances where global projects need to be prioritized over regional/local projects (and vis-versa)? Could you explain the prioritization mechanism that takes place at that moment?
 - 3.2. Would you think global integration and local responsiveness imperatives are adequately balanced within this organisation? How so?

- 3.3. By which mechanisms is the organisation ensuring an adequate balance between global integration and local responsiveness? Formal versus informal?
- 3.4. When reflecting back on how product innovation diffuses within this organisation, what would be your recommendations?