

Managing Synergies Among Digital Platforms: How Haier Pioneered Integrating Open Innovations

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October 4, 2025

ABSTRACT

We interviewed 29 platform managers at Haier, the largest consumer electronics manufacturer in China with operations worldwide. We focused on two of their main open innovation digital platforms, named Hope (an inbound OI platform) and COSMOPlat (an outbound OI platform), which offer complementary services. We examine the strategic linkages between these two platforms and the synergies they create. In addition, we asked 11 senior managers to assess pairwise synergies between inbound and outbound capabilities, and then compared their ratings both within and between platforms. Our paper also offers six research questions - listed in italics - about strategic challenges that some scholars may wish to explore more deeply.

Key words: Open Innovation, Digital Platforms, Inbound Innovation, Outbound Innovation, Platform Synergies, Haier's Business Model, Pull-Push Strategies, Ongoing Research Questions.

The concept of synergy has a long history in strategic management dating back to Igor Ansoff (1965) and is often simply expressed as $2 + 2 \geq 5$. The basic idea is that combining multiple parts of a system can be more valuable than their total sum when each is valued individually. The ways synergies arise in business entail complementarities and cross-fertilizations of activities, know-how, IP, relationships, brands and more. Synergies can produce efficiency gains (lower cost) as well as better problem solving (greater efficacy) in companies, with direct bottom line effects. But full benefits can only accrue only if different kinds of synergies are properly designed, coordinated and refined as parts of a larger strategy. As one researcher phrased it, the “time factor is of paramount importance because the synergy implies not only the valorization of interdependences and differences but also synchronization and compatibility” (Aiken and Hodgson, 1998). We view these challenges as research opportunities in strategic management

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and examine how the Chinese company Haier pioneered the design and operations of digital platforms in parallel.

To understand better how synergies can be garnered in practice, we conducted on site 33 different interviews with 29 middle managers at Haier. These managers were in charge of two major digital platforms of Haier, called HOPE (focused on inbound OI) and COSMOPlat (focused on outbound OI). The goal was to collect first-hand granular evidence inside Haier about open innovation challenges when connecting in and outbound activities across multiples platforms. Some scholars have examined aspects of this integration challenge by studying the overarching dynamic capabilities involved while others emphasized the role of ambidextrous leadership (Ragazou et al., 2022). But these conceptual studies seldom delved deeply into the operational challenges that leaders encounter day-to-day in such platforms.

1. Leveraging In- and Outbound OI

Chesbrough (2003) defined inbound OI by digital platform companies as leveraging external know-how and contacts in order to bring relevant expertise, information and new participants into their platform. Procter and Gamble (P&G) did this off-line via ‘connect and develop’ meetings where parties far removed from P&G, such as diverse companies and scientists in a tech fields, would meet just to explore opportunities. In contrast, digital outbound OI by an established platform is about convincing external parties to buy its product or services on-line, including renting or licensing its technologies and know-how. By combining both in- and outbound services strategically “open innovation is fundamentally about playing both sides of the R&D market” (Chesbrough and Euchner, 2011).

***Q1:** While most empirical studies focused on either the push or pull aspects of this approach (e.g., Arora et al, 2001; Laursen and Salter, 2006), there has been limited exploration by researchers of the potential synergies that can arise from the simultaneous pursuit of both kinds of OI for enhancing products, services and technologies. For example:*

- *What is the role of synchronization when designing synergies across platform?*
- *When do synergies relate more to efficiency gains versus revenue enhancement?*
- *Are push-pull distinctions still useful in highly interconnected business models?*

Key questions in practice arise about how best to integrate in- and outbound activities, the way sales and marketing functions need to do in most companies, or how additional synergies can be leveraged via scale, scope, technology, branding, partnerships, etc. In the field of marketing, out- and inbound activities are typically referred to as push versus pull. Push focuses on informing potential customers about a company's offering and persuading them to buy those (via ads, brochures, conference or sales calls). Pull activities are less sales oriented and first seek to understand clients' needs and pain points before customizing a firm's products and services. Inbound marketing (pull) strategies focus on deeper understandings by developing trust and learnings from customers and partners, especially in more complex business-to-business settings. The insights generated from such pull capabilities can over time be converted into better offerings via push strategies.

***Q2:** When many diverse stakeholders jointly engage in business activities enabled by technology platforms, how can we still clearly distinguish between inbound and outbound activities? Or, in which contexts do traditional push-pull distinctions become less relevant or applicable, both theoretically and practically?*

- *How do firms manage role conflict among key stakeholders engaged in coopetition?*
- *How do we assess marginal costs and benefits in non-additive production functions?*
- *Are dynamically adjusting ecosystems beyond the grasp of basic strategy theories?*

For example, digital platform owners like Amazon or Haier do far more than enable transactions among third parties since they often play direct roles as buyer or seller as well. A large platform community like Amazon entails many participants who operate on both sides of a transaction. This multiplicity of roles may complicate the standard notions of push and pull as deployed in the field of marketing since sophisticated companies will carefully integrate and blend them. Once fully integrated into a complex self-reinforcing dynamic system, it may become less clear which component part is push or pull.

Previous research studies did not delve into this question deeply and instead identified general strategic capabilities crucial to managing OI in general. For example, Appleyard and Chesbrough argued that competencies ranging from technology prowess to supporting organizational processes are key in creating OI value (Appleyard and Chesbrough, 2017). Others viewed the

essence of OI to reside in systematically deploying a firm’s capabilities, internally and externally, especially in technology management and innovation (Lichtenthaler, 2008).

Q3: *How can firms develop stronger capabilities for blending new information with prior knowledge so as to identify new opportunities and overcome the not-invented-here syndrome?*

- *How might a firm’s existing knowledge bases limit or bias its absorptive capacity?*
- *Do synergistic platforms need different ways to manage organizational attention?*
- *What guidance does strategy theory offer to enhance multi-platform business models?*

To develop deeper insights into how OI works when multiple platforms are involved, we examined two different platforms of one of the world’s largest home appliance giants “Haier”. We focused on two very different platforms namely HOPE for inbound OI and COSMOplat for outbound OI. The Haier Open Partnership Ecosystem (HOPE) is an inbound-focused open innovation platform created by Haier that monitors technology trends and stimulates the development of groundbreaking products. HOPE helps customers overcome common obstacles when translating innovative ideas into successful business by leveraging global top-tier networks to align technical resources with customer needs. As Figure 1 shows, HOPE offers seven key innovation services.

Figure 1

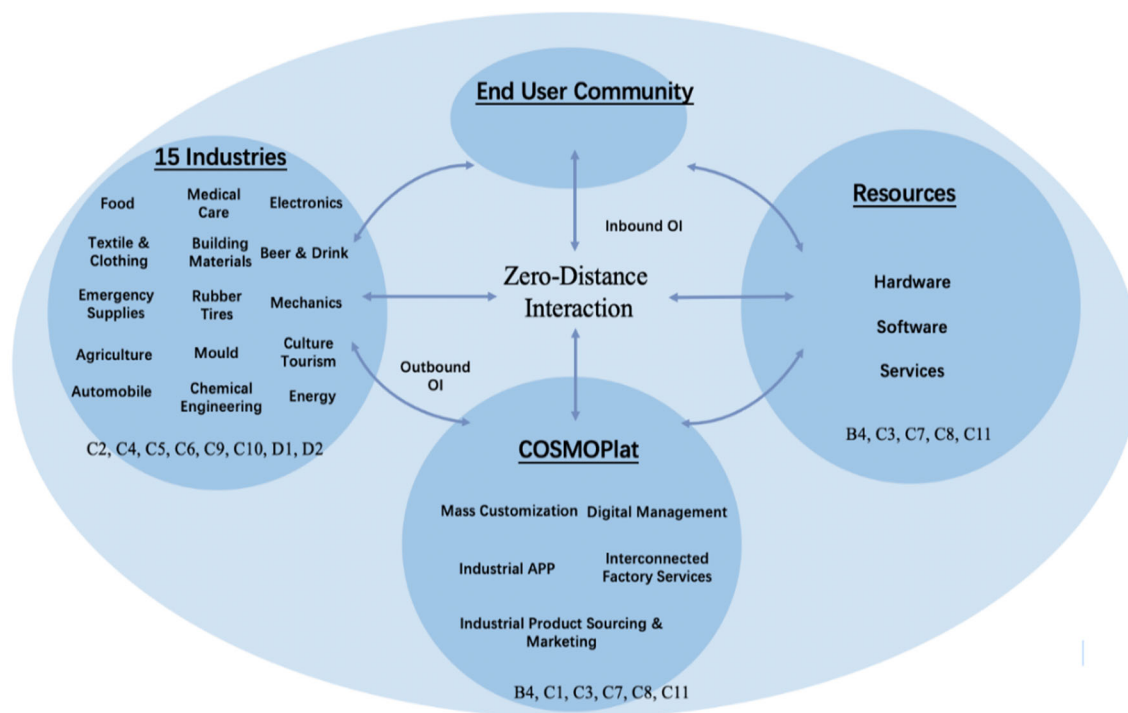
HOPE - Haier’s Open Innovation Platform



NOTE: Labels A1, A2, ..., A10 show where senior Haier managers we interviewed worked (see Appendix A)

While HOPE mainly focuses on inbound activities such as market learning, technological innovation and product design improvements for Haier's own companies in the smart-home space, COSMOPlat operates as an outbound-focused open innovation platform. It leverages its extensive manufacturing, supply chain, and sales channel experiences to offer platform-based services to companies external to Haier. Figure 2 illustrates the basic organizational architecture of COSMOPlat.

Figure 2
COSMOPlat – Hair's Outbound Innovation Platform



NOTE: Labels C2, D1, ..., C11) show where senior Haier managers interviewed worked (see Appendix A)

2. Identifying In-and Outbound Capabilities

Based on our different interviews with 33 managers at Haier (see Appendices), a variety of in- and outbound capabilities emerged that were related to important strategic objectives. We restrict our discussions below to three capabilities of each kind without delving into technical aspects or other derivative concerns.

Q4: *How are platform capabilities distributed within and across different organizational levels, from product groups and management teams to partners and ecosystems (see Harvey et al., 2020)? More strategy research is needed to understand the integration mechanisms that platform capabilities need in creating and capturing systemic synergies.*

- *How do we surface and measure deeply embedded capabilities across levels?*
- *Are resource-based models and dynamic capabilities orchestrations enough synergistic?*
- *How does economic rent and appropriation happen in semi-cooperative platforms?*

Three Important Inbound Capabilities

IB-1: Attracting External Participants

Haier has pioneered collaborations with not just customers buying their smart home products but with innovators around the world – including competitors. The number of problem-solvers that Haier has registered exceeds 400,000 and includes numerous individual experts, non-profits, think-tanks, and even direct rivals such as Honeywell. Attracting a wide range of external participants to its platforms helps Haier solve the different innovation challenges of its customers.

“From worldwide interactions on Haier’s platforms, we can see the latest ideas and ways in customers’ future lives... A lot of ideas for new products have come from our interactions with customers, such as refrigerators sold in Pakistan that maintain cold temperature after power has been cut for 100 hours and portable mini washing machines sold in Japan.” (*Li Pan, Vice Manager of Haier’s Home Appliance Industry Group*)

IB-2: Integrating Platforms with Hosting Processes

Another key capability required for successful inbound OI is the ability to identify cross-industry resources or solutions needed to solve problems that no one industry could do alone. Haier has built a system of cross-industry information sharing, which improves its ability to search for external knowledge. To illustrate its wide and deep scope, the company has formed 11 connected factories that support 15 industries including the Internet of food (Li et al., 2020).

“For example, once HOPE’s data were classified and accumulated via the keywords of say the refrigerator industry, and an agricultural machinery company or a breeding company would search for that same technology, the platform was unable to retrieve it. So, our new platform architecture not only involves an industry label, but also a technology label now. Our ultimate goal is to extract all the underlying data and form the classification by technology.” (RY Jiang, *HOPE Global Resource Network*).

IB-3: Analyzing Platform Data in Real-time

Accumulating and curating quality data is also critical for the development of digital platforms (Jovanovic et al., 2022). Haier collects, integrates, and analyzes data based on its interactions with many other organizations, experts and individuals. Behind the scenes, advanced search engines, special algorithms, and data analytics create a dynamic matching system to pair demand and supply. And the amounts of data available at Haier are very large.

“HOPE engages in advanced data businesses. For example, users will leave traces on the platform, such as whether some information sent to other users, whether those users received that information, whether the information has been delivered and read, or what kind of content the user has highlighted after reading a certain piece of information. We then adjust our data base to reflect the characteristics of users and try to serve them better.” (M, Li, *Director of Data Engineering and Management of HOPE*)

Three Important Outbound Capabilities

OB-1: Leveraging Internal Processes across Platforms

Haier makes some of its internal capabilities available to the outside world through outbound OI. One manager explained below why orchestrating resources across different platforms is an important competitive advantage for Haier:

“We are not a manufacturer of any products. For example, BYD automotive produces its own masks. We do not produce masks, but we integrate all the resources involved on our COSMOPlat. We use these resources to help partners and customers produce more masks than BYD makes. This is what we call integration capability. Our customers can also produce products at a lower cost because Haier shares with them the manufacturing know-how that it has accumulated over 30 years. This is our competitive advantage.” (SH, Wang, *manager of COSMOPlat’s Emergency Supplies*).

OB-2: Iterating Ideas and Procedures Across

Haier's outbound activities involve adapting proven ideas to new contexts. For example, COSMOPlat initially helped Recreational Vehicles (RV) companies with production and quality control, and then expanded into marketing RVs. By leveraging its experience in cultural and tourism sectors, COSMOPlat began renting and selling RVs directly to tourism companies. This example illustrates COSMOPlat's concept of iterative upgrading.

“We constantly attract participants to the platform and then reiterate the user experience and our solutions. We have studied the resources of ecosystem players, and created a business benchmark model. After achieving success in mold asset management, we went beyond the original concept for the platform and also addressed pain points in the upstream and downstream value chain. We call this iterative upgrading. We put forward a solution called the whole process solution, which goes from a mold to engineering, interactive design, R&D, to manufacturing, iterating the experience of its users.” (*Lin, Manager of COSMOPlat's Cross-industrial Platform*)

OB-3: Standardizing Solutions and Methods

Process standardization also proved to be critical for the successful implementation of outbound OI. If a platform relies too much on customer needs, then the business will eventually become customized and hard to reuse or scale. This does not mean, however, locking into an inflexible design model with fixed parameters as in mass production since maintaining flexibility is very important in managing a platform (Karandikar and Nidamarthi, 2007). If executed well, standardization can decrease ambiguity and boost productivity in managing outbound OI.

“We must standardize our service to explain clearly what we can do. Once standardized, it becomes an outbound service for exporting knowledge and content. We can also provide intelligence reports and analyses of users' cognition of products. This will attract other parties of our external ecosystem to use the platform and participate in its further development. When a need emerges, the platform generates technical solutions which may become modules used in other products, or a network structure for suppliers to generate mutual benefits.” (*J Song, HOPE External Ecosystem Collaboration*)

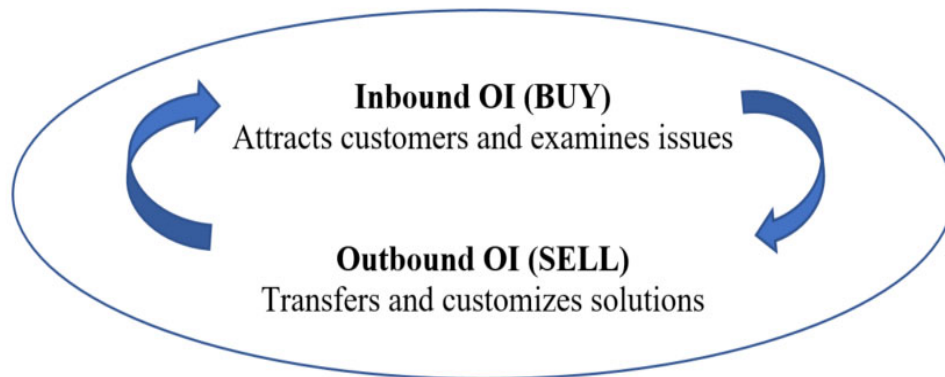
3. Synergies Among Inbound and Outbound Capabilities

Since implementing OI on digital platforms can create enormous amounts of data, additional economies of scale and scope can be garnered, as depicted in Figure 3. Due to its size and

technology, Haier accumulates vast quantities of data at minimal cost, which helps identify new knowledge and further replication thereafter. As one manager of COSMOPlat explained:

“Our current business is about cross-industrial demands, so we need to gather advantageous resources and industries to COSMOPlat to better enable external enterprises. We transfer the demand to HOPE, and they will do technical disassembly for our requirements and develop corresponding technical solutions. The second benefit is strategic interaction. We track HOPE’s capabilities for technology transfer and resource integration, which helps COSMOPlat respond better to customer needs.” (*W. Jia, Resource Integration of COSMOPlat Qingdao*)

Figure 3
Inbound OI and Outbound OI - a “Virtuous Circle”



Haier is actively exploiting such exchanges to create synergies based on economies of scale and scope. COSMOPlat utilizes the wide networks of HOPE to search for external solutions to its particular problems. HOPE, on the other hand, benefits from cross-industry knowledge that COSMOPlat has developed and can share. Such knowledge can be tested in particular industries and then be selectively deployed elsewhere. This way, Haier leverages its collaboration with COSMOPlat to test the applicability of its own capabilities for other manufacturing sectors.

“We haven’t established formal business collaborations, but there are many informal contacts. COSMOPlat makes requests from HOPE, but presently these are not mainly to make money. Their main goal is to test the capabilities of HOPE and verify whether HOPE has options that could satisfy cross-industrial demand. The main purpose here is to test the capabilities of HOPE and assess how to standardize and meet various cross-industrial demands.” (*JY. Song, Manager in Charge of General Management and Open Innovation Operation of HOPE*)

In essence, Haier constantly pools resources from diverse sources and spreads them across platforms. HOPE will readily respond for this reason to solution requests made by COSMOPlat users, as well as from third-party service providers connected to HOPE, just in case some possess relevant expertise.

“HOPE collaborates with COSMOPlat, so we have access to all Haier resources, including Haier's own design, production, research and development, and logistics. HOPE focuses mainly on open innovation, resource integration, and technology transfer. But it also contributes to various capabilities of COSMOPlat. For example, through HOPE, we can see industry trends sooner, and then introduce tools and specialized teams to enhance our COSMOPlat business as well.” (*W. Jia, Resource Integration of COSMOPlat Qingdao*).

Lastly, firms embracing outbound OI develop a reputation for being “open” and receive new opportunities to assess external technologies, which in turn can help inbound OI (Cassiman and Valentini, 2016). Due to such reciprocal learning effects, the transaction costs of searching for new knowledge will often decrease. Research shows, for example, that firms that are open to sharing knowledge tend to identify a larger number of knowledge transfer opportunities than average (Rothaermel and Deeds, 2006). The following quote underscores such decreased transaction costs when searching for new knowledge.

“Many external enterprises do not have very large user bases, and do not collect extensive data, so our HOPE platform offers a lightweight service for these smaller companies. This kind of service connects all the relevant user data resources, and then constructs a unified and integrated platform. Once we standardize these, a greater number of external users can use the HOPE platform, with indirect benefits for us and Haier.” (*J. Song, Manager in Charge of HOPE External Ecosystem Collaboration*)

Table 1 shows how we set up a cross-impact matrix to assess the extent of perceived synergies among the six capabilities identified earlier in the paper. We limited our analysis to pairwise relationships since these already entailed $(6*5)/2 = 15$ dyadic combinations and thus ignored triads or more complex clusters of possible interactions. It is less important how each of these components matter individually than how they interact as a dynamic open business system. For example, external partnering (IB-1) helps create standardized solutions (OB-3) which together

improve each platform by spawning further cross-fertilization opportunities. To assess the various pairwise synergies further, we invited eleven other senior managers from Haier and other leading Chinese digital platforms for their views (see Appendix B). Each was asked individually to provide subjective ratings (on a 1-7 scale) of the cross impacts of each pairing. Their mean scores are reported in Table 1 together with the row and column totals which respectively represent an active and passive score of each capability listed below the table.

Table 1. Cross Impact Matrix for Platform OI Capabilities

	IB-1	IB-2	IB-3	OB-1	OB-2	OB-3	Active
IB-1		4.45	4.09	3.27	3.91	4.36	20.1
IB-2	4.00		4.27	5.00	4.18	4.00	21.5
IB-3	4.55	3.55		3.36	4.09	4.09	19.5
OB-1	4.27	4.27	3.91		4.73	3.55	20.7
OB-2	5.09	3.09	4.55	3.64		4.55	20.9
OB-3	4.91	4.36	4.64	4.55	5.18		23.6
<i>Passive</i>	22.8	19.7	21.5	19.8	22.0	20.5	
<i>Ratio A/P</i>	0.88	1.02	0.94	1.01	0.91	0.98	

Top Capabilities for Inbound OI (IB)

- IB-1 Attracting external participants to platforms to add new value
- IB-2 Integrating multi-sided platforms with internal hosting processes
- IB-3 Analyzing and deploying platform data in real-time via AI

Top Capabilities for Outbound OI (OB)

- OB-1 Leveraging internal processes across platforms for possible export
- OB-2 Iterating ideas and internal procedures for sharing across platforms
- OB-3 Standardizing key solution principles and associated processes

An important strategic feature of Table 1 is that it allows for asymmetric matrix scores unlike say a correlation matrix which is by definition symmetric. For example, IB-1 was assessed as having an impact score of 4.45 on IB-2, whereas the latter only scored 4.00 regarding its impact on IB-1.

The logic here is that integrating platforms with hosting processes (IB-2) only makes sense if external partners join the platform (IB-1). But once these platforms are integrated into hosting processes, they may have limited causal impact in reverse on attracting new partners.

The mean ratio scores at the bottom of Table 1 show clearly that significant synergies indeed exist with the highest mean score observed for Outbound overall being 4.36, followed by sizable synergies based on the impact score of 4.34 of Outbound onto Inbound (in just that single direction). The synergy impacts from Inbound onto Outbound scores 4.02 on average and this was the weakest of the four listed. The shaded coding distinguishes four distinct cell blocks we analyzed further, with two within and two across platforms. For example, the six cell at top left with light shading scored 4.15 on average for Inbound, while the bottom right six cells with darker shading scored 4.36 on average for Outbound. Finally, the unshaded cells contain two larger clusters (I to O and O to I), each representing nine cells, and these two clusters affirm that synergies indeed exist across the two platforms we examined.

Q5: *Methodological issues remain about the strengths and weaknesses of the above kind of synergy matrix or similar approaches. Should we use cognitive modeling as well (Klayman and Schoemaker, 1993) to fully explore differences in managerial views about sources of synergies?*

- *Could influence diagrams, scripts, frames, schemata or cognitive tools be used here?*
- *How can we assess whether more intrusive mental mapping techniques might create Heisenberg-type effects that inadvertently change the phenomena being studied?*
- *Should the pair-wise comparisons noted in the above table extend to triplets or more?*

4. Discussion

Our interview-based examination of Haier's key digital OI platforms revealed various in- and outbound capabilities that mutually benefit from cross-impacts. For example, iterating new ideas and procedures across platforms, along with standardizing key solution principles, not only attracts external participants to the platforms but also improves the integration of internal processes.

Q6: *How might strategy researchers explore more deeply the complex dynamics of internal co-opetition enabled by open innovation ecosystems?*

- *How does internal cooperation differ from that with external alliance partners?*
- *When multiple groups engage OI, how is ex post opportunism guarded against?*
- *How (a)typical is our case study of Haier from other major platform ecosystems?*

Our paper sought to highlight the complex systemic nature of in- and outbound platform open innovation, while emphasizing the limited value of analyzing a single platform or capability in isolation of others. We also illustrated that a cross-impact matrix can help identify first-order relationships among OI platform capabilities. The matrix further helps when assessing the relative contributions of in-and outbound capabilities, by for example computing the active and passive synergy scores of all pairwise comparisons.

Architecting a sophisticated open innovation system comprised of both inbound and outbound capabilities poses a host of research questions for academics. For example, will the strengths in one set of capabilities survive if weaknesses surface in other interacting capabilities? This issue raises theoretical challenges regarding the limitations of additive production or regression models and the identification of partial causation coefficients for complex systems with non-linear feedback loops. Our analysis focused on managerial perceptions of synergies in Haier's two platforms at the time of our interviews, without delving into potential future scenarios that could upset their apple carts. This leaves researchers with the question of how to assess the robustness and resilience of multi-platform business models in turbulent times. As such, much academic work remains to more fully conceptualize and measure the canonical notion of OI synergy in dynamically evolving digital platforms.

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Appendix A

List of Interviewees

SOURCE OF DATA	TYPE OF DATA	KEY TOPICS
Interview on HOPE Platform	11 interviews in June 2020: A1. Chief Director of HOPE and General Director of Haier's Open Innovation System A2. Director of HOPE Resource and Allocation, and Advanced R&D A3. Manager in Charge of General Management and Open Innovation Operation of HOPE A4. Manager in Charge of HOPE Innovation Partner Community, Micro Insight, Business Activities, Domestic Innovation Source, and Expert Consultation A5. Manager in Charge of HOPE External Ecosystem Collaboration A6. Director of HOPE Global Innovation Network A7. Vice Director of HOPE Global Resource Network A8. Director of Advanced R&D of Haier Group A9. Director of Data Engineering and Management of HOPE A10. Director of Content, Business Intelligence and Information of HOPE A11. Director of Platform Technology Architecture, and IT Product Design and Development of HOPE	Questions on the overview of HOPE, examples of OI, and key factors for successful implementation of inbound and outbound OI
	4 interviews in August – September, 2020: B1(A1). Chief Director of HOPE and General Director of Haier's Open Innovation System B2(A2). Director of HOPE Resource and Allocation, and Advanced R&D B3(A3). Manager in Charge of General Management and Open Innovation Operation of HOPE B4. Manager from Regional Resource Integration of Haier's COSMOPlat	Broad questions on the strategic relationships between HOPE and COSMOPlat
Interview on COSMOPlat	11 interviews in November 2020: C1. Chief Technology Officer of COSMOPlat, R&D Platform and Ecosystem C2. Cross-industrial Platform Manager C3. Manager of Qingdao Regional Business C4. Manager of Touring Car Business C5. Manager of Energy Ecosystem C6. Manager of Agricultural Industry C7. Director of Strategic Operation C8. Operation and Marketing Director C9. Manager of Emergency Supplies C10. Manager of Chemical Engineering Industry C11. Director of Haier Industrial Intelligence Research Institute	Questions on the main functions of COSMOPlat, platform governance, complementors, successful iterations of business model innovation, outbound OI, and key capabilities
Interview on Haier's Main Business	2 interviews in December 2020: D1. Manager of Haier's Internet of Clothes D2. Manager of Haier's Internet of Food	Broad questions on OI examples in the clothing and food sectors
Interview on both HOPE and COSMOPlat	4 interviews in September 2021: E1(A2). Director of HOPE Resource and Allocation, and Advanced R&D E2(A5). Manager in Charge of HOPE External Ecosystem Collaboration E3(B4). Manager from Regional Resource Integration of Haier's COSMOPlat E4. Director in charge of Manufacturing Business of COSMOPlat	Questions on OI capabilities and interactions between HOPE and COSMOPlat

Note: A total of 32 interviews were conducted with 26 different Haier middle managers, 4 of whom were interviewed twice and 1 was interviewed three times.

Appendix B

Managers Who Scored Our Cross Impacts

NO.	PROFILE OF RESPONDENT	YEARS OF EXPERIENCE ON PLATFORM BUSINESS
F1	Project manager of regional branch of China Mobile	10
F2	Enterprise manager of energy block-chain business	8
F3	Senior academic researcher on platform business, part-time at Alibaba	7
F4	Big-data engineer of digital platform at Alibaba	10
F5	Software R&D Engineer at Huawei	8
F6	Manager on payment software platform of iOS (Alipay)	13
F7	Product manager of platform enterprise-JD.COM	12
F8	Platform strategic officer at platform enterprise-Meituan	7
F9*	Manager in Charge of Open Innovation Operation at HOPE	9
F10	Manager of customer and industrial platform of household appliance	11
F11	Manager of household appliance industry, Haier Smart Household	8

*this person was also listed earlier as A3, having been part of our interviews at HOPE

Acknowledgements: This research was funded for Sohvi Heaton by the Strategy Research Foundation (SRF) Research in Organizations Program, 2021–2023. In addition, Liang Mei was supported by the National Natural Science Foundation of China [grant numbers 72174005; 72574010; 72232004]. Both authors are grateful for the interview access provided by the HOPE and COSMOPlat teams at Haier Group. They also appreciate the help of Dr. Teng Donghui, Dr. Wan Xinming, Miss Song Jiayan among others. Liang Mei especially thanks Prof. Chunhua Chen for helpful research suggestions and various introductions to managers at Haier.

Biographical Summaries

Dr Paul Schoemaker is an author, educator, researcher and entrepreneur in strategic management, decision making, innovation and leadership. Paul served for 12 years on the faculty of University of Chicago's graduate school of business. While there, he spent a 20 months sabbatical with Royal Dutch/Shell's scenario planning group in London. Later he served for 15 years as the research director of the Mack Institute for Innovation Management at the Wharton School, where he taught strategy and decision making as a full professor part-time. He was also a visiting professor with Cedep at Insead for several years in France. Paul has written 130 articles and thirteen books. He was the founder and executive chairman of Decision Strategies International, a three decades old strategy consulting and training firm with offices in the US, UK and Asia which he sold in 2016.

Dr. Sohvi Heaton is an Assistant Professor of Entrepreneurship at Baylor University. She earned her PhD in Management Studies from the University of Oxford, England. Her research explores strategic management topics including dynamic capabilities, intellectual capital, open innovation, and university entrepreneurship. Her work has been published in leading journals such as *Academy of Management Perspectives*, *California Management Review*, *Strategic Organization*, and the *Berkeley Technology Law Journal*. Dr. Heaton is a coeditor of the *Oxford Handbook of Dynamic Capabilities* and was selected as a Strategy Research Foundation Research in Organizations (RiO) Scholar (2020–2022) for her grant proposal, *Open Strategy in Capable Hands: The Role of Dynamic Capabilities in Open Platform Strategy*.

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