

08

MANAGEMENT INSIGHTS

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ISSUE 08

RESEARCH HIGHLIGHTS

Building Communities within Organizations
Creating a Better Workplace

Location-Independent Organizations
Designing Collaboration Across Space and Time

Indirect Cronyism and Its Underlying Exchange Logic
Why Do Managers Extend Favors to Their Friend's Friend?

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**Driving Forward Organizational Change
with Mission and Vision**
An Interview with Mr. Gaoning Ning

**Enabling a New Era of Quantum Computing
with Management Skills**
An interview with Dr. Hui Zhang



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Management Innovation in Increasingly Digitalized Organizations

Robots, algorithms, and artificial intelligence (AI) are revolutionizing the world and transforming organizations in numerous unprecedented ways that call for management innovation. The collected research highlights included in this issue¹, together with the executive interviews with two Chinese business leaders, offer new insights into this challenging endeavor.

One management innovation is the “Location-Independent Organizations” (see p. 13), where employees do not share workspace and span most time zones. To make such asynchronous-oriented organizations work, they must adopt three novel collaboration practices: an open single source of truth, rich work trails, and informed action-first iteration. These practices help people overcome workflow delays, misunderstandings, and limited information sharing to enable effective asynchronous-oriented collaboration. Another innovation is to offer digital platforms for people to engage in gig work (p. 22): labor contracted and compensated on a short-term basis to organizations or to individual clients through an external labor market. In this case, the psychological contract between gig workers and employing organizations is especially important. Organizations need to identify jobs suitable for gig workers, such as the ones with observable outcomes that can be evaluated by customers as performance metrics. For the gig workers to overcome social isolation and advance career, they should seek out “stretchwork” assignments that offer on-the-job skill development, and developing alternative community structures like professional organization and staffing agencies.

For organizations that maintain the traditional structure, building communities within the company will create a better workplace (p. 09). Findings from five Chinese firms indicate that practices such as providing cafeteria/dining halls and offering childcare and affiliated schools, can motivate employees through two mechanisms – making life easier and fostering organizational commitment, both facilitate their job performance. Moreover, in the interview with Mr. Ning Gaoning, a former CEO of four Fortune 500 corporations, illustrates his unique approach in transforming traditional Chinese state-owned enterprises into world-class companies that embrace management and technology innovations (p. 44). Specifically, when he took the reign of a company, he would spend time listening to understand its strengths and weaknesses, and then work together with others to establish a shared new vision and mission that can inspire people to feel passionate. These shared vision and values are manifested in every aspect of the company operation to achieve results. It is truly impressive that he did it once with China Resources, and did it again with COFCO, and yet again with Sinochem and China National Chemical Co.

To keep up with the rapid technological advancement, organizations need to innovate non-stop. In “Supervisor Curiosity” (p. 33), it is suggested that team innovation hinges on the extent to which team leaders are curious. The findings indicate that when the leader has Interest-type curiosity – driven by a genuine interest in learning and exploration, they can stimulate both incremental and radical

¹ The research highlights were re-written from recent publications in top management journals such as Administrative Science Quarterly, Strategic Management Journal, Management and Organization Review, Organizational Behavior and Human Decision Processes, and Journal of Applied Psychology.

team innovation; whereas when their curiosity is Deprivation-type – arises from a lack of essential knowledge and associated anxiety, they may promote incremental innovation but hinder radical innovation. In “How Chinese Companies Innovate” (p. 41), six paths were identified: ascending steadily from incremental to radical innovation, localized and embedded business models, fast trial and learning, demand-oriented rather than technology-oriented, upgrading technology quickly, and being agile as an organization.

These paths suggest that instead of merely confronting and managing challenges, Chinese companies actively embrace them, thrive on them, and blaze their unique paths of innovation, as evidenced in “The Story of China’s Shan-Zhai Phone Enterprises” (p. 37).

This spirit of innovation is also reflected in our interview with Dr. Hui Zhang, the general manager of Origin Quantum Computing Technology (p.61). This company is devising a new computing paradigm – quantum computing to deal with constraints of physical limits, heating up problems, and the consumption of huge amounts of energy issues faced by high-performance computing, which is highly needed for the rapid rise of the AI industry. The scientist-turned-entrepreneur is confident in his endeavor but recognized the management challenges such as establishing a corporate culture that encourages communication and innovation. ☑



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RESEARCH
HIGHLIGHTS

Building Communities within Organizations: Creating a Better Workplace

Without soft budget constraint, the community model of organizations can help firms to boost their business performance.



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Visitors to Chinese firms often find that some organizations offer extra services to employees, such as kitchens, dining halls, medical clinic rooms, and affiliated schools for the children of their employees. Rather than outsourcing these services, these organizations own them and run them. State-owned enterprises (SOE) established social function units and provided social services to their employees, partly to fulfill the requirement by the government. Surprisingly, newly founded private-owned enterprises (POE) also own and run social function units without mandates from the government. Why are they doing this and what are the pros and cons of offering these non-business units and services?

To answer these questions, organization scholars Yi Hubert Han and Jingjing Yao adopted the view of seeing business organizations through the lens of communities, and conducted case analysis of five Chinese firms to demonstrate the underlying logic and reasons of this phenomenon.

Research Methods

The authors adopted qualitative methods to conduct a multi-case study with a grounded theoretical approach. Central to theoretical building from case studies is the replication logic, that is, being able to replicate the theorized logic and contrast it with other logics. The authors selected five focal firms in China, including Shenzhen Huawei Technologies Co., Ltd., JOYEA Manufacturing Co., Ltd., and three SOEs (one was acquired by a POE later). These firms are dispersed in three geographical divisions of China and can be understood as a nationwide representative sample. They vary from founding year, industry, location, size, and ownership.

The data mainly came from semi-structured interviews and in situ observations. The authors conducted 16 semi-structured interviews, with the length of time ranging from 0.5 to 3 hours (1.5 hours on average). The interviews were conducted

in Chinese. Among the 16 interviews, 14 were with individuals and two were with groups. Interviewees were at different levels in the organization, including entry level, middle level, and top leadership of the organizations. In addition to interview, the authors also spent many hours on site watching and observing the units in operation, and had informal conversations with different stakeholders, such as workers, line managers, and middle managers.

Audio recordings were made during the interviews and were used for analysis after receiving approval from the company. Several steps were taken to ensure the quality of data, including: (1) balance observer insights with interview reflections, (2) similar interview questions were used when interviewing employees and employers to enable triangulation of information, and (3) get confirmation from interviewees about tentative findings to avoid individual biases.

A two-stage coding method was adopted to analyze the qualitative data. In the first stage, open coding was used to help identify emerging themes, with particular attention paid to the themes related



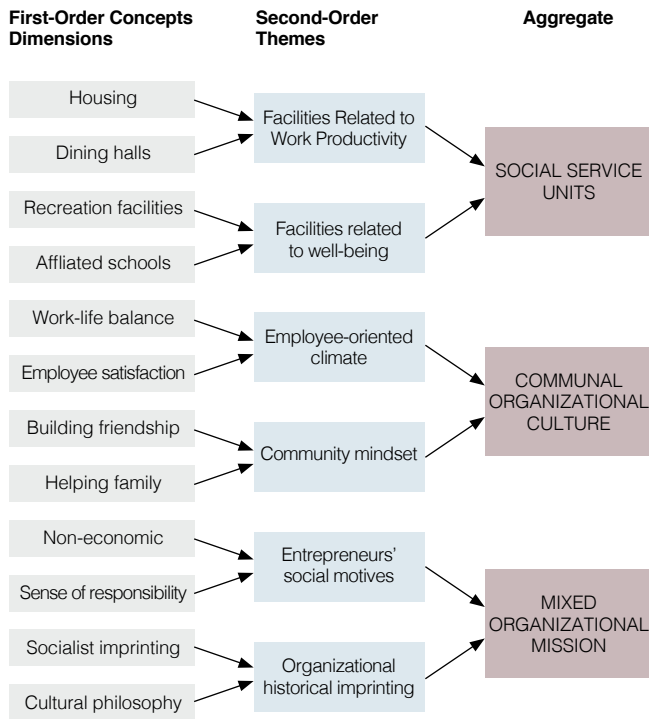


Figure 1. Data structure and the coding process

to community characteristics, such as what, how, and why firms adopted social function units. The interview data was continually triangulated with in situ observations to achieve valid information. In the second stage, axial coding was used to identify similarities and relationships among empirical themes both within and between cases.

Research Findings

All five firms tend to view social function units as necessary for them. Some view setting up these units and providing services for their employees as traditions that employees take for granted, whereas other firms view these units as way to increase employee productivity and efficiency of the company in the long run. Health care, dining rooms, and housing near the production facilities can reduce employees' commuting time, and schools, cinemas, and libraries can enrich employees' life. The themes and categories extracted from the coding process are illustrated in Figure 1.

Based on above empirical evidence and their understanding of the extant organizational theories, the authors applied both inductive logic and abductive logic to identify two key mechanisms that link the themes and dimensions, as illustrated in Figure 2.

The two mechanisms, employee-considerations globally and organizations as communities in China, represent two different lines of practices, logics, and motives, but they are not mutually exclusive. For example, units related to work productivity (e.g., cafeteria) might also function to make life more convenient and improve employee health, whereas units related to well-being (e.g., affiliated schools) might serve as a motivation for employees' organizational commitment and job loyalty.

Firms with social function units and community services, no matter what their ownerships are, bear features of communities in their daily practice, in addition to features of formal organizations. The authors conceptualize the organizing principle of these firms as the community model of organizations. ✉

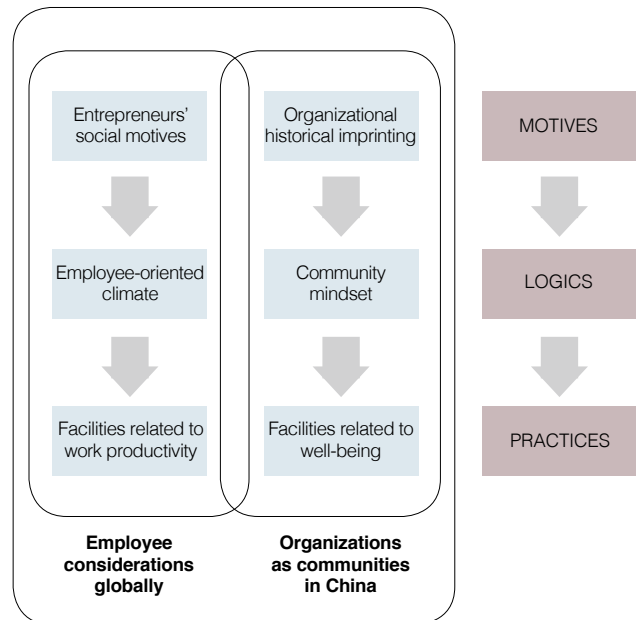


Figure 2. The dual-mechanism model of building communities within organizations

Managerial Implications

Understanding the community model of organizations can provide practitioners with insights into managing organizations and creating a better workplace.

First, organizational imprinting matters. Many Chinese firms adopted the community model because of the historical imprinting of Chinese industrial enterprises—SOEs. SOEs set up social function units and provide community services due to the ideology of socialist state-building; POEs and joint-ventures adopted the similar model in designing their organization to imitate the successful SOEs. These imprints can either impede or facilitate organizational growth, depending on the timing and how managers selectively inherit them. When China started the Economic Reform four decades ago, in order to make SOEs more efficient, policymakers and many business managers tried to abandon the Work-Unit System and build an idealized Modern Enterprise System. In the 21st century, however, new agendas are introduced to Chinese firms, such as Corporate Social Responsibilities (CSR) that includes labor protection and employee well-being. Some Chinese firms now face a dilemma—whether to build their organizations lean and mean, or to retain the social function units they built within their organizations over the years. The findings from this research favors the latter—Chinese firms can retain these non-business units and make good use of them for the new agendas, e.g., change from an emphasis on political goals to an emphasis on social and CSR goals in building and maintaining communities within organizations.

Second, managers and workers' personal value orientations matter. The individual values and life experiences help build community-like organizations,

especially when founders are family and community-oriented. Other than the founders and managers, employees can help create a better workplace as well. For example, they may bring in some personal items to their office spaces—family pictures, coffee mugs, flowers on the office desks, which add warmth to the workplace.

Third, the findings from the five focal firms indicate that the community model of organizations can help firms to boost their business performance, especially for those in a competitive industry. As the communitarian feeling increases loyalty and commitment of the employees and managers, it also increases firm performance in the long run. Without soft budget constraint, community building within organizations can be advantageous, because it does not necessarily increase business expenses. For example, letting natural light in, re-arranging workspaces for more social interactions, providing materials and services for employees to revitalize themselves—does not cost much but can be a good start for brighter future businesses.

Additionally, although the findings are based on Chinese firms, community building has been trending in firms outside China. In the US, for example, firms with a community model were very common in the past, but then it gave way to 'lean and mean' management models. However, it has come back to places like Silicon Valley. Companies such as Apple, Google, Facebook offer social function units and provide various kinds of internal services, are also models of community building within organizations; studying them will generate more insights on the model, and on how to sustain it.

This summary is based on the full article "Building Organizations as Communities: A Multicase Study of Community Institutional Logic at Chinese Firms", *Management and Organization Review*, 2022, 18(5), 829–858. Yi Hubert Han (hanyimail@gmail.com) is a professor at Central China Normal University. Jingjing Yao (j.yao@ieseg.fr) is an associate professor at IESEG School of Management.

Location-Independent Organizations: Designing Collaboration Across Space and Time



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While real-time-oriented organizations used technology to replicate work patterns and interactions in traditional office settings, asynchronous-oriented organizations adopted three novel collaboration practices, including an open single source of truth, rich work trails, and informed action-first iteration. These practices helped them overcome misunderstandings, workflow delays, and limited information sharing to enable effective asynchronous-oriented collaboration.

Location-independent organizations, an extreme case of distributed work, are prevalent in online-dominated industries and continue to grow in other sectors such as professional services, finance, transportation, and healthcare. These organizations have no physical location, so employees work from wherever they want, often whenever they want. Although this increases opportunities for flexibility, the lack of physical proximity requires organizations to establish norms of communication, information sharing, and social practices in order to work effectively.

Scholars have examined distributed work, characterized by the physical dispersion of individuals and reliance on technology-mediated communication. They have suggested that distributed collaboration will be less effective than collocated collaboration and that, in the long term, organizations with distributed work will need to adjust their designs to limit either work interdependence or physical dispersion.

However, location-independent organizations approach reciprocally interdependent collaboration and achieve ongoing success. To understand how they collaborate effectively, the author conducted a multi-case study of profitable organizations with a

long history of location-independent operations.

Sample and Data Analysis

The author purposively selected six location-independent organizations of similar age (at least seven years old) in the Software as a Service (SaaS) industry. These organizations were sufficiently stable in product and organizational development, operated in the United States, and ranged in size from 45 to nearly 900 employees. The author conducted 87 semi-structured interviews (28 to 112 minutes) with founders, managers and employees who varied in function (business, product, customer support), physical location, and individual demographics. Interviews were conducted between June 2018 and August 2019, before the outbreak of COVID-19. Data analysis for a multiple-case design involved a cyclical process intended to explore constructs within cases, emerging patterns across cases, and existing theories.

Two Collaboration Orientations: Real-Time and Asynchronous

Like traditional office-based organizations, *real-time-oriented* location-independent

organizations emphasize human-to-human interactions. They make information available as needed and use communication technology, such as video meetings and back-and-forth text-based conversations, to mimic team-level collaboration in more-traditional office settings.

In contrast, some location-independent organizations *have an asynchronous orientation*. Deliberately moving away from traditional patterns of interaction, these organizations take an organizational-level approach to collaboration, prioritizing document-mediated communication, limiting real-time meetings, allowing flexible working hours, and empower employees (an idea of a “conversational firm”).


Enabling Asynchronous-Oriented Collaboration

To overcome misunderstandings, workflow delays, and limited information sharing to facilitate distributed and reciprocally interdependent collaboration, asynchronous-oriented location-independent organizations have

adopted three novel collaboration practices.

First, these organizations rely on an “*open single source of truth*” practice to provide their employees with a wide range of information. This practice shifts the search for information from human-to-human contact to accessible documents. For example, the organizations build an up-to-date repository of information that exists independently of any individual, make the repository accessible to all members, and develop norms that encourage employee participation in creating and maintaining information. The breadth of information allows employees to discover synergies and unexpected opportunities for collaboration, while also having to manage potential overwhelmed because “there is a lot” of information and “everything is out there.”

Moreover, virtual teams are often challenged by a need for shared context and depth of information. Especially for location-independent organizations, shared context is created through various forms of digital engagement. Asynchronous-oriented location-independent organizations address this challenge by adopting a “*rich work trails*” practice that reflects their core value of “transparent communication.” They leverage document-mediated interactions by documenting work products in progress with the context, notes, and discussions associated with the work, making decision-making processes open access by default, and preserving the complete and rich work history.

Furthermore, asynchronous-oriented organizations adopt an “*informed action-first iteration*” practice by empowering employees and maintaining accountability to their managers. They encourage people to act without waiting for permission, to explore interests outside their core team, and to be aware of what is happening in their organization. Although managers indicate employees’ occasionally misprioritized work, this practice benefits from mitigating the risk of work delays due to time zone distribution. 



Managerial Implications

Asynchronous-oriented collaboration embraces the lack of co-temporality among employees and adapts their default ways of interacting. It is particularly beneficial for organizations with a global temporal distribution, where individuals span most time zones. For organizations, this choice means that they can hire without time zone restrictions. For employees, this choice means that each individual has scheduling autonomy to manage work and life. This creates significant potential for greater inclusion and equity. As one CEO shared, “If you’re able to figure out an effective means of asynchronous communication, it can allow participation from a lot more people and ... give a lot more flexibility and autonomy to people in terms of schedules.”

However, because more-personal interactions indeed enhance the understanding of a shared context, the location-independent organizations in the study also deliberately created opportunities for informal and social interactions among employees. They set social connectedness as an explicit goal and worked to maintain it.

Interestingly, while scholars have suggested the differential effects of different types of technology (e.g., text, audio, video) and their limited ability to convey rich interpersonal and contextual information, the author found that different types of off-the-shelf tools, such as Zoom, Slack, Google Suite, GDrive, Dropbox, Paper, Trello, Jira, Twist, Gitlab, Github, InVision, and Figma, can support the range of practices for effective collaboration in location-independent organizations. What enables divergent practices and orientations

to develop is not the tools themselves but how they are implemented by individuals who enact divergent interaction behaviors.

In addition, the asynchronous and real-time orientations consist of divergent employee interactions for achieving distributed and reciprocally interdependent work. Thus, an organization’s choice of orientation is not independent, but a matter of alignment with other elements of its design and strategy. As this choice can create path dependencies and be self-reinforcing, organizations should carefully consider the trade-offs before committing to an orientation. In particular, asynchronous collaboration practices require significant up-front documentation costs (e.g., time, money, effort), strict organization-wide adherence to novel collaboration practices, and employee acceptance with losing the privacy of their work. Therefore, although these practices mentioned above are not limited to location-independent organizations, organizations with full physical collocation of individuals may find them inefficient.

Notably, the organizations studied were self-selecting, highly committed, and invested in location independence. However, as more organizations have recently moved to remote working, particularly in response to the COVID-19 pandemic, organizations seeking to shift to a location-independent design or a hybrid organizational design could learn from the practices developed in the sampled organizations, yet remain aware of the difficulties of enacting organizational changes.

Indirect Cronyism and Its Underlying Exchange Logic: Why Do Managers Extend Favors to Their Friend's Friend?



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In Chinese organizations, *guanxihu* (关系户) often refers to a person who has a special relationship with another person outside of a formally defined role relationship but involves *guanxi* – an informal, particularistic and personal connection. When a supervisor has *guanxi* with a subordinate, the subordinate is called a *guanxihu* of the supervisor. Previous research on Chinese *guanxi* indicates that *guanxihu* often receives preferential treatment in organizations, such as higher likelihood of receiving an extra bonus, better performance appraisal, and/or promotion opportunities, which has been coined as cronyism, defined as favoritism shown by one party to another based on their relationship, rather than on the latter's capability or qualification. Moreover, accumulated research has shown that cronyism tends to undermine meritocracy and generate negative outcomes, including high injustice perceptions, low morale, and various corporate scandals.

To mitigate the negative impact of cronyism on organizational management, many Chinese organizations, especially state-owned enterprises, have established new policies explicitly prohibiting hiring kin and *guanxihu*, which resulted in significantly fewer *guanxihu* in the formal supervisor–subordinate dyads. However, a subtle form of cronyism, which

we call indirect cronyism, has emerged as a means to circumvent these policies and break the limitations on direct favor exchanges with the third party. Indirect cronyism is defined as a phenomenon in which managers extend favors toward a subordinate because the subordinate is a *guanxihu* of a third party either inside or outside the organization rather than because of his/her own merit. The scandal of J.P. Morgan's 7-year (2006–2013) "Sons & Daughters Program", in which they hired roughly-one hundred interns and full-time employees who had kinship relations with government officials in China and other Asian countries to build banking relationships in the fast-growing region, is a typical example of such phenomenon.

While cronyism generally follows the logic of direct reciprocity, that is, "You scratch my back, and I'll scratch yours", we argue that indirect cronyism follows the principle of indirect reciprocity, that is, "I scratch your back and someone else will scratch mine". When the manager, the third party and the subordinate form a small implicit informal *guanxi* network within which both the manager and the subordinate have *guanxi* with the third party, but only the role-based formal relationship exists between the manager and the subordinate, the indirect reciprocity principle may manifest itself as the un-transference rule of *guanxi*.

Indirect Reciprocity and Un-transference Rule of Guanxi

The un-transference rule suggests that *guanxi* does not automatically transfer from one party to another. For instance, in a *guanxi* chain, person X has *guanxi* with Y, and person Y has *guanxi* with Z ($X \longleftrightarrow Y \longleftrightarrow Z$). When Z has a need, say getting his son admitted into a prestigious kindergarten, Z will go to Y for help. If Y cannot help but knows that X is the owner of the prestigious kindergarten, Y will go to X for help. X agrees and admits Z's son to enroll in the kindergarten. In this case, it is X who eventually helped Z, but X still does not have *guanxi* with Z, and would NOT expect Z to return the favor. Instead, X will think that the favor was extended to Y and would expect Y to return the favor in the future. In other words, the social exchange happened between X and Y and between Y and Z, but not between X and Z. In the J.P. Morgan scandal, the social exchange was between the company and the parents (government officials) of the hired sons and daughters, but not directly between the company and the sons and daughters.

In our study context, where the manager, the third party and the subordinate form an informal *guanxi* network, the un-transference rule (manager \longleftrightarrow third party \longleftrightarrow subordinate) would predict that even when the manager shows favoritism to the *guanxihu* subordinate, their relationship would remain role defined. In other words, the manager may show favoritism to the subordinate, but their underlying motivation is not to gain benefit from the subordinate or earn the subordinate's loyalty, rather, it is the obligation they feel to the third party and/or their desire to strengthen their own *guanxi* with the third party in the hope that favor can be returned in the future. Putting it another way, it is likely that in the manager's mind, the social exchange happens only between him/her and the third party.

Facilitating Conditions: Particularism Orientation, Subordinate Performance, and Third-Party Position Power

We first examine the effect of managers'

particularism orientation, conceptualized as a personal belief that people should give preferential consideration to the interests of close others or members of an in-group over members of an out-group, on their likelihood of engaging indirect cronyism. Particularism dictates that people pay more attention to the obligations of caring for close others than to abstract social rules, such as impersonal merit-based personnel policies. As most Chinese people tend to embody a relational and/or collective self-construal, that is, defining self in terms of close relationships, viewing self as highly interdependent with close others, and treating others depending on the group to which they belong, it is likely that the manager will view the *guanxihu* subordinate as an extended "in-group" member, which triggers felt obligation to render favor, leading to favor giving at the end.

Meanwhile, managers are responsible for creating a positive and highly motivated work environment promoting cooperation and teamwork to achieve organizational goals. They bound to follow the norm of justice such as merit-based criteria in human resource management, and the justice norm dictates that better performance should be rewarded with better outcomes, such as promotion opportunities or higher pay, so when one's performance is better than average, promoting this person is not considered favoritism. But when one's performance is below average the merit-based rule will demand an unfavorable decision. In such a situation, if the manager still renders a favorable decision, it will be perceived as a big favor in the mind of the subordinate as well as of the third party, embodying high value. We therefore predict that the effect of managers' particularism on their favoritism toward the *guanxihu* subordinate would be greater when the subordinate's performance is low than when it is high.

Furthermore, we predict that the third party's hierarchical position will facilitate managers' indirect cronyism. All managers are embedded in a large social network that includes their own supervisors and other fellow managers in the organization, who are interdependent in that they influence one another's

performance and resource allocation. Because people occupying higher positions in the organization often have more power in determining the manager’s future career progress (e.g., performance evaluation, resource allocation, promotion) the manager would be more likely to engage in indirect cronyism when the third party’s hierarchical position is higher.

Research Methods and Findings

Due to the sensitive and secretive nature of *guanxi* in Chinese organizations, it is very difficult to obtain truthful data in the field. We therefore conducted our studies using scenario-based experiments. Three studies were conducted to demonstrate the indirect cronyism phenomenon and its underlying logic. The results provide convergent evidence for our predictions.

Study 1

Two hundred and fifty full-time employees participated in this experiment. The experimental design was 2 (indirect *guanxi*: present or absent)×3 (subordinate’s task performance: poor, average, or excellent) factorial. After reading the scenario below, the participants were asked to indicate their willingness to nominate Mr. Z for promotion.

You are a department manager in a large company.

Every summer, you are asked to nominate one subordinate from your department to be promoted to a managerial position in the company. Your recommendation is crucial because the company policy is such that no employees can be promoted without a manager’s recommendation. You are giving this matter serious consideration.

One subordinate comes to your attention: Mr. Z. Mr. Z joined the company six months ago and you only interacted with him on work-related issues. However (Meanwhile), you heard that Mr. Z is a nephew of one of your superiors (or had no relationship with anyone) in the company.

You checked the task performance record of your department and found that Mr. Z received a 2 (or 6 or 10) on a 10-point scale whereas the average performance of the rest of the department was 6.

We measured managers’ particularism orientation by asking them to answer “yes” or “no” to a situation in which they were selling an insurance product that is really wanted by a friend, but this friend’s health situation does not meet company requirement. They need to decide whether or not to help the friend by hiding his/her true health situation. If he/she respond with “yes”, that means his/her particularism orientation is strong; otherwise, weak.

Findings: For managers whose particularism

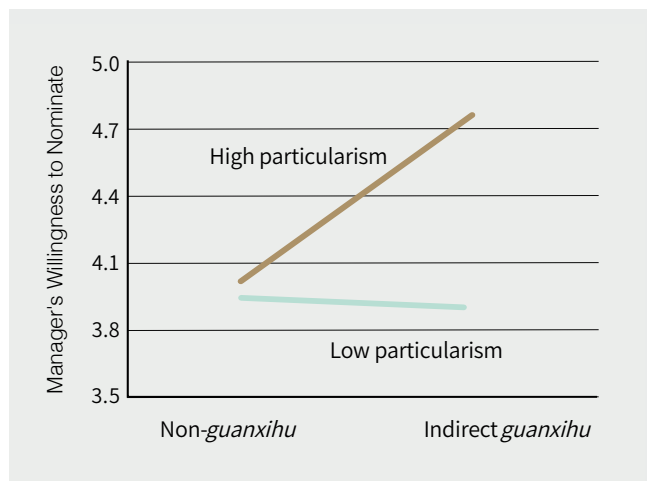


Figure 1

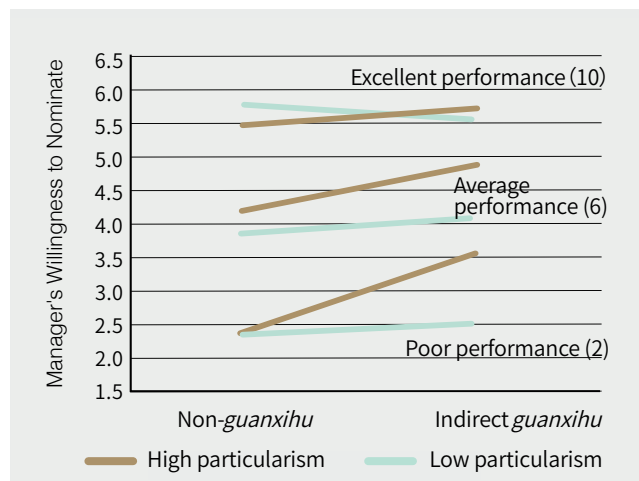


Figure 2

orientation is weak, they treated the *guanxihu* and non-*guanxihu* subordinate the same way; but for managers who have a strong particularism orientation, they treated the *guanxihu* subordinate more favorably than the non-*guanxihu* subordinate, and such tendency was stronger when the subordinate's performance was poorer (see Figures 1 and 2).

Study 2

Four hundred and eighty-six full-time employees participated in this study. To examine our implicit assumption that direct and indirect *guanxi* are different, we included it in our experimental design, which is 3 (*guanxi* type: direct, indirect, no-*guanxi*) \times 2 (subordinate performance: moderately high or low) \times 2 (third party position: superior or peer) factorial. The experimental scenario was similar to the one used in Study 1.

We measured managers' particularism orientation using a 4-item scale (e.g., "Everyone is responsible to take care of close others."). We also measured their (a) felt obligation to help the *guanxihu* as an in-group member, and (b) perception that helping the *guanxihu* can help them strengthen *guanxi* with the third party.

Findings: Managers indeed distinguish between direct *guanxi* and indirect *guanxi*, and they feel closer to direct than to indirect *guanxi*, and more

willing to favor the direct than to favor the indirect *guanxi*. Figure 3 shows that when the subordinate is an indirect *guanxi*, compared to managers with a weak particularism orientation, those with a strong one are more likely to nominate this person, especially when he/she has moderately low performance. Finally, two motivations mentioned above were significant behind managers' indirect cronyism, confirming our predictions.


However, we did not find the influence of the third party's position power on managers' willingness to nominate the *guanxihu* subordinate, who had a kin relationship with the third party.

Study 3

In this experiment, we described the *guanxihu* subordinate as having no kin relationship with the third party. Instead, their *guanxi* bases were either former classmates, former colleagues, or from the same hometown. The experimental design was similar to that of Study 2, a total of 286 full-time employees participated in this study. We found evidence for all of our predictions.

First, when the *guanxihu* subordinate had moderately low performance, managers with strong particularism orientation were more willing to nominate this subordinate than those with weak particularism orientation; but when the *guanxihu* subordinate had moderately high performance, there were no significant differences (see Figure 4).

Second, when the third-party was a superior, managers with strong particularism orientation were more willing to nominate this subordinate than those with weak particularism orientation; but when the third-party was another peer manager, there were no significant differences (see Figure 5).

Finally, results show that the motives for managers to engage in indirect cronyism are two: felt obligation to help the *guanxihu* subordinate and strengthening their *guanxi* with the third party, but not to gain loyalty from the subordinate. 

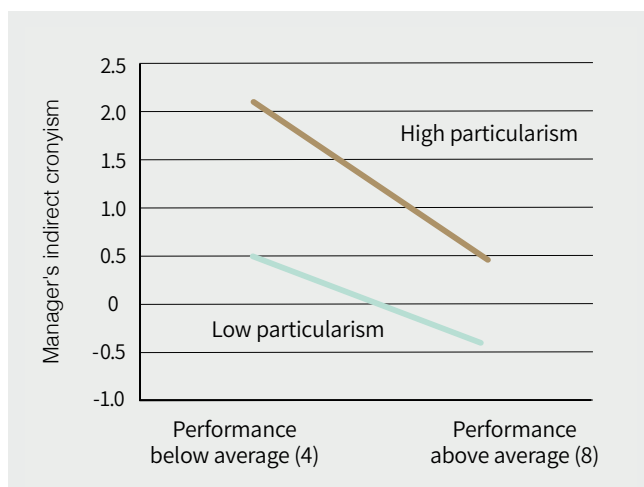


Figure 3

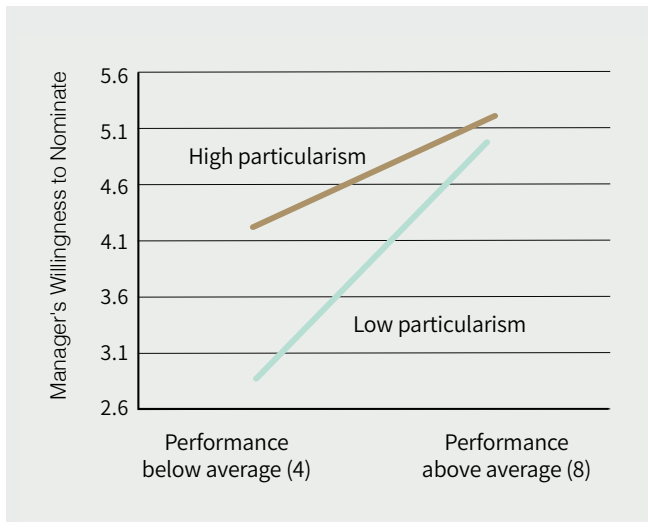


Figure 4

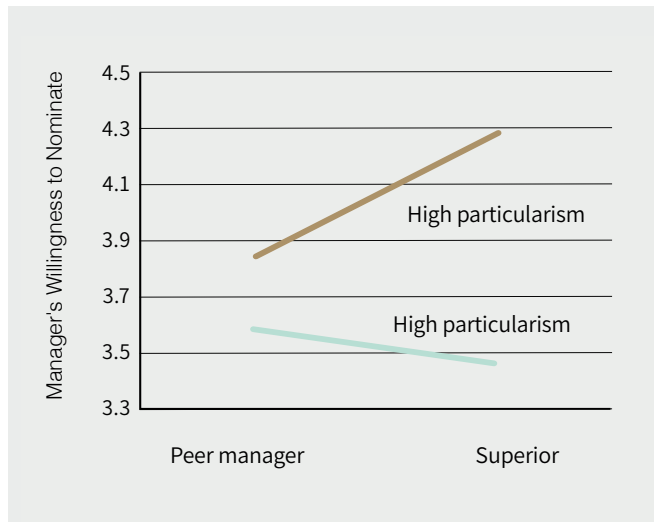


Figure 5

Managerial Implications

We tested the robustness of the indirect cronyism phenomenon by collecting data from another sample 723 employees of Chinese organizations. We first asked them whether they have observed incidents where a guanxihu was involved in their current or previous work unit. 252 (45%) participants reported “yes”, we then asked them to recall one or two incidents that involved a personnel decision related to the guanxihu, and judge whether the guanxihu received favor or no favor. Among the 391 recalled incidents, 47.8% of the decision favored the guanxihu, and 52.2% did not favor the guanxihu. For the favored guanxihu, 49% of them had a kin relation with a third party and 45% had non-kin relation. Meanwhile, among the guanxihu that did not receive favorable treatment, nearly 50% had a kin relation with the third party. These results suggest that indirect cronyism is quite common in Chinese organizations, but it does not mean that all managers do it, and it is not directly related to whether the guanxihu is kin of the third party.

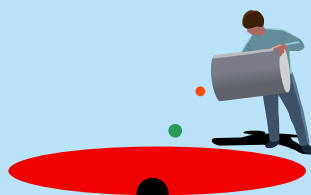
More remarkably, our investigation shows that in the mind of the observing employees, the main reason for managers to give special treatment to the guanxihu subordinate is that these managers strongly endorse particularism orientation; it has nothing to do with the subordinate’s performance or the third party’s positional power. As a result, they don’t trust these managers, and they are unwilling to develop long-term relationships with them, and have a strong sense of injustice about their work unit.

Although everything exists for a reason, our studies show that the reason could be very different for actors (managers) and observers (non-guanxihu employees). While managers’ rationality guides them to extend favor to the guanxihu subordinate, the non-guanxihu employees view such favor as unfair and unjust. To create organizational justice, it will be important to weaken managers’ particularism orientation, and encourage them to learn perspective taking, and to adopt merit-based criteria to evaluate and reward employees.

This summary is based on the full article “Indirect Cronyism and Its Underlying Exchange Logic: How Managers’ Particularism Orientation and the Third Person’s Hierarchical Power Strengthen Its Existence”, *Organizational Behavior and Human Decision Processes*. Xiao-Ping Chen (xpchen@uw.edu) is Philip M. Condit Endowed Chair Professor at University of Washington. Han Ren (renhan_90_12@126.com) is an associate professor at Sichuan University.

The Organizational Psychology of Gig Work

Through an integrative conceptual review, the authors identified six nontraditional human resource (HR) practices that organizations use to adapt to gig work: deconstructing jobs into standardized tasks, hiring through third-party staffing agencies, algorithmic management, project-based compensating without benefits, limited or cost-effective training, and using blended teams. Gig workers respond by engaging in job crafting and work identity management, altering their commitment towards an organization, balancing autonomy and dependence, learning to cope with pay volatility, engaging in self-development, and adapting to social isolation.



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Gig work is thriving, with over 27 million people and around 88% of businesses in the U.S. engaging in this form of employment. This trend is not limited to the U.S. alone but extends to Europe and Japan. Gig work refers to labor contracted and compensated on a short-term basis to organizations or to individual clients through an external labor market. Gig workers handle multiple assignments for various organizations without being legally recognized as employees.

The psychological contract between gig workers and employing organizations is of particular interest, as this group operates under a transactional contract that is focused on short-term economic concerns, easily monitored, and quid pro quo. While traditional organizations have used internal policies and procedures to set wages and labor policies, many have turned to gig workers for flexibility in staffing, specialized skills and knowledge, and cost reduction. The result is a new psychological contract that differs from that of standard workers. The authors review the burgeoning literature on gig work, providing a roadmap for future research and practices in this area.

Method and Findings

The authors conducted a comprehensive search of academic literature in Business Source Complete, Google Scholar, and relevant journals, yielding 243 articles from 1993 to early 2022, including 70 conceptual and 173 empirical studies.

When Gig Work Is Preferred to Traditional Employment

Why do people choose to join and remain in the gig economy? Many individuals choose gig work for its autonomy, freedom, and flexibility. However, it is unclear when these benefits outweigh traditional organizational inducements, such as open-ended employment and medical benefits. Highly talented individuals may prefer gig work if their skills are in demand, whereas less experienced workers may resort to gig work if other options are unavailable. Family

considerations matter as well. Some individuals with children may prefer gig work, as it affords them the ability to adapt their work to their family commitments. However, gig work tends to provide less employment security, and this seems to be a concern for others. Gig work has both challenges and benefits, and gig workers are diverse. More research is needed to fully understand its appeal.

Organizations' Adapting to Gig Work

Organizations that opt for gig workers may need to adapt their HR practices, leading to altered psychological contracts and inducements. The authors identified six key HR practices that are altered by the use of gig workers.

Job analysis and redesign. Gig workers typically perform standardized and peripheral tasks, with traditional jobs broken down into smaller components. This redesign, called “commodification,” enables companies to hire gig workers strategically for lower-value tasks while reserving core responsibilities in-house. However, the prevalence of this practice remains uncertain. By aligning job analyses with organizational strategy, companies can make informed design choices.

Hiring. Gig work’s temporary and standardized nature often means that workers prioritize immediate opportunities over finding an ideal organizational fit. Third-party staffing agencies often serve as intermediaries, screening and assigning workers to clients. This creates triangular relationships between the organization, the agency and the worker, with each party entering into a psychological contract with the others. Actors may strategically reinforce or balance these relationships to optimize outcomes. For example, workers may cultivate long-term ties with agencies to secure better pay from organizational clients, while strong agency ties could benefit organizations but reduce worker wages.

Managing. Gig workers often operate under a new psychological contract managed through algorithmic management, a system that minimizes human involvement in decision-making. Algorithmic

management streamlines administrative systems and reduces human resource costs, allowing businesses to save money. Onboarding new workers is no longer a process of socialization and training, but rather involves simply downloading an app and registering, with payment offered automatically upon task completion. Customers rate workers using the app, and those with low ratings may face penalties or removal from the app.

Compensating. Gig work appeals to organizations as it allows them to pay for specific services, rather than maintaining long-term employment relationships. Determining the best practices for compensating gig workers is a complex issue. Research suggests that gig workers' pay level is comparable to or slightly higher than traditional employment, with some earning extra money and strong earnings that keep them from returning to traditional employment. Organizations can anticipate comparable rates for gig work as for traditional employees, while still saving money by paying based on tasks or projects, while not providing benefits like health care, pensions, and sick leave.

Training and development. Organizations favor gig workers for their flexibility and cost savings, but they often hesitate to invest in training and development due to the short-term nature of gig work. Concerns about legal misclassification further discourage firms from offering training opportunities. However, failing to invest in training may result in a less-skilled workforce, with individual and societal costs. As effective onboarding can improve task performance and increase worker retention, organizations can consider cost-effective training options such as low-cost or recurrent training, and better contracting to avoid legal challenges.

Teamwork. As organizations integrate gig workers into blended teams with regular employees, concerns arise such as increased training responsibilities, less performance feedback, and reduced job security for regular employees. Research suggests that minimizing competition and providing support for both groups are necessary for successful teamwork. Failure to address these issues can result in negative effects of planned turnover, such as work

disruptions and reduced financial performance, which can outweigh the benefits of labor flexibility. However, complementing the workforce with a critical mass of freelancers can result in sales growth, job creation, and benefits for both regular and gig workers.

Workers' Adapting to Gig Work

Gig work introduces a new type of work relationship, which requires gig workers to adapt to the gig psychological contract. The authors identified six adaptations that gig workers may need to make.

Job crafting and identity management.

Standardized tasks can be tedious yet easy to learn. Gig workers can use diversified portfolios of standardized tasks to create unique jobs tailored to their skills and preferences, resulting in enriched work and higher rewards. However, this form of job crafting can challenge gig workers' sense of identity, as their work relationships and contracts are constantly changing. To counter this, research recommends that gig workers develop a meaningful and coherent work identity by flexing their narrative identity, engaging in specific social and cognitive practices, and adapting to the label of "entrepreneur."

Commitment. The rise of gig work challenges traditional notions of "commitment," as gig workers may prioritize other targets, such as staffing agencies, digital platform communities, or their own work/life goals. Recent evidence suggests that individual crafting activities and building stronger interpersonal relationships can strengthen commitment. However, loss of any one of these relationships can have negative psychological consequences. Gig workers may have a different type of commitment that is strong but also multifaceted and flexible. For example, a platform-based digital designer may feel committed to their profession, virtual work community, and work style in ways that reinforce each other.

Autonomy and dependence. Understanding workers' autonomy and economic dependence is key to comprehending their responses to algorithmic management. High autonomy and low dependence


on the platform can lead to job enrichment, while low autonomy and high dependence can result in worker dissatisfaction due to income fluctuations and algorithmic control. For vulnerable workers, such as those in the latter category, tools and safeguards must be developed to protect them.

Income volatility and obtaining benefits.

Gig workers may face declining earnings due to increased competition from highly educated individuals. Additionally, gig workers often receive smaller tips than standard employees, compounding the problem. The volatile nature of gig work also leads to highly variable earnings over time, which can cause stress and anxiety. While gig workers report more perceived flexibility, the reality is that they often work long hours and are “on-call” around the clock, making it difficult to achieve a truly flexible schedule. Although platforms can help neutralize the urgency of gigs, gig workers still struggle to obtain benefits, pay taxes, and handle administrative tasks.

Self-development. Gig workers need to invest in their skills but may miss earning opportunities

due to the costs of self-directed training. To address this issue, many gig workers seek out “stretchwork” assignments that offer on-the-job skill development. However, it remains unclear how workers without credentials or experience can access them. Experienced gig workers can mentor less experienced workers, but effective strategies for navigating this double bind need further research.

Status and social support. Gig workers may struggle with teamwork due to isolation and lack of formal advancement procedures or colleagues. Researchers suggest studying faultlines between gig and standard workers in blended team settings to improve group effectiveness. While detrimental, faultlines can facilitate group effectiveness when teams value diversity and share a common identity. To manage blended teams, organizations, teams, and individuals can take actionable steps like self-affirmation interventions and reframing exercises. Gig workers can also cope with social isolation by developing alternative community structures like networks of practice, professional organizations, and staffing agencies, or utilizing self-led networking. 

Managerial Implications

Gig work can be a boon for workers seeking job flexibility, but excessive autonomy and work instability may lead to negative emotions. Those who can adapt to the new psychological contract are less likely to experience such emotions and can perceive their careers as a diversified portfolio of investments for a personalized “job” and enriched work experience.

Job suitability for gig work depends on the degree of control in which the organizations have over

performance. Jobs with observable outcomes, such as driving or house cleaning, are ideal for gig workers as they reduce risk and enable digital platforms to use customer ratings as a performance metric. Jobs with ambiguous outcomes, like classroom instruction, pose risks. Highly skilled workers who can manage ambiguity effectively, such as independent consultants, are increasingly joining the gig talent pool. As gig work becomes more prevalent, scholars must support gig workers and prompt fair treatment from organizations.

This summary is based on the full article “The Organizational Psychology of Gig Work: An Integrative Conceptual Review”, *Journal of Applied Psychology*, 2023, vol.108, 492-519. Russell Cropanzano is a professor at University of Colorado Boulder. Ksenia Keplinger is a researcher at Max Planck Institute for Intelligent Systems. Brittany K. Lambert is an assistant professor at Indiana University. Brianna Caza is an associate professor at University of North Carolina at Greensboro. Susan J. Ashford is a professor at University of Michigan. Lan Wang is an associate professor at Peking University.

How Do Breakthrough Inventions Influence the Exploration of Problem Complexity?



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In 2016, AlphaGo made headlines when it defeated Lee Sedol, one of South Korea's top professional Go players. Go is a game with complex variations that even computers find difficult to exhaust all possibilities, making it one of the most challenging games for computers. Before AlphaGo's appearance, the best computer programs could only compete with amateur players, and there was still a significant gap between them and professional players. However, AlphaGo's developers' recombination of existing technologies such as deep learning, reinforcement learning, and Monte Carlo tree search algorithm helped AlphaGo stand out from many artificial intelligence programs. As a result, AlphaGo successively defeated top human players to become the world's number one.

Both inventions and innovations involve the recombination of existing knowledge. The complexity in such recombination may lead to the arrival of novel inventions. The authors of this paper define recombination complexity as a high degree of interdependence between existing and new knowledge or technologies. When

considering invention problems, incorporating more interdependent knowledge may result in more unexpected and novel knowledge recombinations.

However, exploring complex invention problems is not easy. To explore complex problems, one often needs to clarify the details of interdependence between related knowledge and understand what effects various knowledge recombinations will bring. This requires a lot of brainpower. Therefore, inventors are often more willing to explore less complex problems. Although doing so may miss the opportunity to make significant breakthroughs, just like humans who like to use intuition to make judgments — even though the accuracy is not high — it is easy.

The Motivational Impact of Major Breakthrough Inventions

Just as AlphaGo greatly promoted and stimulated development and research in related fields of artificial intelligence, major breakthrough inventions will encourage innovators to explore more complex

problems during technological searches. Firstly, if complex knowledge recombination is compared to a maze, breakthrough inventions are like maps that vividly show how to carry out novel knowledge recombination. With this “map” as guidance, innovators can better understand the ways and functions of related knowledge reorganization and can better judge some possible effects that can be produced by knowledge recombinations. Secondly, the “problem-solving ideas” provided by breakthrough inventions are often very novel and unexpected. Innovators will want to explore and investigate the details of related knowledge recombinations. As their understanding deepens, developers will naturally want to try out possible recombination methods between new information behind breakthrough inventions and existing knowledge. After learning how to solve problems, even if unfamiliar knowledge is incorporated into them, it will not be so daunting for innovators. In short, as a “map” and “problem-solving idea,” breakthrough inventions enhance innovators’ understanding of new ways of knowledge combination and potential combinations between new knowledge and existing or unfamiliar knowledge. They equip them with tools for exploring complex problems, reduce their cognitive burden in dealing with complex interdependencies between knowledge, and enable them to explore more complex knowledge recombination problems.

Heterogeneous Effects due to Innovators’ Characteristics

Although AlphaGo’s man-machine battle attracted much attention, not all artificial-intelligence-related innovators benefited from it. The extent to which innovators benefit from breakthrough inventions depends on their personal knowledge reserves and abilities to acquire new knowledge. Learning through knowledge search is a common way to update knowledge and improve knowledge reserves. The



wider the search range, the broader the innovator’s vision will be, and they are more likely to find opportunities for knowledge recombination that others find difficult to discover based on the inspirations of breakthrough inventions. For example, researchers with experience in archaeology, remote sensing, and pattern recognition may draw inspiration from CNN (convolutional neural network) applications and use novel methods to process aerial images to achieve complex tasks such as archaeological object detection.


In addition, innovators can access new knowledge through experimentation. By conducting trial-and-error experiments and verification through experiments, innovators can obtain previously overlooked or misunderstood recombinations of knowledge. New information on knowledge combination possibilities can break innovators’ cognitive inertia and expand the boundaries of their knowledge systems. Through experiments, innovators may also come into contact with relatively obscure knowledge which helps them find more opportunities for knowledge reorganization so that they can extend their learned combinations from breakthrough inventions into new scenarios.

Research Samples, Methods & Findings

AlphaGo's relevant data on machine learning developers provides an excellent research sample for this study. To begin, in several aspects AlphaGo can be regarded as a breakthrough invention in machine learning field: first, it recombined deep learning reinforcement learning and Monte Carlo tree search algorithm. Second, its performance was extraordinary, being first computer program in history which defeated top-ranked human professional Go player. Third, AlphaGo's man-machine battle with Lee Sedol caused huge response. In academia, 3 papers on Monte Carlo tree search only received hundreds of citations while two papers on AlphaGo received nearly 10,000 citations. In Go world, no one thought computers could win against top human players, but AlphaGo not only won but also made brilliant moves during the game play. Therefore, the authors took AlphaGo's man-machine battle as a breakthrough invention and

analyzed whether it helped increase the complexity of problems explored by relevant developers.

In addition, the authors used the posts by machine learning developers on the programmer Q&A platform (Stackoverflow.com) to measure the complexity of the problems explored by developers, the scope of their search, and their level of engagement in experiments. Data analysis was conducted using posts from 1,284 developers obtained from the platform.

The authors found that after AlphaGo's victory, developers in the field of deep learning focused on exploring more complex innovation problems compared to the control group of developers with no relevant experience. Among deep learning developers who had broader knowledge search breadth and trial-and-error experience, the positive impact of AlphaGo's victory on the complexity of the problems they explored was more significant. 

Managerial Implications

Recently, the launch of ChatGPT, hailed as a revolutionary breakthrough, has once again brought AI-related topics to the forefront. It seems that China has lagged in AI competitions. How to respond to the fast technology advancement has sparked widespread discussion. The findings from this study suggest the importance of rapidly and widely disseminating the impact and significance of new breakthrough inventions. Although ChatGPT did not originate in China, the faster the dissemination of these breakthrough inventions, the more comprehensive and extensive the discussions are, the more likely it would encourage Chinese

developers to dare to challenge complex problems, pursue further innovations, create their own ChatGPT, and even lead technological developments in certain fields in the future.

The research also highlights the importance of extensive knowledge reserves and the tracking and acquisition of new knowledge for researchers. In the Internet age, perhaps the time difference in accessing information has become minimal. However, only those who are prepared in terms of the breadth and depth of cutting-edge knowledge can seize opportunities and ride the wave of technology.

This summary is based on the full article "Breakthrough Invention and Problem Complexity: Evidence from a Quasi-Experiment", *Strategic Management Journal*, 2022, Vol.43, 2510-2544. Yuchen Zhang (yzhang54@tulane.edu) is an assistant professor at Tulane University. Wei Yang (wyang@ceibs.edu) is an assistant professor at CEIBS.

Leveraging Categories and Narratives for Market Success: Insights from Airbnb



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Airbnb serves as an online platform that connects hosts offering short-term and long-term accommodations, as well as experiences, with guests seeking such accommodations. In this article, the authors delve into the significance of meticulous crafting of listing descriptions by hosts, exploring when and why it matters.

Imagine you are planning a short family trip, and as you log onto Airbnb.com, several immediate decisions confront you. You must determine the accommodation dates, the number of travelers, the distance from home to the destination, and your affordable price range.

Once you've filtered these initial considerations, additional questions arise: Would you prefer a "castle" or a "treehouse" experience? Perhaps some "off-the-grid" or "beachfront" days? Based on your selected category, Airbnb presents you with a list of options. As a consumer, you then screen and evaluate these options and find the one that aligns best with your preferences.

But wait... Have you ever pondered how the narratives about the "distinctiveness" of these listings impact your final choice?

In a thought-provoking paper titled "Categories and narratives as sources of distinctiveness: Cultural entrepreneurship within and across market categories," published in the March 2022 issue of the *Strategic Management Journal*, researchers reveal that both the category in which a listing falls and the host's narratives significantly influence consumers' demand for the listing and the price they are willing to pay. Now, the question is, why does this happen?

The Role of Categories and Narratives

Narratives serve as crucial symbolic management tools for positioning entrepreneurial offerings, enabling effective communication of a product's similarity and distinctiveness to important audiences. Research has emphasized the pivotal role of "categories" in shaping how audiences perceive and assess a product, acting as cognitive structures that help make sense of and evaluate unfamiliar offerings.

This study contends that product categories play an integral role in shaping audiences' perceptions and evaluations of an offering's distinctiveness. For instance, in Airbnb listings, categories like "apartments" or "boathouse" creates experience-based groupings of accommodations, significantly influencing audience perceptions and choices. These categories act as cognitive filters, helping audiences pre-select products for consideration, while also providing an essential reference point to assess product similarity and uniqueness.

Scholarly research at the intersection of strategic management and organization theory has explored the tension between differentiation and conformity in theorizing the relationship between distinctiveness and demand-side performance outcomes in entrepreneurial markets. This line of research has focused on symbolic forms of differentiation, such as the textual description of a mobile app or the narrative of a start-up story on a crowdfunding platform. In contexts where numerous competitors vie for consumer attention, finding an optimal positioning strategy and differentiating from rivals is crucial for a focal product or organization. For example, a well-crafted entrepreneurial story on a crowdfunding platform can capture consumer attention and significantly drive up demand. The impact of entrepreneurial narratives on demand-side performance can sometimes outweigh other characteristics of the product.


Categories and Narratives in Airbnb Listings

The authors conducted an empirical study using the Airbnb market in the United States to examine the role of "narratives" in conveying the uniqueness of listings and their impact on generating demand. The Airbnb marketplace encompasses a wide array of 45 accommodation categories, ranging from relatively common ones like townhouses to highly unique categories such as boathouses and treehouses. When searching for accommodations on Airbnb, users tend to explore across various categories, evaluating and comparing listings both within and between these categories. This characteristic of the Airbnb marketplace makes it an ideal environment for developing and testing theories related to category distinctiveness and how it influences the optimal distinctiveness of entrepreneurial narratives within and across categories.

To conduct this study, the authors compiled a novel dataset containing information on all Airbnb accommodation listings available in 12 major US markets. The dataset includes 425,857 observations for 159,343 Airbnb listings surveyed at 6-month intervals from July 2018 to July 2020. Using a generalized estimating equation (GEE) approach to analyze this panel database, the authors discovered compelling evidence that the relationship between the distinctiveness of listings' narrative (measured via content analysis using topic modeling of listings' text descriptions) and demand (assessed by listings' price premiums) significantly depends on the distinctiveness level of the listings' categories.

The study delves into when and why Airbnb hosts should craft their listing narratives. While the authors assessed narrative distinctiveness on a continuous scale, it can be broadly categorized into three levels—similar to other offerings, moderately special, and highly unique. The findings reveal that for Airbnb listings in the "indistinctive" category, those with

“moderately special” narratives attract the most demand. However, for listings in the “distinctive” category, having either a highly similar or highly

unique narrative compared to other listings in the same category is most effective in capturing consumer attention and generating superior demand. 

Managerial Implications

How can entrepreneurs and managers successfully generate customer demand for their products? Simply emphasizing “distinctiveness” is not enough. It is important to understand the categories in which their products belong and craft entrepreneurial stories that align with these specific contexts. For instance, Customer A, a novelty-seeker, may be drawn to a hand-crafted modern yet charming rock cave situated in a World Natural Heritage Park, provided the listing’s narrative carefully highlights its uniqueness. Such a customer may happily pay over US\$2000 per night for this exceptional experience. On the other hand, Customer B, planning a family trip with slightly unique travel aspirations, may prioritize family needs and costs. In this case, a listing with a moderately special entrepreneurial narrative, such as one featuring a sunset or a beautiful ocean view, could be the best fit.

This study underscores the role of categories as a source of differentiation for their members, showcasing how a distinctive category can help its members stand out and differentiate their offerings in a crowded market. The distinctiveness of a category can shape the composition of its audiences, influencing their norms, values, and expectations, thereby determining the strategies of category members and the effectiveness of their symbolic tools. For instance, unique products are likely to appeal to “novelty hunters,” characterized by a high tolerance for non-compliance and a strong appreciation for novelty and uniqueness. As a

result, they are more likely to be drawn to distinctive categories than indistinctive ones.

The findings also unveil new possibilities for entrepreneurs to position their offerings by carefully crafting narrative descriptions. The study highlights that ‘category distinctiveness’ acts as a critical boundary condition for what constitutes an optimally distinct narrative. This insight is broadly applicable across various categories, including product and organizational domains.

Of course, the best positioning strategy for a company depends on its specific industry. According to a 2019 study by Haans, if convergence among competitors is the norm, there are ample opportunities for companies to differentiate and stand out. Conversely, if the industry has already achieved sufficient diversification, differentiating from existing players becomes more challenging.

Overall, categories and narratives are powerful tools entrepreneurs and managers can leverage to gain audience attention and positive evaluation, ultimately translating into market success. For example, entrepreneurs can leverage categories and narratives to present a compelling image to investors and resource providers, enhancing their chances of acquiring resources. In establishing strategic partnerships, managers can also gain favor from potential partners by conveying an optimally distinct positioning compared with competitors.

This summary is based on the full article “Categories and Narratives as Sources of Distinctiveness: Cultural Entrepreneurship within and across Categories”, *Strategic Management Journal*, 2022, 2101–2134. Karl Taeuscher (karl.taeuscher@manchester.ac.uk) is a senior lecturer at University of Manchester. Eric Yanfei Zhao (eric.zhao@sbs.ox.ac.uk) is a professor at University of Oxford Saïd Business School. Michael Lounsbury (ml37@ualberta.ca) is a professor at University of Alberta. Monica Ren is an assistant professor at Macquarie University.

Supervisor Curiosity: The Catalyst for Innovation in Teams





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Curiosity might have killed the cat, but it appears to be a driving force behind innovation in the workplace. This research not only underscores the pivotal role of supervisor curiosity in team innovation but also differentiates the distinct mechanisms through which various types of curiosity influence different categories of innovation, providing enterprises with a highly actionable blueprint for innovative job design.

In an era where business success is highly dependent on creativity, organizations often invest heavily in technological advancements and try to unearth exceptional talents from the job market. Yet, curiosity, a crucial personal trait, needs to receive more attention. Curiosity, the intrinsic desire of an individual to learn and explore the unknown, is an indispensable driving force behind innovation. Walt Disney once said, “We keep moving forward, opening new doors and doing new things, because we’re curious and curiosity keeps leading us down new paths.” This profound curiosity has driven industry leaders like Steve Jobs and Elon Musk to establish transformative enterprises like Apple and Tesla.

Moreover, the power of curiosity isn’t limited to entrepreneurs or innovators; it can also drive innovation at the team level. Recently, Dr. Jie (Yonas) Ma from Jinan University (Guang Zhou) published his latest research findings in the journal *Organizational*

Behavior and Human Decision Processes, delving into the structure and features of team supervisor curiosity and revealing its catalytic effects on team innovation.

Types of Curiosity

The study explores two distinct types of curiosity—Interest-type (I-Type) and Deprivation-type (D-Type). I-Type curiosity is driven by a genuine interest, enhancing the joy of learning and exploration. On the other hand, D-Type curiosity arises from a lack of essential knowledge and the associated anxiety about ignorance, prompting individuals to alleviate the discomfort by seeking detailed information. To illustrate, let’s consider a real-life example: when ChatGPT first became publicly available, both types of curiosities could have been triggered. Some people, primarily motivated by I-Type curiosity, would use ChatGPT for the sheer joy of experimenting with new technology, driven

intrinsically. Conversely, others, feeling uncertain due to their lack of understanding of AI, would seek to narrow the gap in their understanding of the AI world by learning how to utilize ChatGPT effectively. While these two types of curiosity can coexist, one may dominate the other for a particular individual.

Categories of Innovation

Due to their roles within teams, supervisors' curiosities might influence how they delegate tasks. Although both supervisor I-Type and D-Type curiosities can propel teams to explore unknown territories, they play distinct roles in team innovation. This brings us to the basic types of innovation. While innovation can be categorized in multiple ways, the level of novelty can distinguish it between incremental and radical innovation.

Incremental innovation improves existing services, products, or technologies without fundamentally altering them, such as adding a new feature or tweaking the design. A classic example is Apple's transition from iPhone 11 to iPhone 12, where the company enhanced OLED display and introduced a faster processor and a flat design on the edges. Such incremental innovations dominate company development profiles, making up roughly 85% to 90% of all innovations.

In contrast, radical innovation manifests as bolder, disruptive forms of innovation. It signifies the birth of entirely new products or services or even a paradigm shift in an entire industry's direction. A quintessential example is Tesla's full self-driving technology, revolutionizing conventional driving methods. Radical innovation allows companies to gain a predominant position in the market, leading to sustained competitive advantages and higher revenue goals.

Research Findings

Although incremental and radical innovations are not precisely the same, they play vital roles in an organization's sustainable development. These two

team innovation types are the cornerstones of the whole organization. Interestingly, the researcher in this study discovered that two types of supervisor curiosity can have different impacts on an organization's incremental and radical innovation. In short, a supervisor's I-Type curiosity can stimulate both types of team innovation, while a supervisor's D-Type curiosity may promote incremental innovation but hinder radical innovation. It implies that a supervisor's D-Type curiosity is a double-edged sword in the team innovation process.


The different types of curiosity can have varying effects on innovation because of their distinct mechanisms. When managing their teams, supervisors of I-type curiosity embrace the value of learning, encouraging team members to acquire new knowledge, skills, and approaches. Driven by such a heightened learning demand, team members are oriented toward growth and more extraordinary accomplishment, making them "promotion-focused"—a state where individuals prioritize personal growth and their ideal self when pursuing goals. Team members of promotion-focused are more willing to step out of their comfort zones, take risks for innovation, and, therefore, produce both incremental and radical innovations.

In contrast, supervisors of D-type curiosity give more weight to unaddressed problems at hand, directing team efforts to solve specific problems to repel the unsettling ignorance. This tendency should heighten team problem-solving demand, which is often anxiety-provoking. This demand triggers team members' collective "prevention focus"—a state where they seek to fulfil safety needs, meet obligations, and avoid any hindrances to work goals. The prevention-focused teams would still innovate incrementally by fixing existing problems and shortcomings. Yet, they tend to withdraw from radical innovation as it can pose more risks to work goals.

Upon discovering the promoting role of supervisor I-Type curiosity and the double-edged effect of

supervisor D-Type curiosity, the author further predicted that supervisors' task authority is a crucial boundary condition for the whole processes. It is certain that given the various structures of organizations, teams, and production processes, supervisors differ in their authority or control over teamwork tasks. Supervisors' trait curiosity can make a difference only when they have a say in designing and delegating collective work tasks. Otherwise, even if they personally prioritize learning or problem-solving, it is challenging formally propose these demands.

The researcher examines the abovementioned reasoning through two studies. In the first study,

he invited 123 team supervisors from different industries and asked them to report their curiosity, task authority, and demands for team learning and problem-solving through emails or WeChat surveys. The data from this survey confirmed the influence of supervisor I-Type curiosity on team learning demand and supervisor D-Type curiosity on team problem-solving demand, and that these impacts are contingent upon supervisors' task authority. The second study further tested the complete research model by surveying supervisors and team members across three different time points, confirming the nuanced role of supervisor curiosity on team innovation. 

Managerial Implications

This research unveils the catalytic role of supervisorship curiosity on team innovation. The findings suggest that managers and HR departments might find it beneficial to incorporate curiosity into leadership competency models. When selecting supervisors for innovation-directed teams (e.g., RND teams), priority should be given to those with strong I-Type curiosity. However, such a choice should be based on aligning individuals with the work environment and the organization's core strategy. Note that overemphasizing radical innovation might lead to losses when unprepared, short of supporting resources, or strategically unfeasible. Under high uncertainty with unpredictable risks, Type-D curiosity might be more viable because supervisors with this type of curiosity are better equipped to navigate through incremental innovation with higher odds of success.

Further, supervisors' task authority is essential

for their curiosity to show the strength. When supervisors lack adequate power to influence collective work tasks, their curiosity will be kept inside their mental world rather than expressed to make a difference to the collective. This suggests that companies seeking greater innovations need to select curious supervisors to lead teams and provide them with adequate authority over collective work goals, tasks, and prioritized demands.

Lastly, we must recognize the potential pitfalls of excessive curiosity that may lead to overwhelming workloads or overly intensified pressure. While team innovation is crucial, it shouldn't come at the expense of employee welfare. Whether it is the need for learning or problem-solving, balance is vital. Only by ensuring that team members are not overwhelmed by work pressure can genuine organizational innovation be achieved.

This summary is based on the full article "Curious Supervisor Puts Team Innovation within Reach: Investigating Supervisor Trait Curiosity as a Catalyst for Collective Actions", *Organizational Behavior and Human Decision Processes*. Jie (Yonas) Ma is an associate professor at Jinan University. Jiaqing (Kathy) Sun is an assistant professor at the London School of Economics and Political Science (LSE).

How Informal Enterprises Achieve Identity Change through Linguistic Reframing: The Story of China's Shan-Zhai Phone Enterprises



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An identity defines “who we are” and “what we do”. The identity of a company is not fixed but constantly changes as it adapts to its environment. Entrepreneurs, especially those in an informal or even illegal market, need to build a legitimate identity to be accepted by the formal system.

Research on strategy and organization found that the process of building the identity of a nascent entrepreneur not only requires concrete actions but also is a process of linguistic framing. Framing refers to the use of metaphors, analogies, genres, rhetoric, stories, narratives, symbols or framing to construct a new identity and gain legitimacy for growth. Assuming that a firm’s activities remain unchanged, using different framings to present itself can result in different identity perceptions in people’s cognition.

An example of entrepreneurial firms influencing market recognition of their identity through framing is Thomas Edison. He described the new lighting system

as identical to traditional gas lights to dispel people’s rejection of novel things. He advised in newspapers to familiarize people with his brand. He popularized new bulbs among celebrities who could guide the public’s acceptance. He also attracted investors and government officials through press conferences to make them feel that the industry can grow and develop.

The choice of framing depends on the development stage of the firm or industry, the specific audiences it faces, and the embedded social and cultural context. The cultural environment is particularly important, as culture determines the acquisition of resources. Culture is a rich resource pool, a flexible “toolbox,” including the logic, vocabulary, names, concepts, skills, and habits commonly used by people in the culture. Firms can flexibly utilize these cultural tools to present themselves. Culture is also a source of external recognition. For a framing to be coherent and resonate with the audience, it needs to be consistent

with the beliefs, values, ideals, and thinking styles of the core audience, all of which are rooted in the social and cultural system. The more a framing resonates with the cultural system, the more likely it is to be accepted by the audience in that cultural system.

Taking the illegal or informal cellular phone (called shan-zhai cellular phone in China) industry as a research scenario, professors Yuchun Chen and Shi-Chang Hung analyzed how Chinese cellular phone entrepreneurs updated their identity through reframing and were gradually accepted by the government, consumers, multinationals, and global markets. The researchers divided this process into three stages, which are characterized by three types of reframing and three firm identities.

Stage One (1998-2004): Building Niche-market Identity via Pragmatic Reframing

In the first stage, 1998-2004, Chinese entrepreneurs created a niche-market identity by using pragmatic framings, which helped justify their activities and gain legitimacy among customs officials, younger and lower-end customers, and national firms with licenses. In the early stages of the cellular phone industry, Chinese firms were small businesses with limited resources, having just transitioned from manufacturers of DVDs, MP3 players, or pagers to cellular phone makers. Due to the nation's regulation of telecom licensing, they could operate only in less-developed or black markets by engaging in simple and low-cost phone assembly and relying on smuggling components.

The informal firms used the term “parallel import goods, not smuggled goods” to address customs official's questions. The firms used “scrap metal, not cellular phone parts” to evade tax, as the tariffs and import fees for cellular phone parts were calculated by the piece, while scrap metal was calculated by the ton. They also mobilized personal relationships to approach and bribe the customs officials to turn a blind eye.

To appeal to a neglected but growing market—

young people in rural areas who did not have money but were keen to emulate the urban consumption patterns, the shan-zhai firms used the term “refurbished phones, not knockoffs or fakes.” The phones usually came with a 14-day warranty, and the price was affordable despite the low quality, which all made them popular with low-end consumers.

The entrepreneurs used the term “outsourcing, not license lending” to justify their exchange relationship with the licensed firms, who were a key source for a legitimate identity. Although the government's license control protected formal firms, the thin profit margins and high costs (such as license application fees and bribes) to obtain licenses forced them to look for other profit models such as lending their licenses to informal firms. The lending was reframed by the informal firms as outsourcing and justified as practices that were no different from any cooperation between foreign brand phone firms and their component suppliers. They even framed themselves as “high-quality manufacturers” building “strategic partnership” with the formal firms.

These discourses told a persuasive story that resonated to China's long term encouragement of bold experiments to propel market development. The framings effectively helped the firms to create a niche-market identity because they were rooted in Chinese familism and ethnic groups (Chao-Shan), which provided necessary resources for making these reframing endeavors both possible and persuasive.

Stage Two (2004-2008): Building Socio-Political Identity via Nationalistic Reframing

This stage witnessed the growth of several unlicensed firms, who started to shift from the niche market to directly competing with established national firms. However, because intellectual capital and technology knowledge were controlled by licensed firms, and the patents were controlled by foreign companies, it was challenging for the firms to develop

software solutions and sophisticated systems.

To obtain more resources, the informal firms called themselves “the saviors of the national information industry.” Since the 1990s, the Chinese government had chosen information technology as a strategic industry. Rooted in the patriotic sentiment, the framing of being “industry saviors” had an intrinsic appeal to government officials, who conferred political legitimacy, created the impression of public support, and attracted more design experts or design-house firms to join the shan-zhai phone industry.

The shan-zhai firms also used “autonomous innovations” to cast their technologies. Autonomous innovation is used in China to describe the national innovation system. To cultivate the country’s own technology, Chinese government emphasizes it as one of the most important values and policy priorities. The use of this term was in line with government policy and thus economically and politically justifiable.

Another linguistic frame was the image of Shenzhen as “the city of cellular phone”. Tianjin, a city close to Beijing, was officially designated as the city of cellular phone by the state in the early 21st century. The Shenzhen government joined forces with local manufacturers to appeal to the National People’s Congress, because “One in every three cellular phones sold in China, and one in every eight cellular phones sold globally, is made in Shenzhen; Shenzhen is the real cellular phone city.” The central government confirmed that Shenzhen could compete with Tianjin, which was in line with the central government’s encouragement of local officials to compete in urban economic growth. With the elevation of the city’s status, the social evaluation of shan-zhai firms was reinforced and enhanced.

As these narratives emphasize national interests, social acceptance, and political recognition, they can be called the use of nationalist reframing to construct a social-political identity.

Stage Three (2008-2011): Building Professional Identity via Comprehensive Reframing

In October 2007, the Chinese government abolished cellular phone license controls, and most informal firms registered as formal firms. In order to enhance legitimacy, these once illegal businesses used the framing of “grassroots innovation” and “independent innovation” to reconstruct the value of their products.

The term “grassroots innovation” originated from China’s cultural life and the Communist Party of China, who values and respects people from all social and economic strata and advocates for a bottom-up revolution. Shan-zhai firms claimed that their products were neither imitations nor pirated goods but rather grassroots innovations that contributed to social equity and poverty alleviation. The term also shared much of the academic concept of “base-of-pyramid (BOP) businesses or markets,” which has been widely recognized in Western literature since 2000. Thus, the term successfully created cross-cultural resonance and appealed to foreign brand companies and consumers.

However, the term “grassroots innovation” sounds somewhat protective and defensive, while “autonomous innovation” showed greater confidence and resonated with China’s intention to build a self-reliant telecommunications industry decoupled from Western technology. The term “Chinese chip” further emphasized autonomous innovation and strengthened the association between these ventures and national autonomy. The framing agent of this term is Taiwan’s chip design company, MediaTek. In the late 1990s, multinational companies such as Texas Instruments, Qualcomm, Nokia, Motorola, and Philips controlled the solutions for hardware-software integration and charged exorbitant fees (including patent royalties and software royalties), which most unlicensed companies could not afford. Although MediaTek developed an alternative solution, most licensed

companies refused to use its chips due to its lack of track record. MediaTek then turned to the shan-zhai phone manufacturers. Technologically, MediaTek's chips integrated the most critical parts of cellular phone design, chip design, software design, and hardware design into a turnkey solution. Culturally, MediaTek promoted its products as "Chinese chips," which was consistent with China's emphasis on autonomy and sovereignty as well as value of "the spirit of brotherhood" in Chinese history and culture.

Another framing used by MediaTek was Clayton Christensen's "disruptive innovation." While hosting Clayton Christensen on a visit to Taiwan, Ming-Kai Tsai, MediaTek's chairman, said "I think there is a language problem about shan-zhai, which gives you a negative image. However, the spirit behind it is disruptive innovation." Interestingly, the term shan-zhai originated from the Chinese novel *Water Margin*, in which 108 outlaws gathered at Mount Liang, a literal shan-zhai, to rebel against a corrupt

government. The 2007 film *The Warlords* was inspired by the novel. In 2009, a TV series of the same name debuted. In this context, the entrepreneurs used this cultural symbol to redefine their shan-zhai business and likened themselves to the 108 bandits, fighting against firms of the national teams and foreign monopolies. The cultural foundation of this term even allowed it to gradually spread from the cellular phone industry to other fields (such as "shan-zhai netbooks") and social spheres (such as "shan-zhai alliance"). Shan-zhai phone firms gradually became part of the social and cultural phenomenon.

In summary, in this period the firms use of terms such as "grassroots innovation," "autonomous innovation," "Chinese chips," "disruptive innovation," "shan-zhai," and "brand companies" to redefine these shan-zhai businesses and enhanced their resonance with China's innovation system and the global industry. This can be called the use of comprehensive reframing to construct a professional identity. ✉

Managerial Implications

The journey of Chinese shan-zhai phone entrepreneurs may be unique, but the three stages they experienced can be generalized to other informal settings. The culturally embedded process of reframing and identity updating provides several insights for entrepreneurial firms or emerging industries. Firstly, linguistic framings and narratives are useful tools that can help establish market identity. When institutional pressure and legitimacy challenges, entrepreneurs do not necessarily have to simply "cross the river by feeling the stones," but can strategically use framing strategies to seek

survival and development. Secondly, entrepreneurs need to understand the culture in which they are operating and make wise use of cultural resources. Shareholders' recognition and the resources they provide are crucial for entrepreneurs, and the concepts and value judgments of these audiences are often rooted in their social and cultural system. Firms need to identify the most relevant cultural values, social expectations, and interest concerns based on the specific audiences they face at different stages, and accordingly use relevant reframings to customize their identity expressions.

This summary is based on the full article "Come the Southern Revolution: The reframing of Chinese Shan-zhai toward Identity Change", *Management and Organization Review*, 19(5). Yuchun Chen (ycchen@nfu.edu.tw) is an assistant professor at Taiwan University. Shi-Chang Hung (schung@mx.nthu.edu.tw) is a professor at Tsing-Hua University. Zhi Liu is an associate professor at Peking University.

How Chinese Companies Innovate

Chinese companies mainly take six paths to innovation. The innovation advantages of Chinese companies may well be in the creative combinations of different innovation practices.



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China has had a reputation as a “Copycat nation” for years, and Chinese companies were known for imitating rather than innovating products. However, Chinese companies have already evolved from copycats to innovators in the past decades. *MIT Technology Review’s* annual listing of the 50 smartest companies in the world in 2017 included seven Chinese companies: iFlytek (#6), Tencent (#8), Face ++ (#11), DJI (#25), Alibaba (#41), Ant Financial (#49), and Baidu (#50) (in the order of innovativeness). Furthermore, Face ++, a Chinese startup, was recognized as one of the top “10 Breakthrough Technologies 2017” in the world by the same magazine.

How did Chinese companies catch up so rapidly in innovation? To have a better understanding of the paths to Chinese innovation, researchers Mark Greeven and George Yip conducted more than 400 in-depth interviews with large and small private Chinese companies in manufacturing and service sectors in Beijing, Hangzhou, Shanghai, Shenzhen, Suzhou, Tianjin and Xiamen in the past decade. They identified innovative practices of Chinese companies in the following six aspects: product, business model, process, customer, technology, and organization.

Path 1: Ascending Steadily from Incremental to Radical Innovation

Because of China’s catch-up position, most of its companies started as imitators and innovation came incrementally. Through relentless innovation, some Chinese companies have made breakthroughs and achieved radical innovation. For example, Huawei has continuously developed new-to-the-world technologies, such as SingleRAN and LTE technologies. BYD, originally a battery manufacturer with leading technology, transformed into one of the leading electric vehicle manufacturers. Internet technology companies such as Alibaba, Baidu, and Tencent have continuously brought new products to market, from online finance, e-commerce, and taxi

hailing to the successful IM WeChat, which have spread across all aspects of people’s lives. In addition to these well-known companies, others, such as Hikvision and Positec, have been crowned as hidden champions in little more than ten years after start up.

Path 2: Localized and Embedded Business Models

Adapting products according to user needs does not necessitate the use of top-notch technology, but rather requires companies to be able to manufacture quickly and at low cost. The situation of most Chinese enterprises is exactly in line with this. The “copy and paste” phase was quickly outgrown by many Chinese shanzhai (copycat) companies when they adopted a business model of localization. For example, G’FIVE, a Chinese phone maker, become a leading brand in India with some unique facilities, such as A5-battery and extra loud speaker that solves the charging challenge and meets the music playback needs of Indian users.

In a few sectors, radically innovative business models, such as building embedded business ecosystems, are emerging. This practice fits well with the long-time Chinese culture of relationships and networking. Many of today’s successful Internet companies, such as Baidu, Alibaba, and Tencent, have connected their products or services in multiple industries through search engines, e-commerce, and instant messaging portals respectively, as do many hardware manufacturers. For instance, Xiaomi began its operating system development in direct collaboration with its user community and is now building its own network of a hundred hardware companies.

Path 3: Fast Trial and Learning

Many Chinese companies—not only start-ups, but also giants such as Alibaba, Haier, and TCL—tend to be good at fast trial and learning. Market testing, product development, and business model design take



place simultaneously, which is similar to the current popular lean method. This practice of experimentation and risk-taking is compatible with Chinese pragmatism and the transitional nature of a market with much uncertainty. A striking example is Geely, a Chinese multinational automotive company. Li Shufu, the founder of Geely, started out by successfully making motorcycles. He later decided to manufacture cars in 1997. To confront all critics, Li had a famous response: “There is nothing mysterious about making cars. It’s just four wheels with a steering wheel and an engine”. One year later, in 1998, his first car rolled off the production line. In 2001, the government gave Geely an official license to produce cars, and in 2010, Geely surprised the world by acquiring Volvo.

Path 4: Demand-Oriented Rather Than Technology-Oriented

Chinese companies are adept at listening to their customers, even though nearly all companies in market-based economies are customer-focused to some degree. They meet customers’ needs not by designing more sophisticated products with complete functions, but by bringing more styles or versions of the product to the market. Many of these companies are characterized by a large variety and wide range of products. For example, Goodbaby, a baby stroller giant, has more than 1,600 different product models. These successful practices are based on China’s rapid and lower-cost execution, well-developed manufacturing capability, and infrastructure. Chinese products can also meet some seemingly odd needs. For instance, G’FIVE pre-installed religious-related applications on mobile phones out of consideration for Middle Eastern users or extra loudspeakers for Indian family users who like to dance together.

Path 5: Upgrading Technology Quickly

Some Chinese enterprises are upgrading their technologies very quickly. On the one hand, this is because most Chinese companies have a low starting point in terms of technology, knowledge, and experience, and they need to catch up faster. Moreover, there are so many local competitors in any sector in China, typically 10 to 100 times more than in a Western economy. Therefore, leading Chinese companies are desperate to gain a technological edge. In addition, upgrading technology rapidly is not only a way to stay ahead of the competition, but also a way to stay ahead of copycats. In an environment of weak enforcement of intellectual property rights (IPRs), this is a strategic solution for Chinese innovators to address the issue. Immediately after the establishment of Hikvision, the leading enterprise in the smart security industry at present, a large number of copycats emerged. Hu Yangzhong, the co-founder of


Hikvision, quickly realized the threat, so from the beginning of its establishment, the firm has focused on upgrading technology to compete with those copycats.

Path 6: Being Organizationally Agile

With the influence of a 2,500-year culture of hierarchy, however, Chinese companies are more CEO-oriented than Western ones. Furthermore, many Chinese companies are young and lack sophisticated management structures, so employees listen more to a decisive CEO. Generally speaking, the concentration of administrative power tends to cause difficulties in horizontal coordination, but Chinese enterprises still have a high degree of horizontal flexibility, which allows resources and knowledge to flow smoothly and rapidly among peers in different departments and functions. This is the benefit from the coordinating role of Chinese relationship culture. Such a paradoxical combination of centralization and flexibility enhances innovation in Chinese companies. For example, Baidu, Alibaba, and Tencent have averaged more than 40 strategic acquisitions or investments per year since 2012 and meanwhile have proved highly profitable.

The same phenomenon emerges in other industries as well. Geely's transformation from motorcycles to cars took only one year. Haier's new product development cycle is shorter than most of its competitors.

Innovative Combos

Most of China's innovative enterprises do not only rely on one of the aforementioned six innovative paths, but adopt multiple parallel paths at the same time. Operating in an emerging market characterized by speed and change, Chinese companies have to juggle many different balls at the same time. Furthermore, these aforementioned innovative practices are inherently intertwined and mutually reinforcing. Haier's development of its Crystal series washing machines is a good illustration. On Haier's HOPE platform, a highly autonomous work team communicates directly with users (Path 6) to enable the company to be aware of and focus on local customer needs (Path 4). However, without the steady ascent towards product innovation (Path 1), technology upgrading (Path 5), and fast trail (Path 3), Haier would not be able to develop the product to meet identified needs. 

Managerial Implications

Although the overall innovation level of Chinese enterprises has significantly improved and many innovative star enterprises and hidden champions have emerged, many Chinese enterprises are still seeking effective innovation paths. The six innovative paths of Chinese enterprises summarized in this research have provided them with answers. Moreover, it is encouraging to find that the

disadvantages of being a latecomer and constantly changing environment actually accelerate the innovative vitality of Chinese enterprises. Instead of merely confronting and managing challenges, Chinese companies actively embrace them, thrive on them, and blaze their unique paths of innovation. This is perhaps the most unique feature of innovation by Chinese companies.

This summary is based on the full article "Six Paths to Chinese Company Innovation", *Asia Pacific Journal of Management*, 2021, 38:17–33. Mark J. Greeven (mgreeven@gmail.com) is a professor at IMD Business School. George S. Yip (g.yip@imperial.ac.uk) is an emeritus professor at Imperial College Business School. Haizhen Wang is an associate professor at Xi'an International Studies University. Huili Tang is an associate professor at Xi'an International Studies University.

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Executive Perspectives



Driving Forward Organizational Change with Mission and Vision



Gaoning Ning

Standing Committee Member
of the 13th National Committee
of the Chinese People's Political
Consultative Conference
Former Chairman of the Board
of Sinochem Holdings Co., Ltd.



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The first time I met Mr. Gaoning Ning, it was at a conference during the first International Association of Chinese Management Research (IACMR) in Beijing. The year was 2004, and he was then the president of China Resources (Holdings) Co., Ltd. (CR). Mr. Ning was invited to deliver a speech on behalf of entrepreneurs. Two other guest speakers were Mr. Chuanzhi Liu from Lenovo and Mr. Wenjing Wang from Yonyou Software. What impressed me a lot was that Mr. Ning addressed his speech in English, unlike Mr. Liu and Wang, who needed an interpreter. In the years that followed, Mr. Ning has been a member of the executive advisory committee of IACMR, giving advice on the development of the association. And thanks to him, the magazine *New Insights of Chinese Management*, the predecessor of *Management Insights*, was born. At the same time, his own career has made significant progress. In late 2004, he took the reign of COFCO, and later transformed company. In 2015, he became the CEO of the establishment of Sinochem Holdings Co., Ltd. (Sinochem) through the joint restructuring of Sinochem Group Co., Ltd. and China National Chemical Co., Ltd. As a business leader who has been at the helm of four Fortune 500 companies, Mr. Ning's management experiences and insights are probably difficult for others to match. Recently, Prof. Xiongwen Lu, dean of the School of Management of Fudan University and I had an interview with Mr. Ning on his new book entitled *Five Steps of Management*.

Xiao-Ping Chen: Hello, Mr. Ning, it's my pleasure to see you again after so many years. I recall that after you took over CR, you made major changes to it, transforming it from a company focusing on foreign trade to a diversified enterprise. Then when you were at COFCO, you brought radical changes to its entire business model, changing

it from a grain import/export company into an industrial group of grain- and oil-related business. Afterwards, you were in charge of the joint restructuring of Sinochem Group Co., Ltd. and China National Chemical Corporation Ltd. In a short period of time, you made all-round changes to the corporation. Therefore, in my opinion, you

are a professional serial transformational leader. This is a term I created for you. We usually call someone who builds new companies one after another as a serial entrepreneur, and describe a CEO who can bring a company back to life as a transformational leader. You didn't just transform one large company, but revitalized four giant corporations—that makes you a professional. Therefore I think it is appropriate to call you a professional serial transformational leader, and you are the only one who deserves such a title.

A transformational leader typically possesses six extraordinary capabilities. First and foremost is the ability to articulate the company's vision and mission clearly. Followed by are the abilities to foster team collaboration, to challenge established thinking, to expect high performance, to lead by example, and to take a personalized consideration in employee development. I wonder how you do the first, i.e., establish the mission and vision of each company you were in charge of. How do you form that company's core cultural values?

Mr. Ning: This is an interesting question. For me, the mission, vision and values are the most important things for a company. I won't proceed with anything before clarifying them. I start from defining the mission of the company, then designing a logo for the company and confirming the company anthem, all the way down, and finally to setting up performance goals. I believe that as long as everyone buys into company's mission, vision and values, other matters will naturally follow. Of course, I met resistance at the beginning. It was relatively easier at CR, because we had no choice but to change. The overseas suppliers of supermarkets under CR, including Coca-Cola and Johnson & Johnson, refused to support or provide credit for our payment due to our lack of a clear mission. Such a way of

thinking brought huge impact for everyone and urged us to change.

Therefore, after many rounds of in-depth discussions and reflections, I proposed that the mission of CR was to "maximize the value of the employees and the corporation". I wrote it on the blackboard, with the title "mission" and showed it to the executive team. They added the word "solemn" before it, which later turned into "the solemn mission of CR". In the end, the executive team took the oath together, our heart pounding with excitement.

It was the first time that CR put forward the concept of maximizing the value of the employees and the corporation. We intended to lead the industry, realize the value of our shareholders and build a dynamic enterprise. This goal was richly embedded with our mission and the kind of company we wanted to become. Later on, I created a company motto: "better life together", and we commissioned Ogilvy to create the logo for us.

I found that the new mission statement spread quickly. The night after a meeting at the headquarter, our team in Wuxi started singing the corporate anthem. Their recognition and attitude were highly encouraging. I gradually realized that, many leaders don't think much about their company's mission, because they don't know that it can motivate people. When the interests of an individual are aligned with the interests of the company and the society, it is highly likely that this individual would act positively. You can imagine a situation when a hundred people are in a room together. When there are only two people in a room, they may become rivals. However, when there are a hundred of them, they behave. People aspire to virtues. Our mission and vision are reinforced by constant promotion, review and repetition. Gradually, they take roots in the heart



CR's Longhua Wind Farm in Longmen County of Huizhou City

of our employees and become their belief. When we are holding a meeting, we will stand up and read our mission statements together before we proceed.

Xiao-Ping Chen: That's very impressive. CR by then was a Chinese invested company based in Hong Kong. Therefore your reform was well-received. When you took over COFCO, a company based in China, did you encounter any challenges in that change process?

Mr. Ning: The challenges were great. Beijing

is a different place, and the state of staff was different. CR is a Chinese company, but over 90% of its employees are from Hong Kong. They are adaptable to the changes towards marketization. On the contrary, COFCO is a state-owned enterprise. Its employees, with excellent qualities and much experience, are also trying to find new directions, but they have never been through any kind of large-scale reform.

From my part, I was also committed to establishing a new mission for COFCO. I remember that on my first day at work, my superior accompanied me, we held a round-table.

I asked everyone to introduce their upbringing and family background. Then, when we met again, I requested them to think about their individual mission, values and goal of life. “This person is full of crap.” That was a comment from a then senior vice president. I was challenged, but I was not in a rush. I gradually guided my team members to see that the realization of their individual goal must be based on the success of the corporation. In other words, the goal of the individual and the company should be aligned. Over a period of time, they realized that they were important, they understood that the mission of the company was nothing “impractical” but directly related to what they were doing and how they were going to do. The business of COFCO is not just made up of commercial activities, but also a determination to ensure the safety of food and grain and our responsibility to the society and our country. We have to shoulder this responsibility actively. Of course, each of us is also rewarded for taking up such a responsibility, with our salary, welfare and career development. It took over six months to a year to encourage such a change of thinking, but it was swift after all. We all have something in common. Once this something is found, the rest goes smoothly.

Xiao-Ping Chen: I think you did one thing especially well. When you have a mission in your mind, you didn’t force others to accept it, but instead you listened carefully to others, and you worked with them to sort it out clearly. So when you took the CEO role of Sinochem, did you work on articulating its mission statement and vision first?

Mr. Ning: Yes, I did. It was twenty years after my time in CR—the society has changed a lot. People tend to be more materialistic and

practical nowadays. When you talk about mission and the like, they presume that you are just fooling them around.

Xiao-Ping Chen: Then how did you respond?

Mr. Ning: I’ve developed a way to turn my thinking about the company’s mission into a team consensus. Specifically, I began from talking extensively with the group, requiring everyone to share his or her thoughts, family background, personal needs and life plans. Their needs and plans were of various aspects, including wealth, career, family, everything. Next, we would discuss how to meet these needs, meet every individual’s expectations, through the company as an organization. During this process, the mission of the company would reveal itself gradually. That is to say, this mission should be a way to help every employee realize his or her needs in the current environment rather than just what the company wants to achieve at the employee’s expense. Then we wrote this mission down and revised it over and over again together for a day or two, until we could accurately understand its content and essence, including what we wanted to do, what we wanted to achieve, what we wanted to fulfill, and how we would work towards these goals.

Therefore, I did not force them to accomplish MY vision, instead, we created OUR vision. I insisted that it had to be a consensus reached after much discussion and refined by all of us together. In fact, they provided me with a lot of useful ideas. Sometimes their thoughts were even more revolutionary than mine. I would then ask them whether they found the proposal feasible. If they felt it was okay, then I agreed with them. In this way, the whole team was

motivated, and everyone would find ways to implement the plan.

That is how organization development begins, I think.

Direction and Method of Transformation: Science and technology are our foundation

Xiongwen Lu: When you took charge of Sinochem, you proposed “science first”. It was very impressive. In China, the government invested in scientific research. The investment into scientific research occupies less than 2% of all investment of state-owned and foreign-funded enterprises. But private enterprises are willing to put 3% to 4% of its total investment into research. So we say private enterprises are still the main force for research and development (R&D). Sinochem is a state-owned enterprise. What is the point for you to encourage “science first” and to promote scientific and technological innovation?

Mr. Ning: I don’t need to repeat how important and urgent scientific and technological innovations are. I will just tell you how I did it. I proposed “science first” at Sinochem in March 2018. The reason I did it was that, upon my arrival, I examined all the businesses of Sinochem. I found that businesses that were vital and held relatively large share of the market globally were all related to two technological breakthroughs. The first was a technology relating to rubber antioxidants, which could prevent tire aging. There used to be a legal dispute over the technology between us and an American company, and we eventually won. Today, our product bearing the technology held about 60% to 70% of the market share worldwide. Another

breakthrough was the technology relating to 134a refrigerant, developed in Xi’an. A factory was built for it later, which contributes more than one billion yuan in revenue every year. Such stable revenue was not attained because of something of a large scale, but of excellent technology. These analyses inspired me. I believed that Sinochem must turn to science and technology innovation to achieve further growth.

So I wrote a paper entitled “Science First”. I spent a whole day in a café writing it, over 10,000 words. From then on, I pushed the idea within the corporation. We spent three days and nights in the meeting room. We held heated discussions, and everyone was very excited. Of course, some senior members of the team were skeptical and worried that the shift might affect the profitability of the corporation. They were especially concerned about whether their pensions would be affected too. Later on, the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) organized a conference attended by representatives from more than 100 state-owned enterprises. I was invited to share our thoughts at the conference, a lot of people raised questions. I remember that one of them was like this: We all know that Sinochem is not especially wealthy, so do you have the money to implement such an idea? My answer was like we might not have the money, but we are determined to do it. Because if we don’t, we are doomed.

Today, we have transformed to become a technology-based enterprise. We did so after a lot of mergers and acquisitions and also through our own R&D. It was the only way for Sinochem to adapt and survive. Now it is clear to all employees in Sinochem that no investment could be made without R&D, no expansion should be realized without R&D, no merger or acquisition should be made possible without R&D. No expansion



could be attained without new products. We would rather invest in industrial upgrading. We no longer engage in low-end businesses of caustic soda, sulfuric acid, etc. Today's Sinochem has a strong research institute behind every product and every project. I said that a research institute served as an engine. Building a research institute was a strategy, it led the way towards the future. In the past, there was relatively little R&D due to a lack of clear strategies. But it is different now. We have a clear direction. Our research institute, as a result, is full of vitality, and has truly become our engine, enabling us to achieve further growth.

Xiongwen Lu: You mentioned that quite a number of mergers and acquisitions took place in the process of transformation. However, considering today's global trends, many multinational giants

overseas have suggested that it would be difficult for a corporation to succeed unless it could diversify its businesses and at the same time surpassed others in the same market. Companies such as General Electric (GE) and Johnson & Johnson, for instance, would have struggled to do well if they were forced to merge. They are more likely to thrive when operating separately. What was your logic when you allowed the mergers and acquisitions? And when you had a lot of unrelated business units, how did you integrate them?

Mr. Ning: Let me share my thoughts from a few aspects. First, let me talk about CR. CR is still a diversified company, because it has the foundation for diversification from the very beginning. At that time, CR was desperate to transform. It had a very traditional connection to the international capital markets. To meet market needs, CR had to expand its businesses to attain sufficient investment and support from the international capital markets. CR was not wealthy at that time, it was just a trading company. From 1983 to the early 1990s, thousands of trading firms mushroomed in Hong Kong. They were all competitors of CR, and CR's trading business was severely challenged. The only way out was to transform. And one way of transformation is to become a diversified enterprise.

The CR logo has a square in the middle, and there are four "ren" characters ("people") in the square, implying population driven, humanistic, people-oriented and CR's dedication to improve people's lives. Therefore, I proposed to start from "people". Why? Because I felt that China's economic development at that time was largely dependent on the country's demographic dividend. As a result, we began to diversify our business by focusing on the areas with the largest consumer populations. We stepped into beer

production, healthcare, real estate, and many other areas. But we came up with a decision that unless we could be among the top three providers in this specific sector, we would consider selling this part of business. With much effort, CR's core sectors generally worth over hundreds of billions of dollars today. For example, China Resources Power Holdings Co., Ltd. (CR Power) is among the newer members, but it has already become a role model for many, earning a reputation for its efficient operations and diversification.

This was how the diversification of CR was formed, and each sector could achieve its own healthy development, thanks to CR's 6S Management System. 6S is the acronym for the six systems—strategic planning, performance

assessment, internal audit, manager assessment, management reporting, and business planning. We first formulated a clear strategy on the scale, speed and direction of future development. Next, we valued accurate budget assumptions and adopted operational audits to monitor various businesses, including how to manage account receivables, how to design depreciation policies, how to deal with bad debts or losses, how to make sure every member of the team takes up responsibilities, etc.

It should be emphasized that synergy, including financial synergy, technological synergy and sales synergy, is especially important in a diversified enterprise. With the rise of the Internet, the diversification of the ecological chain



Sinochem Circular Economy Industrial Park in Lianyungang

and the rapid information transmission provide new opportunities for diversified enterprises. In contrast, COFCO focused more on industrial chain and good products. The core of COFCO is not a diversified enterprise. COFCO built an industrial chain to connect different segments and cover all agricultural products, like corn, soybeans, wheat, sugar beets, tomatoes, etc. For example, corn can be made into feed, starch, and be used all the way to produce sugar, lactic acid, and more. Following a similar vein, products like soybeans can also be the origin of an industrial chain. By building complete industrial chains and through synergy effects, COFCO has achieved sound business development. There are a lot of problems, needless to say, since this chain is not a 100% match. COFCO would outsource part of its business, but it still holds control of over the entire industrial chain.

When it comes to Sinochem, it's different again. Sinochem witnesses the infinite possibilities of energy change. For example, oil refining brings about a lot of byproducts, including ethylene, aromatics, and many more downstream chemicals. Sinochem adopts a chain-style development process in areas of oil refining and chemical production, developing new materials and products through synthesis and innovation. Sinochem plans to set up several large parks with different production lines and build links between upstream and downstream products. In this way, we can meet the needs of the market efficiently in a cost-effective manner, and gradually form our own business model. The key is to innovate new materials.

In short, CR, COFCO and Sinochem have adopted different strategies regarding diversification and specialization. CR started with diversification and emphasized synergistic development of multiple businesses. COFCO

focused on building industrial chains and developing quality products. Sinochem put emphasis on innovating new materials. Each enterprise seeks to develop in different areas to adapt to the market's changing demands.

World-class Enterprise: We operate on an international scale with leading technology and quality products

Xiao-Ping Chen: It's fascinating to hear how you led these companies through their transformation. You always started from establishing a worthwhile mission and vision with the characteristics of the industry respectively, driving the enterprise to develop in a certain direction with specific strategies. Now I would like to hear your thoughts on the internationalization of companies. What makes a world-class enterprise?

Mr. Ning: Global operation is indispensable for any ambitious enterprise. In the end, enterprises compete on an international stage. For example, you can see John Deere harvesters even in the most remote rural villages in China. That means, this American company has expanded its market into the homes of Chinese peasants. A world-class enterprise must have a global mindset and matching vision and competitiveness.

In terms of the fundamental attributes of a first-class enterprise, I believe that technology is still the most important of all. I regard technology, R&D, as well as innovation as the most important tasks of building a world-class enterprise. Only on this premise can efficiency be improved, and maximum output could be achieved with minimum input. Enterprises must try their best to create new things, so that wealth can be created,

living standard can be lifted, the efficiency of material exchange between man and nature can be increased—and today society can be made better.

Sinochem believes in “science first”. We put science in the first place, and all our businesses are based on the innovation of science and technology. Innovation and science should not be seen as merely a task. Building an R&D team is only the beginning. To research and to innovate is at the core of our business. When the fundamental needs of human beings have been satisfied, it is only through technological innovation and development can we continue to gain added value. I thus requested the whole team of Sinochem to focus on technological innovation, scientific innovation, and R&D, especially on creating new materials and developing new products. The problem with R&D though, is not that we don’t have financial resources. It is how to turn money into useful technology. I once set up an R&D fund totaling 20 billion yuan. I waited for proposals, for over half a year, and none came to me. Why? Because it is difficult. Most of the things have been studied by many. Can you invent a new synthetic material? It is true that chemistry is about creating new substances. You find a way to synthesize something that do not exist in the world and turn it into a new material. The sneakers you are wearing today have become much lighter than before. They are better, and cheaper, because they are made of a new synthetic material. So are your clothes, synthetic materials. I would welcome it if someone proposed to create a better photolithography machine. It would probably take some time, but you could start from making photoresist, producing optical gas, or even creating an energy storage device. You see, one step at a time.

A good example is a product branded Baozhuo, developed by the Shenyang Research Institute of

Sinochem. It is a biological synthetic drug, used to kill mites. Bayer of Germany and Sumitomo Chemical of Japan used to monopolize in this sector, there had been twenty years without any new products in the field, and the mites as a whole became resistant to existing drugs. Our research, Li Bin, took 15 years to develop this new drug. It went into the market. In the first year, this drug’s market share was between 20% to 30%, achieving a profit of more than 100 million yuan. In the second year, its market share grew to 50%, higher than drugs from Bayer and Sumitomo Chemicals, and its profit to over 200 million yuan. Nowadays, Li Bin is working on something more impressive now. We all know that weeds grow in rice paddy, but we can’t use herbicides, as rice can’t resist it like corn (a genetically modified crop). So he is now working on using non-genetically-modified herbicides in rice paddy, so that rice thrives and weeds fade without genetic changes.

In my opinion, no matter what industries an enterprise is in, its survival will surely be challenged unless it keeps improving itself. To be competitive in the global market is the premise to become a world-class enterprise, private firms and state-owned ones alike. Therefore, enterprises should stick to the only way of improving itself—developing quality products. Eventually, the survival of an enterprise depends on the quality of its products. Lively meetings and sophisticated strategies are important, but they are all useless if this firm doesn’t have good products. I believe that good products open up a window for the enterprise to be seen and to be recognized. With good products, you don’t even need to advertise. And to develop good products requires the effort of everyone in the enterprise.

Needless to say, overseas mergers and acquisitions are also a way to obtain quality products. Take Sinochem’s acquisition of Syngenta

as an example. Syngenta was an internationalized firm with an R&D team of several thousands of people located in the United States, the United Kingdom and Switzerland. Syngenta invested over 2 billion US dollars on R&D annually, yet it didn't venture into production. With the acquisition of Syngenta, Sinochem gained sustained R&D results that have propelled our growth. A world-class enterprise must make a difference in the global market, and technological innovation is how it can be done. Meanwhile, to maintain the enterprise's status in the field, it is essential to keep improving product quality and rising the enterprise's competitiveness.

Xiongwen Lu: Now we are entering the era of scientific innovation. However, some countries have started to restrict the export of technology to China, and we don't have a solid foundation in terms of science and technology. In this situation, how do state-owned enterprises make R&D decisions?

Mr. Ning: Currently, the primary for state-owned enterprises is to promote innovation. In fact, there are few who can turn insights into R&D capabilities, who can transform vision into tangible results, who can commit themselves relentlessly for eight or even ten years. Sinochem has 26 research institutes. It took us a great deal of work to clarify their roles and responsibilities. At first, there was a weak link between the institutes and the enterprise, and the strategic positioning of research was not clear enough as well. During that period, our institutes took outsourcing projects, applied for state funding, or got engaged in some superficial testing tasks. They were not really focusing on R&D. Over time, it began to change. Some quality technologies were gradually developed successfully and were purchased by

subsidiaries within the enterprise. In this process, the institutes were rewarded financially, and our subsidiaries gained advantages with technologies and were then able to launch excellent produces.

When our institutes got listed, an equity incentive plan was adopted. I find the effect of equity incentives positive. Once I was in the elevator and heard people talking about equity in high spirits. They told me, "we now have 'votes'!" Although each person held a small amount of equity, they felt better about themselves. So you see, people are not just motivated by money. There are other ways to motivate them.

Employees in Transformational Organizations: Be passionate, and have a long-term view

Xiongwen Lu: Let's talk about yourself then. You often say that you are a cowherd (professional manager). You are given this cow (state-owned enterprise), so you have to raise it well. You don't own this cow—it has nothing to do with you. But you are particularly attentive. You devote yourself to your job, and you even ask people around you to work with you for its welfare. You are not the owner. So why do you work so hard?

Mr. Ning: That's a good question. But I will ask you a question first before I give my answer. You don't make money by sleeping at home, right? And you don't make money just walking around, right? But you still sleep, and you walk. A person should not care for instant success or quick profits. Your experience, the platform you are on, what you can achieve in your life, these are the things that matter to me. I saw the enterprise as my platform. I work for my country. I also work to realize my own dream.

I was only 39 years old when I became the general manager of CR. There was a lack of college graduates due to years of turbulence. As a result of the talent gap, my superior at that time was over twenty years elder than me. I've told many of my colleagues that state-owned enterprises provided us with a rare platform at that time. In any other firms, it was impossible for someone as young as we were to get such opportunities. It was true that CR was facing a lot of problems then. Yet, we, the young professionals, made CR what it is today. We established 90% of CR's new business. We purchased buildings in Hong Kong. We built tunnels and piers. We ventured into telecommunications, clothing, banking and supermarkets. Trading was no longer CR's main business, but it was through trading that we laid our foundation in Hong Kong. Very soon, CR expanded its business to Mainland China, where the scale of the business far exceeded that of Hong Kong.

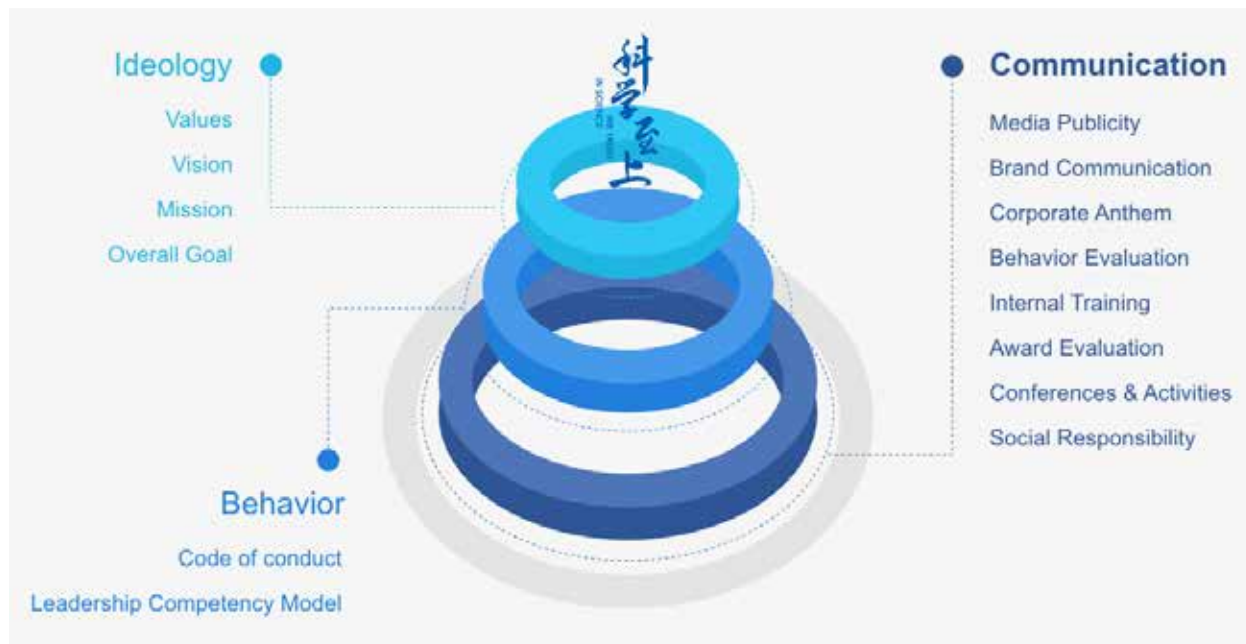
So, one should not care too much about instant profits. I have a motto, "Don't chase money. Let the money chase you." We should not put too much emphasis on instant success. We should value our experience, vision and seize opportunities—they are what actually matter. It is as if we have come out of a deep mountain without finding any treasure but merely traces of dew and twigs on us. However, they were the most valuable because they witnessed our efforts. Of course, you can always start a private firm, but you need to make sure that you can commit yourself to it unreservedly for at least five years. Don't let any obstacle, probably just a small sum of money, stop you from adventuring and taking risks. It will eventually pay off. That is for sure.

Xiongwen Lu: How do you pick those who can work with you and don't fall for instant benefits?

Mr. Ning: I used to say that you have to be able to "feel" a person. If you don't have such a sense, you will not be able to play the role of a manager. You have to be able to tell whether a person is suitable or not for a task. You have to be able to foresee whether he or she is going to make an achievement or make a mistake. Only in this way can you put this person in the right position.

Once, I went to Zhejiang Province. A senior executive that came to welcome me told me that a leader had only two tasks. One is to be able to tell about a person. You have to know who to use. The other is to impress people by making yourself a role model. If you can lead by example, people will follow you. I think this is a very good summary of the art of leading. You have to see others and let others see you. If you can incorporate these two things into a theoretical framework, you will be able to build a system for evaluating and assessing others, so that you can make choices. But remember, people are not objects. You can't just rely on ratings and scores when you evaluate people.

Besides, we value balance. It is not likely that each individual on a team can be good at everything. But you can pick ten core qualities and rank the employees. For instance, you can measure their ethics in performance. If you find them violating the ethical value, they won't be promoted anyway. In addition to selection, training and cultivation is also a gradual process. Personally, I care about whether this employee has the enthusiasm to make progress. This person has to be full of energy, be positive, optimistic and upright. He or she has to be someone, in Chuanzhi Liu's words, who "cries for progress". What's more, this person should have charisma with the power to impress others and be admired, and be able to lead the team to take action. To impress others, you have to lead by example and



practice the values you promote. Of course I believe that the “cowherds” deserve a decent life. In Sinochem, in COFCO, and in CR too, my staff all told me they were satisfied when their income reached the “inflection point”. So what is the “inflection point”? How much is enough? When you stop caring about how much you have earned this month, you are having enough. I told them, if what you want is to earn enough for a nicer car, a bigger house, for your wife to buy more expensive clothes, for your child to go to better schools, and for you to take your family on a trip every year, then we can reach this “inflection point” together. However, if you are looking at buying private jets, then it’s probably not a good idea to work here, for your ambition is unlikely to be realized. Our company grows, and you grow with it. That’s our basic logic.

Xiao-Ping Chen: In fact, the whole process of “impressing others” is a process of communication. You listen to others, you talk to others and you take

actions, these are all your means of communicating. Recently I’ve been doing some in-depth research on the key factors of communication in management. I’m particularly interested in hearing your thoughts on this topic. I noticed that after you went to COFCO from CR, you changed the way of addressing each other’s titles, which was quite shocking. COFCO used to adopt a bureaucratic structure with titles based on rank. However, you replaced these titles with professional terms. You even renamed the “COFCO Management Conference of Middle-level Leaders” as “the Annual Conference of COFCO Managers”. The change in the language could actually alter people’s perception of their positions. In the past, they set everything based on bureaucratic rules. Now, they have turned to see things as professional managers. It was clever.

Mr. Ning: It was actually unintentional. I didn’t feel it could be a problem either. Probably it was because I got an MBA, and I was taught this

way. Of course I did intend to change things. For example, when I was at COFCO, I set up seminars instead of having leaders sitting on the podium in conferences. I felt that it was not the way an enterprise should be, to have some leaders reading from scripts on the podium. A corporation is a team, and everyone in it should be equal. We do have different positions, but it doesn't mean we are superior or inferior to others. We simply shoulder different responsibilities.

Xiao-Ping Chen: You shortened the power distance. It actually reversed the bureaucratic system in traditional state-owned enterprises, where a leader of higher ranks could make decisions regardless of the opinions of the subordinates. As you said, in the past, leaders sat on stage and read prepared scripts. You were not like that at all. This is a very essential shift regarding organizational change. It was a change of the mindset.

Besides, how do you communicate with others during the process of transformation? The questions you ask, the form you take, the content you include, the method you adopt, the purpose and goal you want to achieve, these are all big issues. Have you met anyone who challenged you, or who were particularly defiant? Probably they didn't say anything, but they were resistant. How did you defuse such tensions?

Mr. Ning: People tend to understand you when you are trying to make a change not for your own interest. Therefore, I didn't encounter much resistance, at least not any sharp conflicts. I didn't think it a big problem if someone held different opinions. Eventually we as a team would reach a consensus. However, I did replace a few key personnels for their abilities were not suited to their positions. Fortunately, my coworkers

understood it very well. My replacement didn't cause any major conflicts and I was grateful for all of them. They even told me after some time that they agreed that it was wise to transfer them, and it was a relief for them, too. Of course, they were arranged to fill other positions, and they were grateful for the firm as well.

Xiao-Ping Chen: That means your thorough communication was very effective and convincing. How did you do it?

Mr. Ning: In fact, I think the key lies in thinking in other people's shoes, being sympathetic, and presenting the facts and reasoning. This makes it easier to change the mind of those whose interests would suffer. Take the joint restructuring of Sinochem Group Co., Ltd. and China National Chemical Co., Ltd. as an example. In the newly established Sinochem, leading positions were reduced by nearly half. But not a single complaint was made during the process of change, and no one tried to get into a fight with me either. There were bound to be conflicts. Many were disappointed, for their positions changed and their income lowered. And the restructuring process was not carried out gradually. Everything was completed within one day. Two headquarters were merged into one, two departments into one, and their businesses integrated immediately. Although the legal procedures took quite a while because of the company's IPO, the change was very rapid for the operational and management teams. It was probably one of the most successful aspects of the restructuring.

I was moved a lot by the coworkers affected by the restructuring. Afterwards, some of them came to my office. What they said to me were pertinent, and sentimental. They told me that they knew the restructuring and how we did it was

necessary and essential. One of them even got a Chinese calligrapher to copy the lyrics of our new corporate anthem, turning it into a piece of artwork. Their understanding and attentiveness was beyond my expectation. They had noble characters and good nature. I think we are wired for morality. In fact, only very few of us may not possess correct values and rational judgment. Of course, it is still necessary to make apologies if the decision was not right. We all have our perception about right and wrong.

Xiao-Ping Chen: As you just said, it is important that they could see you were not doing it for your own interest. You made the decisions for the company, for the society. Your decisions were in the best interests of everyone. If you talked to them frankly, then they could also see the problem from your point of view.

Mr. Ning: It is a very difficult decision to change any key business leader. I would hesitate and think for a long time. But it was part of the corporate culture. When I went to Sinochem, I was told that Sinochem's corporate culture enabled anyone to be promoted or demoted. I found it true, and the employees of Sinochem built this culture. They were very understanding. A lot of people got transferred to different positions, but none made troubles or complained. With such employees, the corporation was bound to move forward.

An Idealized Organization: We need faith, leadership and strategic judgment

Xiao-Ping Chen: What does an idealized organization look like in your mind? If you were

to start an organization on your own, what would it ideally look like?

Mr. Ning: The first and foremost thing is faith. Everyone in a company should hold the same faith. In the society, people may have different beliefs. But a corporation has to be focused and everyone in it should move in one direction. Therefore, faith is necessary. A corporation has to establish its mission, vision, strategic direction and the way to work towards these goals. Once these could be agreed upon, many others issues could be resolved, including appointments, welfare, division of labor, etc. In this way, an atmosphere could be created, where people no longer cared about their positions. The division of labor could be optimized, and a flexible organizational structure could be established.

In addition to faith, strong leadership is also necessary. A system of leadership suggests a combination of people and the system. Despite our shared faith, our business and strategic directions are constantly adjusted. Which industry should the company venture into? In what region? On what kind of a scale? These are the questions an entrepreneur has to ponder every day. No company goes out of business because its leaders spend too much on banquets or its employees are paid too much. However, a company is doomed when its choice of strategic directions go wrong. Therefore, faith, leadership and strategies are all crucial. They relate to the spiritual dimension and the material dimension as well, for I combined strategy with operations. In CR, we took the eight trigrams (Bagua in Chinese) approach at first, dividing the corporation into two teams, one focusing on the development of the organization, the other on strategy. The two teams work closely with each other so that our business could grow.



China Resources Shenzhen Bay Headquarters

Xiao-Ping Chen: I find that you are particularly good at seeing the big picture. You have good judgment on the future direction of the industry and the trend of the market. Then you have made good decisions, such as when to carry out a merger. Most of your decisions led to satisfying results. How do you make judgment in the face of high uncertainty in the external environment?

Mr. Ning: At different times, our judgment and decisions will be based on different factors. But we will always focus on the interests of the corporation. For example, CR was transferring a major part of its business to China's Mainland. COFCO, on the other hand, owned industrial chains, conducted mergers and traded with overseas firms, aiming to build itself into an internationalized corporation and ensure food security. The basic goal for Sinochem was to transform it into a technological corporation, as it was the only way out. All our judgment and decisions were then made based on different

situations. Some people say I'm blessed with good fortune. I made a decision and it turned out to be a good one. The fact is that I've probably discarded 99 ideas before I decided what to do. You can imagine how many people would try to approach me—they send me proposals, investment banks come to me—but I have to take every one of them seriously, for it is possible that none of their ideas could be turned into reality.

Xiao-Ping Chen: How did you make judgement in the process?

Mr. Ning: It is indeed a complex task. In terms of specific criteria, I think it involves more than a hundred factors, including political risk, economic risk, financial risk, team quality, product status, R&D strength, etc. However, I am more concerned about the culture and team of the target firms—whether they have core competencies, whether they have technological strength, and whether we could complement each other.

I usually visit the target firm in person, to see with my own eyes, to explore the environment, and to talk to people, so as to establish my understanding. For example, we processed the acquisition of Luxi Chemical Group Co., Ltd (Luxi Group). It joined Sinochem, then upgraded itself and expanded its business at a comparatively low cost, and would continue to play a key role. I personally visited to Luxi Group twice before the acquisition, and through conversations, field research, I gained a deeper understanding of its industrial positioning, team situation and its potential to work with Sinochem in the future. At the same time, I built up the confidence that I would be capable of resolving problems, if any, after the acquisition.

Xiao-Ping Chen: How do you define your role, representing a state-owned enterprise? How do you deal with your superiors and the system when you encounter inconsistencies with the ideal state you wish to be in? Do you fight, compromise, or seek changes within the system?

Mr. Ning: I won't try to change the system, it is too hard. The system makes things a bit bureaucratic, that's true. But it is not too rigid to crash the enterprise. I believe there is still room to do the right things.

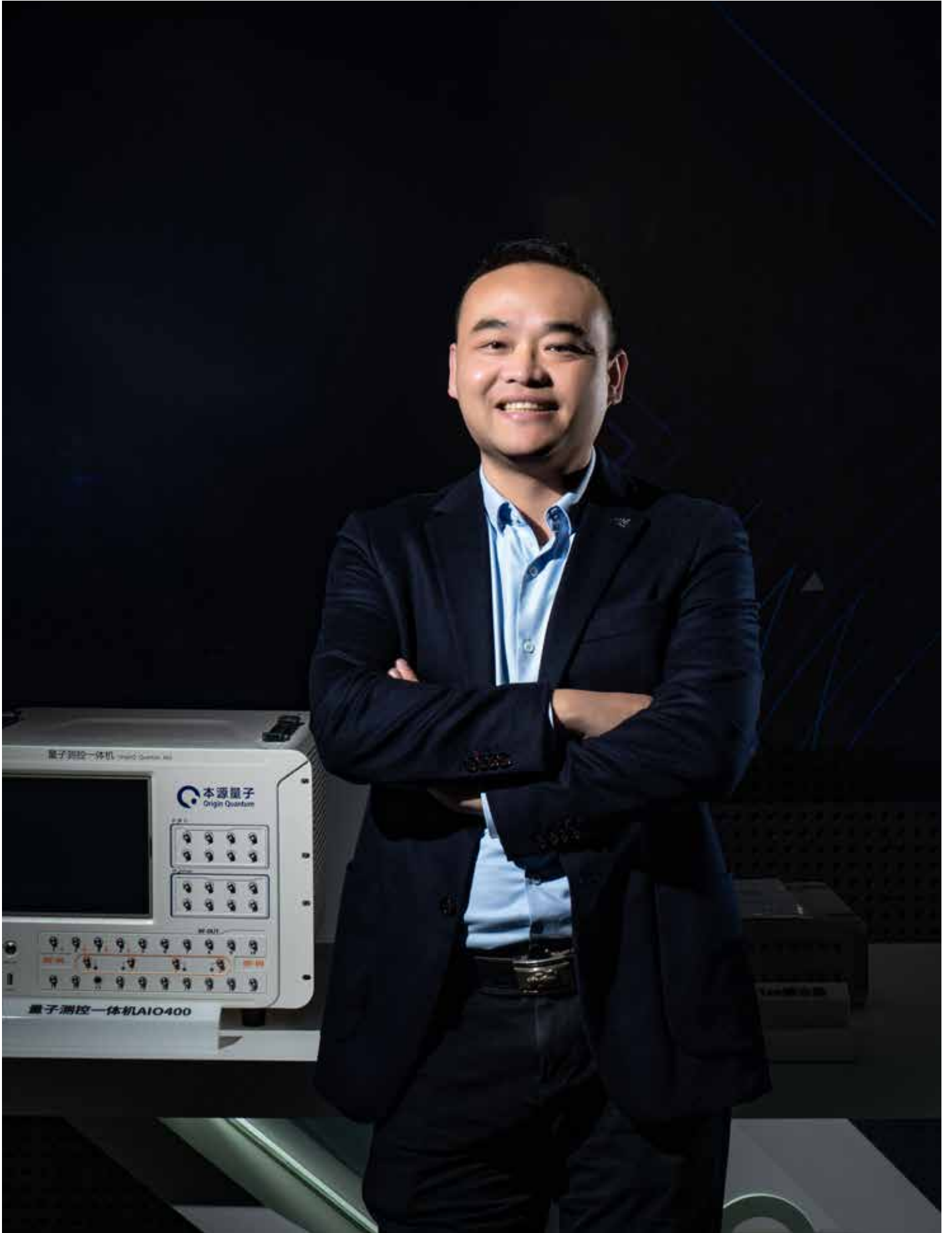
When I first came to COFCO, my superiors had a few thoughts on how to set up departments. However, a lot of subsidiaries found it hard to follow their opinions. I said to my superiors that they would only need to set the principles, and I would try my best to get things done and ensure that our enterprise performed well and gained profits. Nothing is black or white, that is especially true in an enterprise. Even firms in the US would have to face issues raised by labor unions and answer to problems of gender discrimination and

social responsibility. They would need to balance the interests of all parties. Some people may say that as an entrepreneur, the superiors shouldn't interfere with my decisions too much. I would tell them that it's not a problem for me. We should take things more positively.

I actually have been giving lectures about the Communist Party of China (CPC) to my coworkers every year. I've been doing so for over ten years. I believe it is beneficial to enterprise management. In my lectures, I talked about the ten philosophical problems (or paradoxes) in corporation management, such as the relationship between quantitative and qualitative changes, to change or not to change, the link between the phenomenon and the essence, and so on. These issues may also rise in enterprises. Each time we studied the documents of the CPC, we tried to relate them to our daily operation and made them part of the logic in making strategic decisions.

Xiongwen Lu and Xiao-Ping Chen: What are the thoughts and wisdom you'd most like to share with young entrepreneurs and managers?

Mr. Ning: Every entrepreneur faces different problems. What I want to say is, I think China is in a very good stage of development. China is the second largest economy in the world with an enormous potential for further development. We should have the courage to join the process of creation. Entrepreneurship is the driving force for a country to develop. Enterprises, business and the market are the most important forces to drive social progress. In addition, I think we should complain less, stay optimistic and positive, and look for long-term achievements rather than instant profits. At COFCO, we encourages our staff to set bigger goals. Enrich your mind and your knowledge—that is what makes your life truly successful. 📧



Enabling a New Era of Quantum Computing with Management Skills



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“When you are in doubts, try quantum mechanics.” It is a widely spread joke on the Internet, it is also a proof that quantum physics has been widely known by the public as being esoteric and mysterious. However, in the eyes of Dr. Hui Zhang, General Manager of Origin Quantum Computing Technology (Hefei) Co., Ltd. (Origin Quantum), the world is quantum mechanical. “We find it hard to understand quantum mechanics and quantum computer. That is because in the real world, we see things in a deterministic state of collapse, which we cannot find equivalences to,” said Dr. Zhang.

Today, high-performance computing is constrained to its physical limits without further development. Conventional chips heat up and consume huge amounts of energy. Besides, the rapid rise of the artificial intelligence (AI) industry strains the supply of computing power as never before. As a result, there is an urgent need for a new computing paradigm around the world.

And the answer is quantum computing. It is considered to have great potential. As classical computers rely on binary bits as their “brain cells”, quantum bits are the “brain cells” of quantum computers. While a binary bit could only handle one thing at a time, a quantum bit, or a qubit, could deal with two tasks simultaneously. Assuming that a qubit can handle two tasks, then two qubits can handle 2 to the 2nd power of two tasks, and three qubits 2 to the 3rd power of two tasks. Currently, the most powerful quantum computer in the world possesses 433 qubits, which means at a certain moment, one microsecond for instance, this quantum computer could process 2 to the 433rd power of two tasks simultaneously.

According to Dr. Zhang, quantum computing has a disruptive significance and will bring a complete revolution for all walks of life. Quantum computers are known as the atomic bomb of the information age. In the United States, the research and development of quantum computers is known as the “New Manhattan Project”, whose name revealed its importance. Almost every powerful country in the world is actively developing its own quantum computer. However, at present, only the U.S., Canada and China have the ability to deliver quantum computers. From open information, Origin Quantum is the only domestic company that can deliver entire engineered quantum computers to users. Quantum computer powered by Wukong, a 72-qubit indigenous superconducting quantum chip, is China’s most advanced quantum computer.

According to Dr. Zhang, quantum computers should not just stay in the laboratory. They are tools to serve the mankind. The goal of the establishment of Origin Quantum is to apply quantum computers to practice and find their commercial value.

Due to the broad development prospects of quantum computing, competition is on the way. An executive order is likely to be issued in the U.S. to strictly limit the investment of U.S. companies in some of China’s high-tech industries. Among them, AI, semiconductor and quantum technology are about to face comprehensive investment ban. Meanwhile, IBM and Google are actively deploying quantum computers around the world. IBM alone has nearly 30 quantum computers worldwide, located in Germany, Spain, Japan, South Korea, Canada and other countries. Besides, IBM has formed industrial alliances with large international firms such as JP Morgan,

Goldman Sachs and Citi in the financial industry, Daimler and Volkswagen in the manufacturing industry, BASF in the chemical industry, etc.

Dr. Zhang believes that under the current situation, quantum computing should make use of the integrated circuit chip technology and equipment of classical computers to develop in both superconducting and semiconducting approaches. We domestic firms are about three to four years behind foreign firms in these directions. However, he also believes that the field of quantum computing has not yet been completely monopolized by our overseas competitors. China has the opportunity to get involved in the entire process from developing software to manufacturing hardware.

How to use basic research to solve problems in reality? How to manage and empower scientific and technological startups? How to change from being scientists to being entrepreneurs in business operation? These are the issues faced by Origin Quantum. We therefore interviewed Dr. Zhang to hear his thoughts.

Direction of the technological path

MI: You quit your job in Shanghai and came back to Hefei to start a business with your university Prof. Guoping Guo. Why?

Dr. Zhang: Prof. Guoping Guo [Prof. Guoping Guo is the Deputy Director of the Chinese Academy of Sciences (CAS) Key Laboratory of Quantum Information, and Associate Dean of the Institute of Advanced Technology of USTC.] is the Founder and Chief Scientist of Origin Quantum. He has been encouraging us, the younger generation, to make contributions to areas that others can't. I spent nine years studying at University of Science and Technology of China (USTC) to gain my Bachelor's, Master's and Doctor's degrees, and

Prof. Guo has been my supervisor for nine years. My research interest was on the experimental study of the transport of low-temperature semiconductor electronics and the theoretical study of quantum information in a double quantum dot. Later, I became our college's first to get a Doctor's degree on semiconductor quantum computation. As a result, the PhD students who graduated afterwards were all in this field too.

I still remember that while I was pursuing my Master's degree, there was no specialized laboratory for our major. Therefore, Prof. Guo led us to assemble equipment and build a place for doing experiments in person. We spent over two years on the project. In order to ensure that the space was free of dust, we cut the glass into pieces ourselves and glued them together with silicone, and eventually

built a simple dust-free cubicle.

Looking back now, when we were building the lab, it was as if we were starting a business. When Origin Quantum was founded, Prof. Guo invited me to join. Several other co-founders agreed that they could probably spend 500,000 to 1 million yuan a year to hire a professional manager, but they couldn't find a professional manager who also understood quantum technology. Therefore, they would first consider Prof. Guo's students, who had graduated with over ten years of working experience. Prof. Guo had a simple logic. He said that I was his most senior doctoral student, therefore I could take good care of my alumni behind me.

MI: When the company was founded in 2017, did your first product take shape?

Dr. Zhang: Our products took shape after some time. In 2017, we were just starting out, and our only result was a quantum chip, the brain of a quantum computer (QPU). But our chip then was still a chip in the lab, not a product, as we were still not mature enough in terms of scientific research. We used imported equipment and devices. We didn't need to worry about the cost of the lab. The only goal was to get and publish results without thinking about turning them into products.

Our firm was later founded because there were countless reports of how Google and IBM were making great progress in the field of quantum computing. The few founders felt the urgency. In 2019, Google achieved quantum supremacy for the first time. It made use of a quantum computer with 54 quantum bits. Sycamore, and completed a sophisticated computational task within just a few minutes, a mission impossible for classical computers. At that time, it was widely recognized that Google was making big progress, not just in the laboratory or theoretically, but was involved

in the engineering stage of developing quantum computers. It was also at that time that I decided to join Origin Quantum full time as General Manager. I believed that it was a responsibility of our generation. It was also a meaningful cause for which I could devote myself to. I thought that my previous experience in the field of investment promotion, finance, Internet and fresh products could help commercialize our QPU in the lab.

MI: Google's quantum supremacy was first realized in September 2019. What about the state of technology in our country?

Dr. Zhang: China has also made big progress in quantum supremacy. First, a project led by Academician Jianwei Pan of the University of Science and Technology of China (USTC) achieved quantum supremacy regarding optical quantum. Later on, there was a breakthrough in superconductivity as the quantum processor named Zu Chongzhi II also achieved quantum supremacy. This makes China the only country that has achieved quantum supremacy in both optical and superconducting approaches. However, these results were still mainly carried out in the laboratory with no real products. Superconductivity is an important direction for quantum computers. Of course, the development of quantum computers is still at an early stage. Even in the area of superconductivity, there are many ways of doing it. For example, Google and IBM used different designs for the specific topology of their chips—IBM took a hexagonal structure, while Google took a quadrilateral structure. Different research teams make different choices and use different structures to realize quantum computing.

There are other paths in the field of superconductivity, such as the "trapped ion" technology. At the beginning of the 2020s,



An in-depth look at an Origin Quantum computer

Honeywell developed a quantum computer with ions as the basis for its qubits. Developments related to optical quantum are even more diverse. Both of these systems are based on different physical foundations.

MI: In which sub-division of superconductivity do the products of Origin Quantum belong to?

Dr. Zhang: In terms of broad categories, we Origin Quantum, along with Google and IBM, are all doing research and development in the area of superconductivity. Of course, when we are designing chips, we can choose different topologies, such as hexagonal, quadrilateral and triangular structures. We base our choices on our needs.

And what we need is to solve problems. Therefore, we try out different designs to solve different problems. Quantum computing is still in its early years, compared to classical computing. There are multiple ways of building its underlying physical structures. In this phase of development,

every way worth exploring. When we make decisions, we will also take other tech giants' choices under consideration. However, we are not saying that other solutions are in any ways inferior, or at least we can't reach such a conclusion at the moment. It's unlikely we can predict which is the best way to go. Therefore, we will suggest to the government that more teams should be brought together for cooperation and collaboration and explore all possibilities.

MI: It is true that a lot of different approaches can coexist in the early stage of the innovation of a certain technology. However, a dominant approach will eventually emerge, and other solutions may be phased out or turned to play a supporting role. Does it mean that there is only one way to commercialize a technology?

Dr. Zhang: According to our prediction, in the next five to ten years, there are multiple possibilities for quantum computing to solve problems. It is even possible to make use of quantum computing based on different physical systems to solve a particular problem together. At present, each approach has its unique advantages. For example, optical quantum computing is better at solving problems regarding Boson Sampling, while superconducting quantum computing is good at dealing with problems of Random Circuit Sampling. It is true that these two paths will probably converge theoretically, and a general-purpose quantum computer may eventually emerge. However, at this point, we haven't yet found an approach of quantum computing that excels in solving all these problems.

Of course, for most users, there is no need to understand in-depth how the chips of quantum computers are structured. They are only concerned with the performance of the computers. Today, many large firms are already deploying quantum

computers worldwide. Even though they may possess a limited number of qubits, these firms have started building a globalized application ecosystem that will allow their users get accustomed to taking advantage of their quantum hardware and software. This ecosystem can be established from sorting out the users and application of quantum computing first rather than with a bottom-up approach starting from dealing with technological problems.

MI: In terms of the number of qubits, the current record is held by IBM. What about the arithmetic power of Origin Quantum?

Dr. Zhang: IBM claimed to have built a quantum computer with 433 qubits in 2022, but didn't present its operation. It was understood that a chip for such a computer was built in 2022, and user access to a quantum computer mounted with such a chip to drive over 410 qubits was allowed in 2023. At present, there are five criteria for quantum computation. Quantum computing has to be definable. Qubits have to be initializable and read out. A good quantum computer can keep the qubits in superposition state for sufficient time, and can perform a set of universal quantum operations. These five demanding criteria are interrelated. For example, when the number of qubits increases in a quantum computer, the interactions between the qubits introduce quantum noise, which may interfere with the computer's fidelity. The more sophisticated the system is and the qubits there are, the more likely that quantum noise and errors may occur. Therefore, I personally believe that the number of qubits is not the only way of measuring the quality of a quantum computer.

In the case of Google, it announced that its quantum computer possessed over 70 qubits and kept there for quite some time. However, Google release another announcement recently that it has

discovered a new approach to improve quantum computer's performance regarding error correction. As the number of qubits a computer has increases, its fidelity increases rather than decreases. This is a promising way of building general-purpose quantum computers. It is remarkable. Google and IBM differed in their expectation of quantum computing. Google has focused more on carrying out in-depth study so as to lift the performance of quantum computers, and thus promote the development of related technologies. IBM, on the other hand, has achieved a bigger success in terms of the commercialization of quantum computing by selling quantum computers to all around the world. IBM is leaving it to their users to measure and perfect the technology.

Our current chip Wukong has a qubit count of over 70. Taking 72 qubits as an example. There is not a huge gap between ours and IBM's computer in terms of the absolute number of qubits. However, the gap becomes enormous when it comes to arithmetic power: a gap between 2 to the 72nd power and 2 to the 433rd power. In addition, although our computer possesses a similar number of qubits as Google's computer, ours is unable to perform error correction as well as theirs. Google has setup dix milestones along the path to its quantum computing research. First of all, it is essential to prove quantum supremacy, which means quantum computer can be used to solve a problem that would take a classical computer an impractically long amount of time. Google achieved this breakthrough in 2019. And in 2023, Google has reached the second milestone by using more qubits to lower error rate of quantum calculations. It will take about ten years before the system Google has in mind is close to being ready in around 2030.

MI: What are the advantages of Origin Quantum in terms of technology?

Dr. Zhang: Although lagged behind the global leaders in the field on hardware and software, Origin Quantum has already been listed among the firms with the most number of patents. Among the top ten list, Origin Quantum ranked sixth. According to the statistics of European Patent Office (EPO), in the last three years (2019 to 2022), Origin Quantum ranked second only to IBM in the number of patent applications worldwide. We are comparatively mature on the engineering of quantum computers. We have full control over the technology applied to spare parts. We are able to build fine quantum computers from scratch. This is what Origin Quantum is proud of and will stick to.

Meanwhile, we have also achieved quantum supremacy within a certain number of qubits. Now we are trying our best to solve real-world problems for our users. However, the problems we are facing now differ from the ones we have met in the lab. That was why Ministry of Science and Technology of the People's Republic of China (MOST) approved our proposal and established a project to promote the collaboration between quantum computers and supercomputers in 2022. It was absolutely necessary to invite the best supercomputing and quantum computing teams in China to work together.

When we try to solve real-world problems, we have found that it is unlikely for a quantum computer to solve any problem by itself. A problem could be solved taking multiple steps, and one or a few of these steps could be calculated using quantum computers, while the rest could be more suitable to be processed by classical computers. How to make classical and quantum computers work together to solve real-world problems is itself a big challenge. Quantum computing won't replace classical computing. On the contrary, they two should complement each other. We believe Origin Quantum will make breakthroughs in this regard.



Origin Pilot, the first quantum computer operation system in China

Science and technology empowered by management skills

MI: You are now an entrepreneur. What are the challenges with this transition?

Dr. Zhang: I have to admit that I am not so good at management and communication. At least not as good as we are at doing research. When we lead a team in the company, we may unconsciously take up the same way as how we teach students or manage a lab at school. We need to constantly reflect on our management skills. We have learned from our predecessors' lessons, and found that those who succeeded were all brave enough to admit their mistakes, keep learning, and have the courage to correct themselves.

Unfortunately, this is a challenging task for many area experts, because they tend to believe that they are right—which has been a deep rooted mindset. I believe scientists should overcome such a psychological stereotype. Only in this way can they successfully commercialize their scientific and technological achievements and become leading figures in their field.

I can relate to the management issues you have mentioned. For Origin Quantum, when our company grows to a team of about 100 staff, we somehow reached a balance. It was a time when we were the most united, stabilized and achieved the highest efficiency at work. However, with the increase of business, the total number of employees increased to over 300. We met a lot of problems regarding the stability and working atmosphere of the company. We reflected on these issues, and found that we lacked management skills. For example, we used to make swift changes to our pay and incentive system so as to encourage or restrict certain behaviors, but we may revoke the decision after merely a few months. This has hurt the feelings of our employees. Again, most of our employees have to do multitasking, shifting between projects and cooperating with co-workers every day. If the pace of work is not well managed, there will be a lot of troubles. The good thing is we have established a corporate culture that encourages communication. When something goes wrong, we sit down and discuss it together, and then make constant adjustments.

MI: What changes have you made in management? Are there any lessons to share?

Dr. Zhang: We have been learning as we move forward. We have gained some experience from the talents we have hired from different industries. But the talent we need to work on quantum computing talents are very different from those wanted by other industries. Even AI industry can have more options than we do. When we are hiring, we often say that the talents come to us are only 50% prepared. If they graduate from computer science programs, we will have to teach them about quantum science and quantum physics. If they graduate with degrees in physics, then we will teach them about computer

science. In the process of research and development, we continue to break down the complex quantum computing tasks into smaller steps, and we can find the most suitable talents to work on each part. This is a valuable lesson for us. Now even if a new employee doesn't know much about quantum mechanics, he/she can still join the team by working on merely a part of the whole task. Therefore, it is very important for our senior level technicians to learn to break down problems. Of course, we are also constantly cultivating an understanding of quantum computing among our talents from traditional industries, which may in return motivate them to work more effectively.

Commercialization and future development

MI: How have you helped Origin Quantum to commercialize your technologies after joining the company?

Dr. Zhang: We had an in-depth discussion on the commercialization paths and thought about the future directions between 2017 and 2019. We explored five or six business models. Among them, we paid special attention to the commercialization path of intellectual property patent licensing. It was the technological advantages of Origin Quantum that we owned a number of core patents in the field of quantum computing, which could be licensed to other firms in the future for royalties. Therefore, we started deploying intellectual property rights early and cultivated a specialized team of patent engineers of our own. In Origin Quantum, a patent engineer works with about a dozen of engineers. It has been listed as a strategy of our development. It has played a positive role. As a result, Origin Quantum ranks high

in the world in terms of the number of patents. We believe that the construction of a patent and intellectual property system is the foundation for our future competitiveness. We are adopting a similar business model as that of Qualcomm in the field of communications. Qualcomm doesn't yield products, but it owns the core patents that other firms have to make use of so as to ensure its revenue.

Another path of commercialization is to provide quantum computing services in the cloud. IBM and Google made 5-qubit and 6-qubit quantum computers accessible to users in 2016 and 2017 using cloud platforms. Most of the users in the future are likely to visit quantum computers and make use of quantum computing services online. When Origin Quantum was founded in 2017, we started to build China's first cloud computing platform. In the following five to six years, we have been providing quantum computing services via the platform, accumulating an increasing number of users.

In addition, we have found a new path of commercializing quantum technology by creating quantum applications. For instance, we worked with China Construction Bank (CCB) to launch a laboratory to solve their problems. We not just provided solutions, we also helped CCB to cultivate talents who could explore the application of quantum computing in the field of finance. As a result, quantum education has become part of our business, and it has started to make good revenue nowadays. In March 2021, Ministry of Education of the People's Republic of China (MOE) listed Quantum Information Science as an officially-approved major for undergraduate programs in China. We believe that degree programs, industry training and even popular science lectures about quantum computing is going to be a big market in the future.

MI: In what areas are quantum computers superior to classical computers in practice?

Dr. Zhang: At present, we can't prove that quantum computers excel classical computers on processing all problem. For instance, quantum computers are neither quicker nor more reliable when doing basic calculations. But the supremacy of quantum computing has been proved in the following two areas.

First, massive data can be processed using parallel algorithms, such as the big data processing in the field of finance, AI, etc. Combining quantum computers and AI together, it is possible that we can build a quantum AI computer similar to "Moss" in the movie "Wandering Earth 2". Second, the motion and evolution of microscopic particles such as molecules, atoms, electrons, etc. can be simulated. The particle motion of these microscopic systems follows the laws of quantum physics, which can be too complex to be processed by classical computers. In this regard, it is promising that quantum computing could produce a revolution in the biomedical industry and restructure the process how new medicines are developed. We often say that with sufficient input of parameters, a powerful algorithm can even simulate and predict the future. For example, throwing a coin from a high-speed airplane at a height of several thousand meters, whether its head or tail is up when it hits the ground is too complex a problem for a classical computer to process in tens of seconds. There are too many factors to consider, such as the height and speed of the airplane, the temperature and humidity in the air, the win resistance, the gesture of tossing the coin, etc. If there is a bird passing by, even more parameters have to be considered for solving the problem. However, in theory, with a powerful tool, such as a quantum computer, it is possible to predict the outcome. ☑



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