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创新发展报告

特别呈现

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汇丰中国副行长
工商金融总监
方啸

创新时代

承前启后，继往开来，中国社会已经进入了新的阶段，站在了世界舞台的中央。新时代的蓬勃活力让千千万万人感受着生活的便利和美好。重塑创新体系、激发创新活力、培育新兴业态，这些不仅提升着人们生活的幸福感，也在为经济社会各领域转型升级注入新能量。

创新意味着引领时代，在全球创新浪潮的驱动下，一大批中国科技企业正凭借着创新与实干成功崛起，并走向全球市场，无论是海外资源布局，还是在海外建立研发中心集聚全球人才，中国企业走出去的新时代，正在逐渐到来。汇丰，迎着这股浪潮，与企业同行。

与众不同的市场，巨大的机会，是最好的时代，也是最具挑战的时代。创新被时代所强烈召唤；创新需要颠覆，创新也在不断进化。我们清晰地看到，创新催生了以高科技、大健康、教育和专业服务为主导的新经济，这是创新带给未来的一份礼物。这份礼物带给我们很多的灵感和激发，也让我们去思考金融行业应该如何更好地去迎接新时代的到来。

汇丰中国在大家的印象中一直是严谨和稳重的风格，我们一直努力给我们的客户传递真实而有力量的内容，同时，汇丰也是大家在创新这条道路上的同行者。我们的大量伙伴都是创新型企业，如何就“创新”带给他们更好的内容，是我们

一直在探索的课题。此次我们有幸携手第一财经研究院和浙江大学管理学院，共同推出《中国企业创新报告2017》，这就是在大量数据的基础上去研究中国企业创新力和创新效率的行为，希望以此引发企业的共鸣、思索和行动。

创新是一种基因，它不可量化和复制，更不存在绝对的因果关系。但，商业是有经验可循。感谢我们的伙伴第一财经研究院和浙江大学管理学院，更要感谢报告中每一家受访企业的大力支持，无私地与我们分享他们的创新经验，共同探讨创新路程中的得与失。

汇丰一直是伴随着客户的成长而成长，我们希望和专注于产品及技术，同时又有远见及野心走出去的创新型企业合作。在不断提升我们的产品和服务的同时，一起解码新经济，探索新时代! ☑



浙江大学
管理学院院长
魏江

颠覆世界 以创新的名义

这是个中国的时代，也必将写入人类历史的时代！

这个时代，我们正以创新的名义不断颠覆世界。而颠覆这个世界的最重要力量，无疑是创新型企业。在这个风起云涌的时代，在古老的中华大地上，出现了一批以华为、阿里、腾讯等为代表的、正在颠覆世界的领袖企业，它们在全球竞技场长袖善舞；站立这些企业潮头的任正非、马云、马化腾们，正在与乔布斯、马斯克、扎克伯格们一道，创造着人类新的历史。

这个时代，我们的企业正以创新的名义不断颠覆世界。如果说，过去对企业创新的认识更多局限在技术层面，那么，今天的创新已经是弥漫在空气中的全部元素，无孔不入。今天的企业组织早就不是韦伯时代的企业组织，今天的企业生产方式早就不是泰勒时代的生产方式，今天的企业边界早就不是科斯时代的企业边界。今天的创新，已经颠覆了传统组织经济学下的企业型态，组织内涵、基础设施、市场关系、劳资关系早已发生了革命性变化。

这个时代，企业领袖们正以创新的名义改写着生产函数。今天，价值创造的核心要素已经不是索罗提出的资金、土地、劳动力，也不仅仅是科博-道格拉斯提出的科技进步，而是知识和智慧等全新的生产要素。企业家们以创新实践正在重构新生产要素。让我们特别骄傲的是，中国

企业也参与其中，他们发出了这样的呼吁，“让我们一起去颠覆世界吧！你不去颠覆别人，那就只能等着被别人颠覆”。

作为引领中国创新理论研究的浙江大学管理学院，毫无疑问该承担起记录这段历史的重要使命。回首三十多年前，当浙江大学的创新研究团队开始探索企业创新规律时，显得是那么的孤独，因为，那时“创新”一词在理论界还只是个呱呱坠地的婴儿，更不要说企业界的“前所未闻”。幸运的是，二十年前，浙江大学创新研究团队提出了“企业是创新主体”时，得到高瞻远瞩的国家领导人首肯，尽管那个时候，“创新”一词在企业更多是一个装饰品。更加幸运的是，十多年前，浙江大学创新研究团队原创性提出的“全面创新管理理论”，今天竟然成为了国家的核心战略，并且，“创新”成为企业安身立命的根本已经成为业界共识。

没有不好的行业，只有不好的企业；没有不好的时代，只有平庸的活者。今天的企业要么是创新者，要么是等待死亡者，要么是颠覆者，要么是被颠覆者。这是个不进则退的时代，这是个不变则僵的时代，把握机会，颠覆思维，你才能成为这个伟大时代的强者！浙江大学管理学院将以使命、责任和情怀，与合作者一起，继续走在引领人类未来创新的道路上。☑

魏江



上海第一财经传媒
有限公司CEO
周健工

测量创新

创新已经成为企业的生存术。看下上市公司，寿命越来越短；产品的生命周期，迭代越来越快。不创新的企业，将很快被激烈的市场竞争淘汰。

什么是创新？人们引用最多的是奥地利经济学家熊彼特一个世纪以前的定义，即将生产要素的新组合引入生产体系。一方面，这些要素本身是新的；另外一方面，这些要素之间的组合是新的。其目的是为了生产，为了提供更好的产品和服务，进而创造价值。不创造价值的研究、发明等，都不是创新。

谁来创新？企业。为了竞争，企业创新包括了研发、技术、管理、模式、品牌、组织等等。企业创新的活跃期，往往是市场环境发生了大的变化，如中国的改革开放、人口红利与市场结合、资本市场建立等等，为创业和企业成长提供了奔涌的机会；有时候是技术革命席卷各行各业，导致新行业的产生、旧行业的重新发明，以及行业之间的跨界交融。

如何测量创新？在企业成长的不同阶段，在不同的行业，测量标准是不一样的。我认为从长远来看，对于那些商业模式相对成熟、所处行业相对稳定的企业，应该用结果来测量创新的手段。那些创新的企业，应该有更高的劳动生产率，进行同类基准对比时，各项经济指标要明显高出一筹。而一些巨头式、龙头型的创新的企业，

往往也能跳出其所处的行业，对更多的行业和经济带来正面的影响。

第一财经研究院与浙江大学管理学院共同调研、汇丰银行（中国）有限责任公司呈现的《中国企业创新发展报告》，以1264家A股上市公司作为样本，对中国企业的创新能力进行了一次刻画，并且选取了5家企业进行剖析，最后对中国打造更适于创新的环境提出了一些建议。

这些企业基本代表了中国实体经济。我们可以看到，这些企业大多数都处于市场竞争程度很高的行业，近年越来越注重增加创新的投入，提升创新的效率，从企业的成长、回报等方面已经取得了效果。许多企业在主动拥抱互联网、大数据、云计算等技术，提升了企业的运营效率。中国的资本市场也在容纳更多高风险和高成长的创新企业。

在中国创新成功的企业，也日益具有全球的价值。而中国的资本市场，也会日益吸引世界上最创新的企业。☑

周健工

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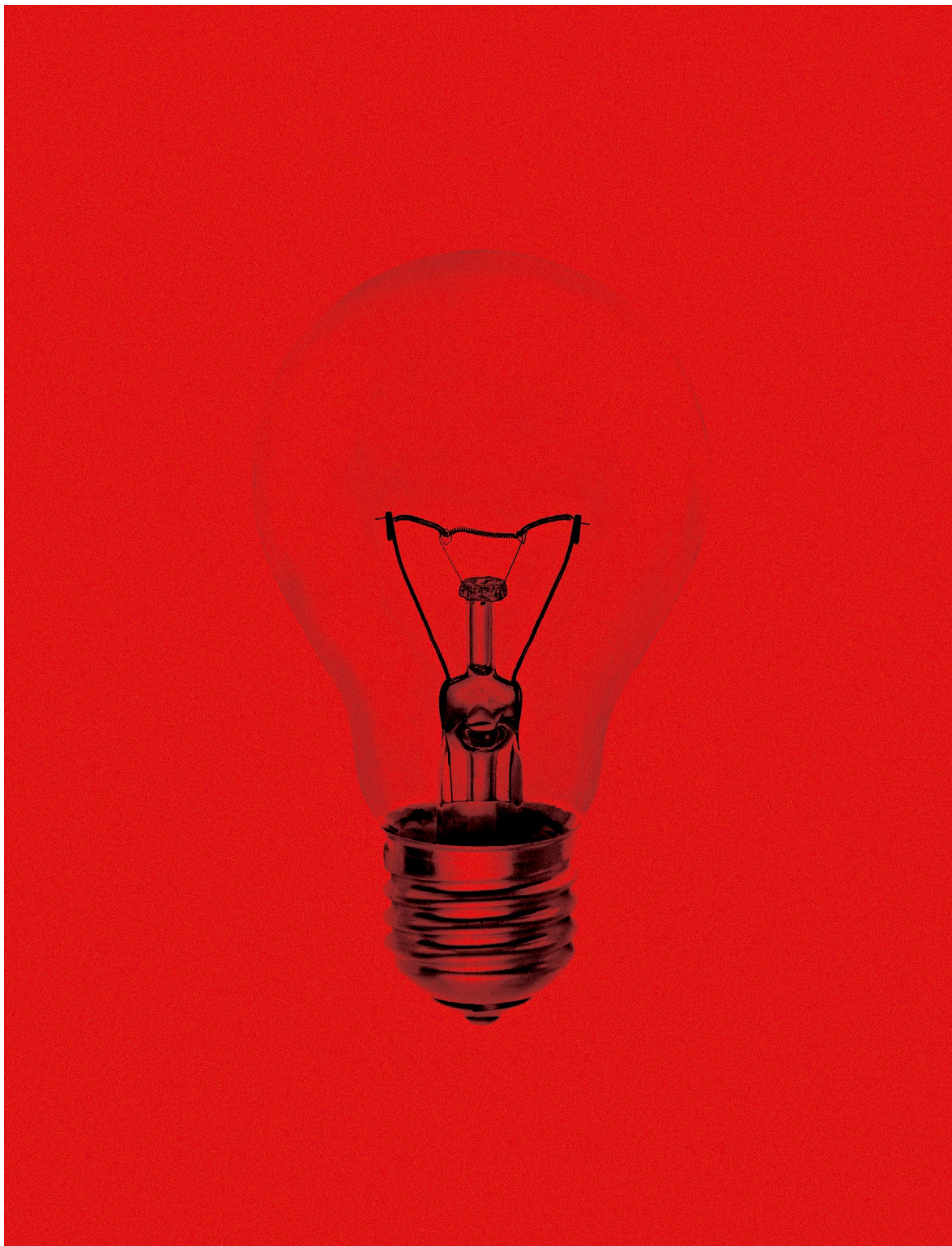
第一节
中国企业的创新力量

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⋮



创新正在成为
中国企业
赢得国际竞争力的
重要推动力量。



中国企业的 创新力量

在知识经济时代，
创新的意义超越以往任何时代。

本报告第一章所引用的中国上市公司创新指数编制方法以及所使用的上市公司创新指数分析基础数据，是源自于浙江大学管理学院郭斌教授及其团队研制的中国上市公司创新指数。该创新指数自2015年开始每年编制并且逐年发布。本报告中第一章的定量部分为浙江大学管理学院及郭斌教授研究团队与第一财经研究院沟通之后，由郭斌教授研究团队根据2014-2016年中国上市公司创新指数数据进行数据分析并完成本章节的主体内容撰写工作。

《公司的力量》

1. 人民网:
<http://scitech.people.com.cn/GB/n1/2016/0817/c1007-28641571.html>

2. 中新网:
<http://www.chinanews.com/cj/2017/05-24/8232620.shtml>

3. 姜慧, 曾群超:
区域中小企业创新指数体系构建研究[J]. 科技管理研究, 2014(13):35-41.

4. 王智慧, 刘莉:
国家创新能力评价指标比较分析[J]. 科研管理, 2015(s1):162-168.

多年来，中国一直被认为是世界工厂，低成本和模仿优势被认为是最为重要的竞争力基础。不过，近年来伴随着大批中国科技型企业的快速崛起，创新正在成为中国企业赢得国际竞争的重要推动力量。

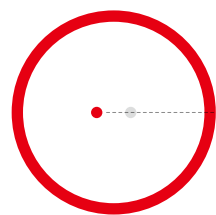
创新的概念最早由熊彼特在其著作《经济发展理论》(1912年)中所提出，并被视为是将生产要素的“新组合”引入生产体系的过程。创新DNA正在不断地被植入到中国企业当中，并根据中国企业自身的实际情况被善加利用。由世界知识产权组织、美国康奈尔大学、英国国际商学院共同发布的2016年全球创新指数显示：中国首次跻身世界最具创新力的经济体前25位¹。从本质上来讲，创新的目的是为了挖掘和利用技术和市场变化所带来的商业价值，并使之最大化。

中国企业所处的技术和市场环境正在发生深刻的变革：在技术方面，不仅仅在产业技术这一端出现了不断新兴的产品与技术发展机会，“互联网+”和人工智能等技术的发展也为中国企业在软实力的发展上面提供了更多的机遇和挑战；而在市场方面，由于中国经济持续快速发展，中产阶级人数大幅上升，消费者的购买类型和偏好发生着动态的变化，其中的趋势之一就是

是希望得到质量更高的产品、享受更好的服务。此外，高端市场也在中国日益出现规模化发展的趋向。《2017福布斯中国中高端富裕人群财富白皮书》的数据显示中国的富裕阶层在2016年底达到1261.08万人²。这意味着，在国内市场上，中国企业不仅要维持中低端市场的优势，而且要不断向传统上由发达国家跨国公司主导的高端市场挺进。与此同时，随着中国企业创新能力的不断提升，尝试切入海外市场、融入全球价值链和参与全球竞争舞台的中国企业数量也逐年增加。这些企业无疑将需要借助创新的力量来同时面对本土和海外市场的“双市场”挑战。

此外，中国市场也日益成为商业模式创新的试炼场和掘金地。越来越多的公司为了更好地拥抱技术和市场的变化，在商业模式创新上进行了大量的尝试和试错。这些商业模式创新在很大程度上重新定义了企业间的竞争，也引致了大量的跨界竞争现象出现。因此，在竞争格局不断变动当中，商业模式创新与产品（或技术）创新的结合，将成为中国企业在市场竞争和全球化情境下赢得优势的重要力量。

可以说，中国企业已经不仅仅在照搬国际上的创新套路，“创新”实践本身也在中国被不断地创新。



主要创新指数比较^{3,4}

发布者

测评项目类别

指标构建和测评方式

研究层面

优点

缺点

关于企业创新力的评估方法

在过去的三十年中,一些专业组织、科研机构以及研究学者以国家、区域、产业等为对象建立了不同层面、不同方式的创新评估体系,例如欧盟创新记分卡(European Innovation Scoreboard)、中国国家创新指数、全球制造业竞争力指数、中关村指数等(如图,主要创新指数比较)。但这些基于科学调查和专家咨询的评估方法普遍存在以下几点问题:

第一,评价主观性。绝大多数的创新指数评估高度依赖于专家的主观判断(如图,创新评估体系基础指标说明)。如何来保证这样的主观判断不会受到其他因素的影响是很多评估实践中需要解决的问题。即使参与评价的专家具备足够能力来判断指标和权重,在面对如此大样本数据和繁多的指标时专家是否有精力和时间去准确评估也是个疑问。

第二,信息覆盖性。传统评估方法主要评估基于研发或者是以产品等纯技术形式出现的创新,但对大量的创新以非研发、非技术方式呈现的,如知识管理体系改进、销售渠道改变、商业模式创新等,很容易被忽略掉。

第三,样本可得性。现有评估方法数据收集依赖于问卷调查,数据获取成本高,样本覆盖性存在问题。

第四,指标逻辑性。传统对创新能力或指数的测度基本思维方式是先定义,再从逻辑出发,说明指数所包含的维度,本质上假定了不同维度相互独立,相关指标无可争议。然而创新本身就是一个复杂的概念,还不存在一致的定义。另外,传统的测量方法往往考虑指标的因果逻辑,存在驱动因素和效应因素混合的情况。

	01	02	03	04	05	06	07
	欧盟创新记分牌 European Innovation Scoreboard + 区域创新记分牌 Regional Innovation Scoreboard	技术成就指标 Technology Achievement Index	知识经济指数 Knowledge Economy Index	国家创新指数	全球制造业竞争力指数	自主创新能力评价指标	中关村指数
发布者	欧盟委员会	联合国开发计划署	世界银行	中国科学技术发展战略研究院	德勤	中国国家统计局 国家经济景气监测中心	北京统计局 北京市社会科学院 中关村创新发展研究院 北京方迪经济发展研究院
测评项目类别	A 创新推动 B 企业创新行为 C 创新产出 8个创新维度 25个分项指标	A 技术创造 B 新技术扩散 C 就技术扩散 D 人力技能 8个分项指标	A 人力资本 B 知识资本 C 地区经济产出 D 知识可持续性	A 创新环境指数 B 创新投入指数 C 创新产出指数 D 创新成效指数 21个分项指标	A 全球制造业竞争力指数 B 竞争力驱动因素分数 C 政策分数	A 潜在技术创新资源 B 技术创新活动 C 技术创新产出能力 D 技术创新环境	A 创新环境 B 创新能力 C 产业发展 D 企业成长 E 辐射带动 F 国际化 14个二级指标,38个分项指标
指标构建和测评方式	基于熊彼特创新定义、前面上调研和各国数据可得性构建指标体系,数据源自欧盟委员会的创新调查、欧盟统计局、OECD和文献数据库	专家法+面上调研获取权重	专家法+面上调研获取权重	采用“逐级等权法”进行权数的分配	根据高管们给驱动国家制造业竞争力的各项指标的相对重要性打分,然后再给40个国家/地区的制造业当前和五年后的整体竞争力排名	专家法+面上调研获取权重	借鉴“硅谷指数”的编制经验,形成开放式指标体系,包括监测科技园区发展状况常规指标和中关村特色的指标
研究层面	国家级、区域性	国家级、区域性	国家级	国家级	国家级	国家级	产业园
优点	规范度高,处理方法可靠	通用性	通用性,从知识视角考虑创新	信息覆盖性强	通用性,区块对比性	强调“自主”	与地区特色契合程度高
缺点	驱动要素与表征要素重合	偏向技术创新	信息覆盖性较弱	驱动要素与表征要素重合	偏重全方位的竞争力而非创新	从技术创新能力的角度出发有一定局限性	适用于中关村高新技术产业测评范围有一定局限性

注: 本表根据姜慧, 曾群超(2014); 王智慧, 刘莉(2015) 论文整理和改写。

我们建立的评估体系

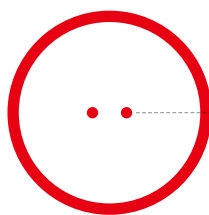
1.

我们新建立的创新评估方法能够解决上述这四个问题。

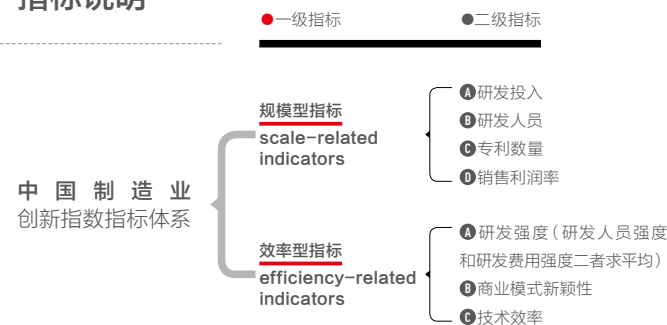
第一, 这是一种评估方法不依赖于个人的主观判断, 这样可以最大限度保证这套方法评估出来的指数不依赖于个人并具有稳健性。

第二, 把非技术因素这类对公司竞争力和绩效常常也很重要的因素被纳入评估中。

第三, 我们所建立的评估方法具有较低的



创新评估体系基础指标说明



注: 本表根据王智慧, 刘莉(2015) 论文整理和改写

评估成本, 并且可以在较长的时期内追踪我们所考察的企业样本(上市公司)。

第四, 对于创新缺乏广泛被认可的概念及维度的问题, 我们采用信息抽取思想来解决。这意味着我们关注的是创新能力中被实现、体现出来的那部分。换言之, 也就是这部分体现出来的创新能力能够体现在对公司绩效的贡献上。在公司绩效的反映指标选择上, 我们相信创新真正而言体现对价值创造的贡献上, 所以我们选取了EVA作为公司绩效的反映指标。

在新的创新评估体系中, 我们把中国公司创新力分成创新实力(innovation strength)

和创新效率 (innovation efficiency) 这样两大部分。针对这样的两个维度, 我们选取的评估基础指标如下表所示。

对于前者, 我们发现有些公司创新整体实力很强, 主要反映在规模上, 研发人员、研发资金投入更多, 意味着创新产出更多。因此, 创新势力的评估上我们采用的基础数据包括如下四部分:

第一, 研发投入规模, 这直接反映了公司在研发上的财务资源。

第二, 研发人员规模, 背后反映公司隐性知识的数量。

第三, 专利规模数据, 因为专利我们可以把它理解为企业所拥有的显性知识。

第四, 一个公司创新势力很强的话, 那么它在市场中将具有足够定价能力, 反映在平均销售利润率上会具有优势。

而对于创新效率, 考虑到有一些公司存在这样的现象: 他们缺少大公司那样雄厚的资金和人力进行研发创新投入, 但是创新活动产出却效率非常之高。因此用于评估创新效率的基础数据则包括以下三部分:

第一, 用创新研发强度指标, 也就是研发投入与公司销售额的比例。

第二, 技术效率。通常, 企业在资源利用上达到最理想情况下应该得到一个最大的潜在产出水平。然而真实产出水平往往由于资源没有得到充分利用, 而低于上述理想状态 (即潜在产出水平)。偏离的程度则代表了企业技术效率的高低, 技术效率越高, 应该越接近在理论上能达到最大的产出水平。我们衡量了在产品意义上和知识意义上这两种情形下的技术效率。

第三, 不仅仅是新兴互联网公司, 传统制造业里也有许多公司面临着来自于商业模式创新上的挑战。因此我们也把商业模式新颖性纳入到评估当中。我们评估它的模式偏离其在行业平均状态的程度。这个偏离程度越大, 一定程度上反映这个公司商业模式的独特性。

新的创新评估方法得出的结果不仅仅可以运用于学术研究, 同样也能为政策分析提供基础数据。例如哪些行业有最高的创新效率, 哪些行业有最高的创新势力, 过去三年他们怎么变化,

哪些行业不断上升、哪些行业下降?

基于地域的创新力和创新效率排行和趋势分析也可以为政府和投资者了解区域层面在创新竞争中所处态势服务。

2.

基础指标的数据来源与测度。

1) 规模型指标

①研发投入: 研发投入数据主要来自Wind数据库的“研发费用”字段; 缺失的数据从对应企业的年报中进行补充。

②研发人员: 研发人员数量主要来自Wind数据库中“技术人员人数”字段; 缺失的数据从对应企业的年报中进行补充。

③专利数量: 专利数量数据全部来自国家知识产权局的专利检索系统, 以上市公司为申请人, 查询公开 (公告) 日介于2016年1月1日至2016年12月31日之间的专利总量。

④销售利润率: 销售利润率 (ROS) = 税后净利润 / 销售额; 其中, 税后净利润数据和销售额数据分别来自国泰安数据库 (CSMAR) 的“净利润”和“营业收入”字段。

2) 效率型指标

①研发强度: 研发强度的测度有两类, 分别为“研发强度_费用 (研发投入 / 营业收入)”和“研发强度_人员 (研发人员 / 员工总数)”。研究所用的研发强度为研发强度_费用和研发强度_人员二者的均值, 计算公式如下:

$$\text{研发强度} = \frac{\text{研发强度_费用} + \text{研发强度_人员}}{2}$$

研发投入、研发人员和营业收入的数据来源如前所示, 员工总数数据来自国泰安数据库 (CSMAR) 的“员工人数”字段。

②技术效率: 技术效率是衡量企业生产经营效率的重要指标。技术效率的计算主要利用 stata 14.0 软件中提供的随机前沿分析 (SFA) 模块, 估算超越对数生产函数, 具体模型如下:

$$\ln(Q_i) = \beta_0 + \beta_1 \ln(K_i) + \beta_2 \ln(L_i) + \beta_3 [\ln(K_i)]^2 + \beta_4 [\ln(L_i)]^2 + \beta_5 \ln(K_i) \ln(L_i) + (v_i - u_i)$$

其中, Q_i 、 K_i 、 L_i 分别代表了增加值、固定资产净额以及员工总数。

增加值的计算方式依据收入法, 其计算公式如下:

公司增加值 = 应付职工薪酬 + 应交税费 + 应付利息 + 固定资产折旧 + 资产减值损失 + 公允价值变动收益 + 投资收益 + 汇兑收益 + 营业利润。特别地, 对于企业增加值为负值的情况, 因为对负的企业增加值取对数之后会生成缺失值, 为便于更为合理地计算这类企业的创新指数得分, 因此, 在计算技术效率之前, 将这类缺失值统一替换为0。

员工总数数据来源如前所示, 计算增加值所需的数据和固定资产净额数据均来自国泰安数据库 (CSMAR)。

③商业模式新颖性: 为了测量焦点企业同行业内其他企业商业模式平均水平的差异性 (即新颖程度), 我们构造了一个多维矢量, 包含前五名供应商占比、前五名客户占比、营业周期、流动资产与收入比、销售费用率、非制造业占收入比共六个维度。计算公式如下:

$$\text{商业模式新颖性} = 1 - \frac{V_{ij} V_j'}{\sqrt{V_{ij} V_{ij}} \times \sqrt{V_j V_j}}$$

其中, V_{ij} 为焦点企业的矢量, V_j 为行业平均水平的矢量。

3.

评估权重生成。

权重的确定一般有两种方式。一种是利用德尔菲法让专家来确定每个指标赋予的权重, 但是这种方法主观性较强。本研究采用统计方法, 依靠二手数据更加客观地计算出各个指标的权重, 以保证测度的客观性。过去的研究显示, 创新的目的是提升绩效, 因此各个变量对创新的贡献最终会反映在对绩效的贡献上。因此以绩效为因变量, 以创新指标为自变量, 估计各个指标的权重。具体做法如下:

1) 选择因变量

EVA (经济增加值) 是衡量企业为社会创

造经济价值的指标。其理论源于诺贝尔奖经济学家默顿。从最基本的意义上讲, 经济增加值是公司业绩的度量指标, 与其他度量指标的不同之处在于, EVA 考虑了带来企业利润的所有资金成本。在这个意义上, EVA 更加真切地揭示了上市公司的经济业绩, 可以帮助企业判断是否当期真正为股东创造了价值。EVA 数据来自国泰安数据库 (CSMAR)。

2) 自变量及其无量纲化

自变量为中国制造业创新指数指标体系中的二级指标, 包括研发费用、技术人员人数、专利总数、销售利润率、研发强度、商业模式新颖性、技术效率等7个变量。

由于自变量的量纲不统一, 各个行业之间差别很大, 这样会使估计的误差很大。因此, 为了使得回归中跨行业可比, 我们首先将自变量中的各个指标剔除行业均值, 排除行业带来的差异。然后按照以下公式, 将所有自变量的取值统一在0-10范围内, 便于模型的回归。

$$Z_i = \frac{x_i - x_{\min}}{x_{\max} - x_{\min}} \times 10$$

其中, x_i 表示自变量 x 的第 i 个观测的取值, x_{\max} 和 x_{\min} 分别表示第 i 个自变量的最大值和最小值, Z_i 表示 x_i 无量纲化后的取值。

3) 回归分析与权重计算

因变量为2016年的EVA, 自变量为2015年无量纲化之后的研发费用、技术人员人数、专利总数、销售利润率、研发强度、商业模式新颖性、技术效率, 控制变量为2015年的员工总数和企业年龄。采用OLS进行回归。第1个模型为基础模型, 只放入控制变量。第2到第8个模型, 每个模型都在前一个模型的基础上新增一个自变量。最终得到8个回归结果。因为回归模型的衡量了该模型中自变量和控制变量对因变量的解释程度, 而每新增一个自变量进入回归模型都会导致 R^2 的增大 (或者不变), 因此, 新增一个自变量所导致的回归模型 R^2 的增加值代表了该自变量对因变量的贡献。每个自变量权重的计算公式如下:



$$w_i = \frac{\Delta R_i^2}{R_8^2 - R_1^2}$$

其中, w_i 表示第*i*个模型在第*i*-1个模型的基础上新增的自变量的权重; R_8^2 表示第8个模型(包含2个控制变量和7个自变量的回归模型)的 R^2 , R_1^2 表示第1个模型(仅包含2个控制变量)的 R^2 , 则 $R_8^2 - R_1^2$ 表示全部7个自变量对因变量的贡献; $\Delta R_i^2 = R_i^2 - R_{i-1}^2$ 表示在第*i*-1个模型的基础上增加一个自变量所导致的 R^2 的增加值。例如, 第2个模型在第1个模型的基础上新增了“研发投入”作为自变量, 那么“研发投入”的权重即为

$$w_2 = \frac{R_2^2 - R_1^2}{R_8^2 - R_1^2}$$

值得注意的是, 自变量放入模型的顺序会影响该自变量的权重。为了消除这一问题, 本研究穷举全部7个自变量可能进入模型的顺序, 共计35280种可能的组合, 对每种组合进行回归, 计算各个自变量的权重, 然后对每个自变量的权重求均值作为该自变量最终的权重。

根据上述方式, 我们可以算出每个指标的权重, 如表3.1所示:

各指标权重

变 量 名	平 均 权 重
研 发 费 用	0.360859
技 术 人 员 人 数	0.048225
专 利 总 数	0.013955
销 售 利 润 率	0.015639
研 发 强 度	0.010289
商 业 模 式 新 颖 性	0.003313
技 术 效 率	0.547719

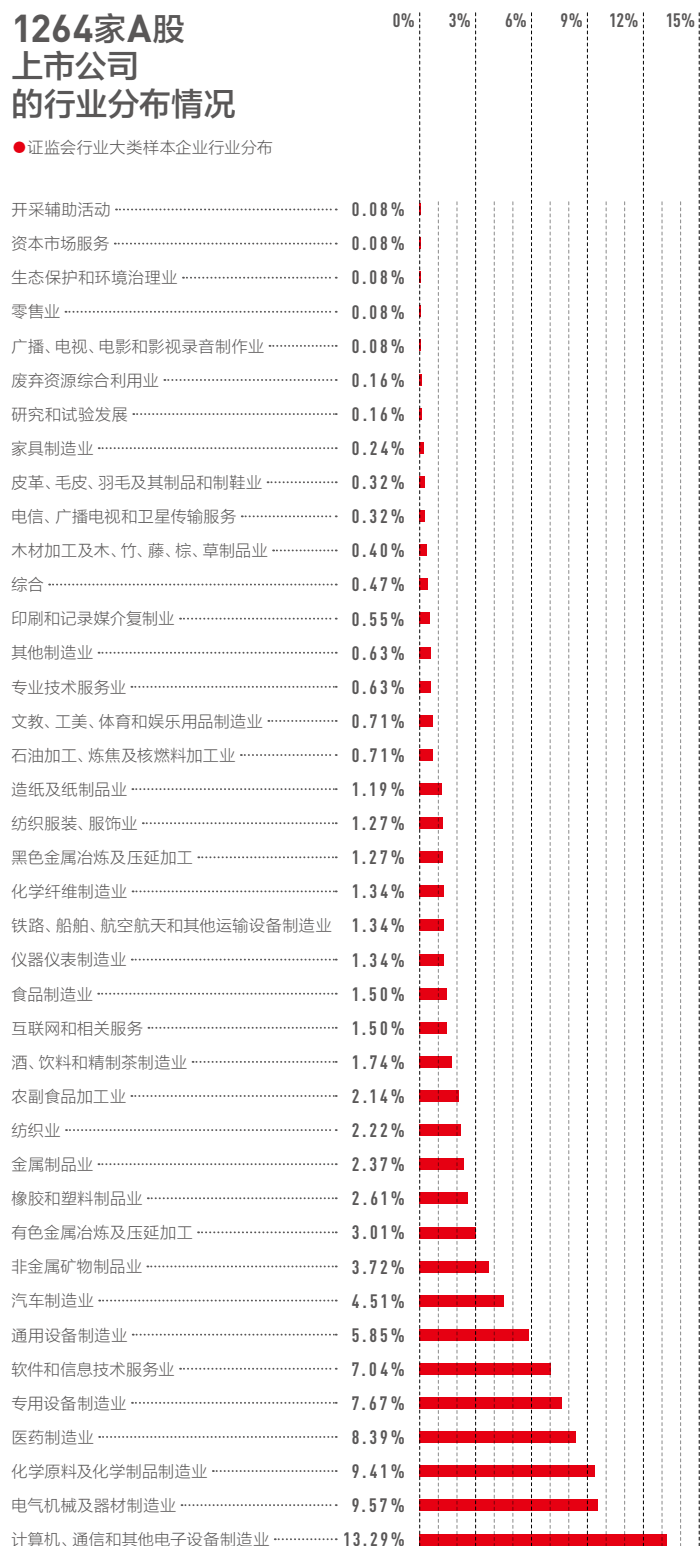
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得分计算。

创新指数得分分为“创新势力”得分和“创新效率”得分, 其中, “创新势力”得分的计算基于全部7个规模型指标和效率型指标, “创新效

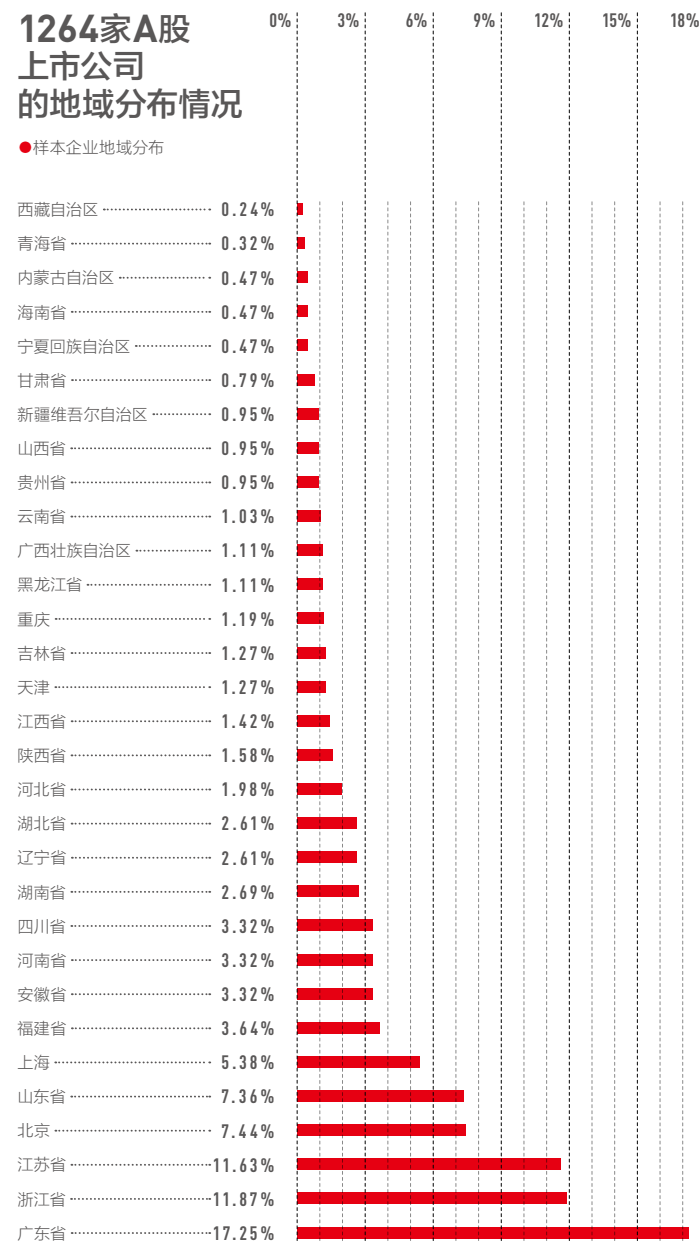
1264家A股上市公司 的行业分布情况

●证监会行业大类样本企业行业分布



1264家A股上市公司 的地域分布情况

●样本企业地域分布



率”得分的计算只基于效率型指标。在计算创新指数得分时, 对每个指标进行无量纲化, 且无量纲化不预先去除行业均值。

1) 创新势力得分

创新势力得分的计算公式如下:

$$Y_i = \left(\sum_{i=1}^7 w_i \times x_i \right) \times 10$$

其中, $x_1 \sim x_7$ 分别是无量纲化之后的研发投入、研发人员、专利数量、销售利润率、研发强度、商业模式新颖性和技术效率, w_i 表示第*i*个变量的权重。为了将创新势力得分的取值范围变为0~100, 在

$$\sum_{i=1}^7 w_i \times x_i$$

的基础上乘以10。

2) 创新效率得分

创新效率得分的计算公式如下:

$$Y_i = \left(\sum_{i=5}^7 \frac{w_i}{w_5 + w_6 + w_7} \times x_i \right) \times 10$$

其中, $x_5 \sim x_7$ 分别是无量纲化之后的研发强度、商业模式新颖性和技术效率。为了将创新势力得分的取值范围变为0~100, 在

$$\sum_{i=5}^7 \frac{w_i}{w_5 + w_6 + w_7} \times x_i$$

的基础上乘以10。

中国企业的创新现状

鉴于数据的可得性, 我们以上市公司作为评估对象来考量中国企业的创新现状, 所覆盖的上市公司行业包括制造业、信息传输、软件和信息技术服务业、科学研究和技术服务业和综合五类行业。进入我们评估的企业有1264家(部分数据缺失上市公司被删除), 每家企业在2012~2016年中数据均为完整的。

通过对于这些上市公司的评估,我们总结中国企业创新状况在地域、行业和企业层面存在着以下的特点(以上市公司为例)。

中国创新地域特点

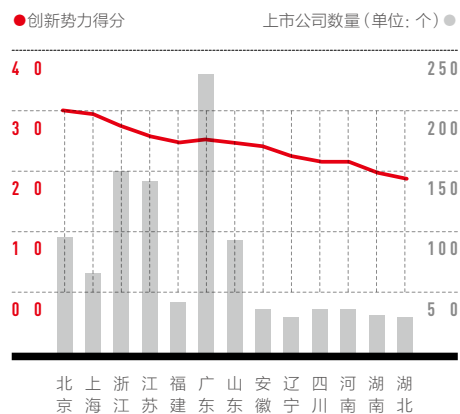
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沿海地区创新势力优势突出,省间差距明显,区域间创新势力梯队明显。

沿海地带创新势力排名靠前,北京、上海、浙江省、江苏省、福建省、广东省,这些省份经济发展水平都处于全国前列,拥有丰富的创新基础设施和资源,并且属于人才高地;同时这些省份的企业与内陆省份的企业相比,受到更多国际化跨国企业的影响,对创新活动更加重视。通过比较各个省份创新势力的标准差发现,各省份标准差都是在10-14之间,说明在各省份内部,上市公司之间创新势力的得分差距很大,这恰好反映了各省份在企业创新能力上的分布离散性以及创新资源分配上存在着不均衡性。

具体来看,创新势力基本可以分为三个梯队。第一梯队以北京、上海为主,其创新势力的排名领先于其他各省;第二梯队是浙江省、江苏省、福建省和广东省;第三阶梯主要是少数沿海省份和多数内陆省份。排名与目前经济发展水平有着显著的相关性。

2016年中国上市公司所在省份创新势力排名



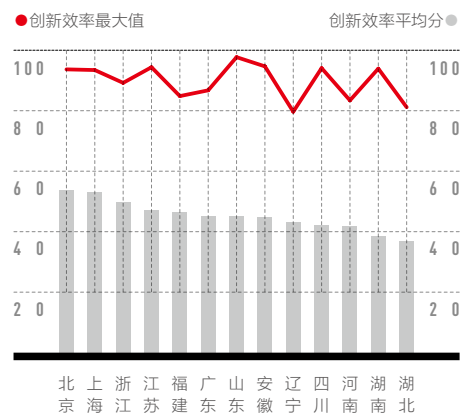
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创新效率与创新势力相辅相成,内陆省份企业间分化严重。

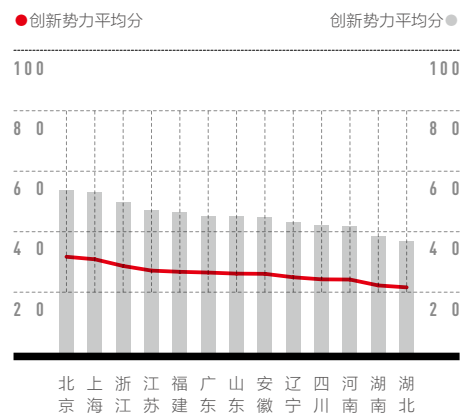
全国各省创新效率的排名与创新势力的排名完全一致。湖南省、四川省和安徽省虽然平均创新效率得分靠后,但是效率得分最大值大于北京、上海、浙江。这一方面体现内陆创新能力在迅速提升,另一方面也体现了企业创新能力分化比较严重,后者原因可能是创新资源分配不均,如政策激励不均,或者人才聚集在个别突出的公司中,这都应该引起当地政府和企业的重视。

如果从2016年百强企业省份分布情况来看,北京、长三角地区与山东省遥遥领先其他省份。

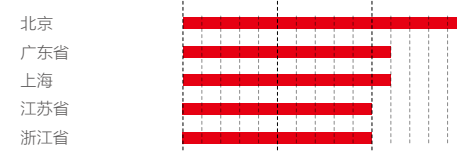
2016年中国上市公司所在省份创新效率排名



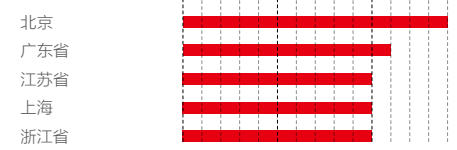
2016年中国上市公司所在省份创新势力和创新效率对比排名



百强创新势力分布



百强创新效率分布

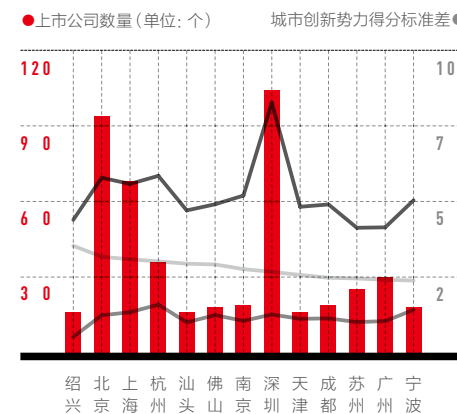


3.

城市创新势力,深圳独树一帜

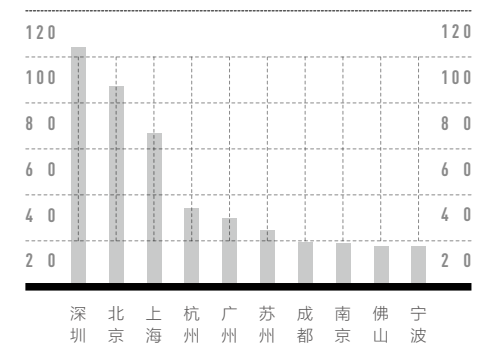
城市排名中,深圳市上市公司数量位居全国第一,达到104个。在创新势力百强企业中,深圳市企业拔得头筹,且得分均值排名第一。这意味着深圳拥有着全国创新势力最强的一批上市公司。

2016年上市公司所在城市创新势力排名

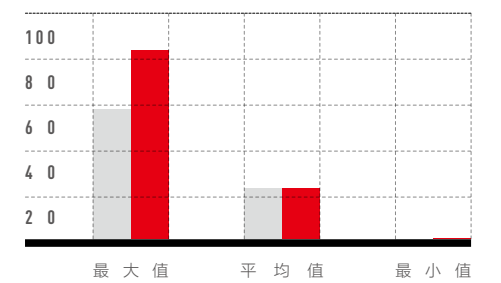


注
上市公司数量
低于16家
的不参与排名

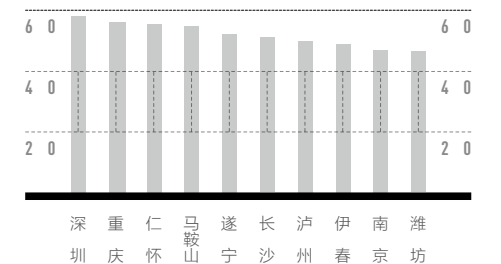
样本企业数



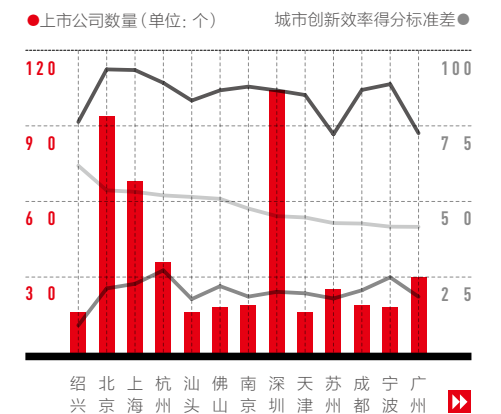
2016创新势力得分情况



2016创新势力百强企业得分均值



2016年上市公司所在城市创新效率排名



中国创新企业个体特点

1.

主板企业规模对创新势力作用明显，三大行业优势突出。

主板创新势力百强企业在平均意义上属于高市值企业，不仅远高于A股企业的平均市值，而且高于A股主板企业的平均市值。从百强上榜家数和上榜率综合来看，酒、饮料和精制茶制造业、汽车制造业和医药制造业在创新势力上都优势明显。

2.

中小企业板民营企业创新势力突出，上市时间与创新力关联性不大。

民营企业在中小企业板创新势力百强榜单中数量最大且上榜率最高。上市时间与企业创新势力排名之间的相关性不显著，因此可以认为上市时间对企业创新势力并无明显的促进作用。

3.

创业板企业指数成份股覆盖率较高。

创业板有13家企业属于沪深300指数的成份股，其中12家属于创业板创新势力百强企业。类似的指数还有中证100指数、深证100指数以及中证500指数，在这三个指数中，创业板创新势力百强企业在创业板指数成份股企业的占比分别为100%、89%和70%。

4.

主板企业制造业在创新效率上的规模不经济问题较为明显。

2016年中国制造业主板上市公司固定资产净额前百名的平均创新效率只有17.93分，而制造业主板上市公司的平均创新效率是45.08分，由此说明公司规模越大，创新受到的管理和约束也越多，从而在一定程度上呈现出与创新效率的负向关系。

5.

企业所有权属性对创新效率有一定的影响。

从企业所有制属性来看，平均创新效率最高的是集体所有制企业，得分为60.84；最低的是地方国有企业，得分为39.78。这可能是由于集体企业在分配方式上更易于体现按劳分配原则，企业利益与个人利益更为紧密，因而创新效率会高于多层级式管理的国有企业。

6.

创业板企业上市越早创新效率越高，企业成立越早创新效率越低。

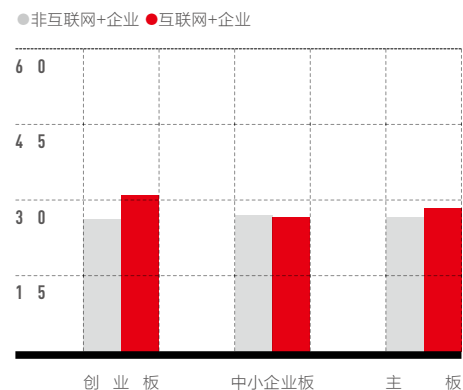
2009年上市的创业板企业创新效率平均得分为51.09，而2010年和2011年上市的企业得分分别为47.91和44.41，呈递减趋势。这一方面可能与早期创业板公司上市时对企业质量的审核更为严格有关，另一方面也可能是因为上市时间越早，企业在获得上市融资之后通过经验积累可以更好地提升竞争效率。但企业成立时间和企业创新效率的关系与上市时间和创新效率的关系恰好相反，成立于1987-1998年的73家创业板上市公司创新效率平均得分为44.23，而成立于2004-2010年间的64家公司得分为49.80，1999-2002年间公司得分为46.17。说明公司成立时间越早，管理层更容易固化于当前的管理模式，进而降低创新效率。

7.

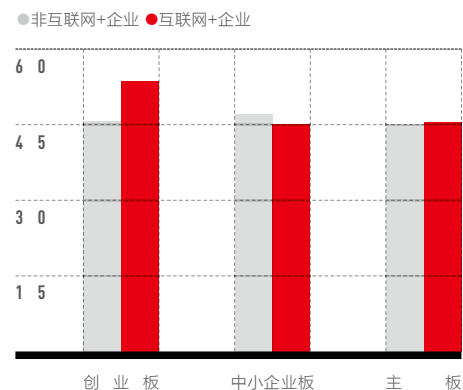
互联网+企业创新更强，但中小板除外。

主板和创业板的互联网+企业创新力度更强、效率更高，但同样的情况却没有出现在中小板企业中。2016年中小板互联网+企业的创新势力与效率方面的平均分均不及非互联网企业。

**互联网vs板块
创新势力平均分**



**互联网vs板块
创新效率平均分**

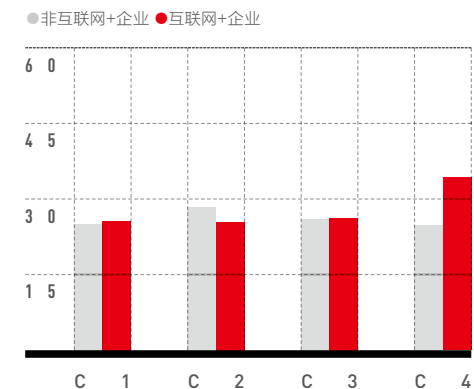


8.

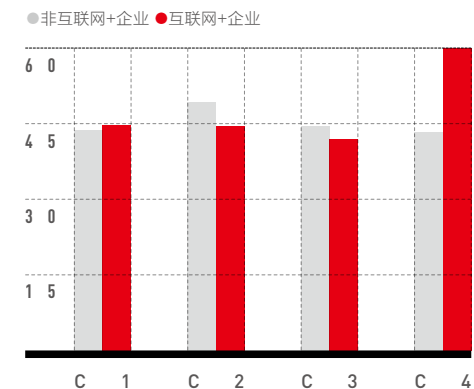
轻工业和重工业中互联网+企业的创新效率仍有待提升。

从创新效率来看，C2轻工业与C3重工业（除仪器仪表）中传统企业的创新效率更高。化学原材料与重化工产品目前触网较少，这可能是出现这种局面的原因。在大多数制造业中，互联网企业的创新势力均高于传统企业，唯一的例外出现在C2轻工业（除食品、烟酒饮料业与纺织服装、皮革业），这些轻工行业里传统企业对创新的投入仍然领先。

**互联网vs制造业
创新势力平均分**



**互联网vs制造业
创新效率平均分**



注：C1 C2 C3 C4所代表行业的详见P22

时间趋势： 2015~2016年对比

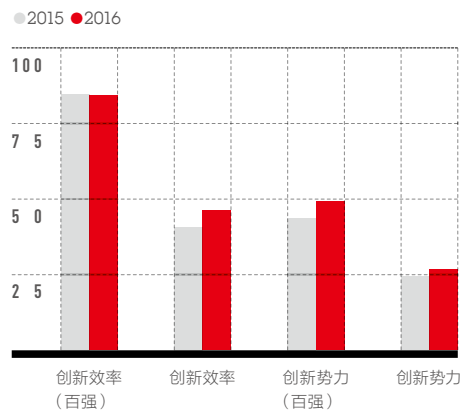
2014年“大众创业、万众创新”提出，到2015年政府工作报告中该口号再被提起；2015年7月，国务院印发《国务院关于积极推进“互联网+”行动的指导意见》。我们特意将2015年与2016年的数据进行比较，希望从中可以找出关于中国创新更多的信息。

9.

创新势力与效率均显著提升。

2015-2016样本上市企业创新势力与创新效率得分均显著提高，表明万众创新已开始成为新常态下经济增长的新引擎。创新百强企业在创新势力上表现较好，而其他企业在创新效率上的表现更为突出。2016年绝大多数省份在创新势力与创新效率方面均有明显进步。

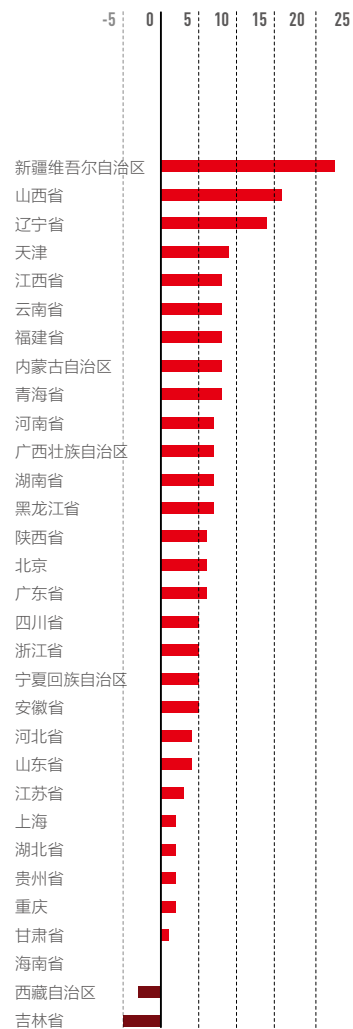
分项得分均值



创新势力省份得分变化 2015-2016



创新效率省份得分变化 2015-2016



10.

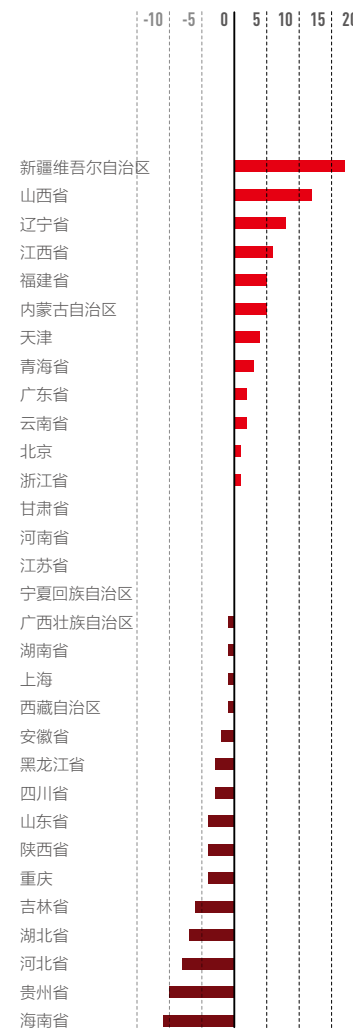
山西、辽宁进步较快。

对于排名显著上升的省份，除了新疆由于样本企业较少波动大以外，如山西、辽宁都属于传统工业大省。在巨大的经济下行压力下，这些省份的上市企业也坚定地走上创新的道路。而2016年工业品价格走高，企业盈利改善或许也对这种变化起到了积极推动作用。而对于沿海省份，不仅排名较高，在全国各省份间的相对水平也保持稳定。

创新势力排名变化 2015-2016



创新效率排名变化 2015-2016

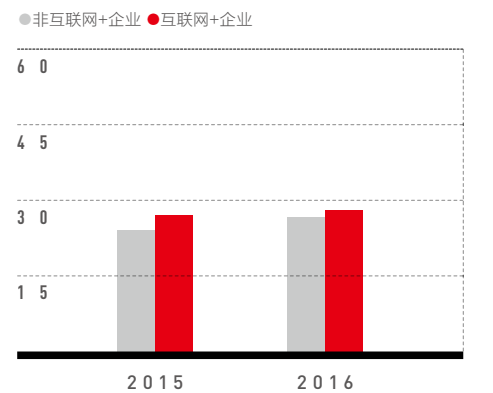


11.

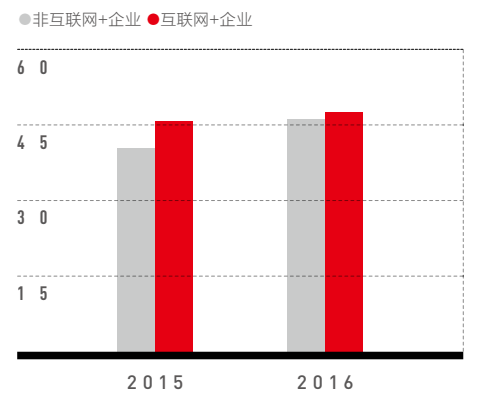
非互联网+企业正在快速追赶。

互联网+企业仍然在创新力与效率上保持其相对优势，但非互联网+企业近年来在研发投入力度上正快速追赶。中国企业已经越来越多地意识到创新的重要性。

创新势力 得分均值



创新效率 得分均值

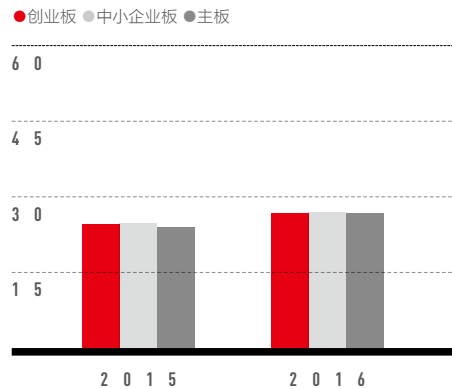


12.

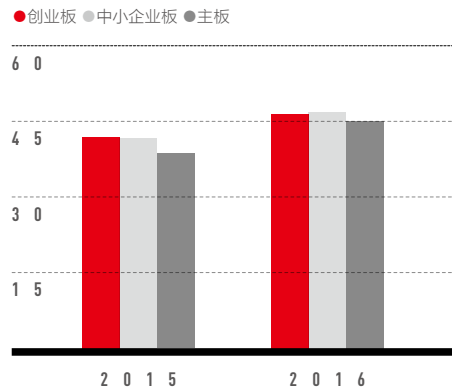
中小板企业在创新势力和效率上全面占优

2016年主板上市企业的创新势力得分大幅增加,已经与创业板企业处于旗鼓相当的水平。但主板企业的创新效率仍然低于其他板块的上市公司。值得注意的是,2016年创业板公司的创新效率已低于中小板企业,后者2016年在创新势力和创新效率上全面占优。

按上市板块统计的创新势力得分均值



按上市板块统计的创新效率得分均值

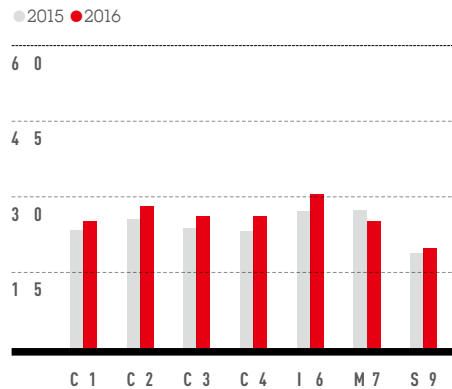


13.

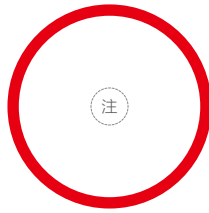
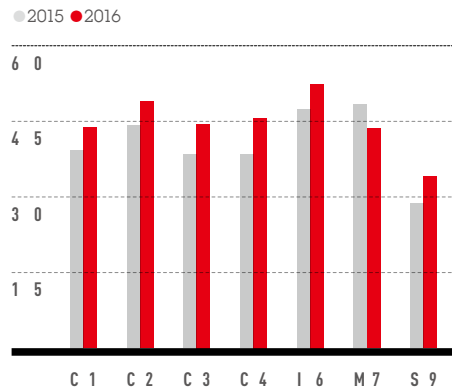
科研与技术服务业创新力有一定的下降趋势

从分行业情况来看,创新势力与创新效率同时出现下降的是科研与技术服务企业。考虑科研与技术服务业在产业创新系统中具有的重要作用,其创新势力与创新效率的下降趋势值得引起关注。

按行业统计的创新势力得分均值



按行业统计的创新效率得分均值



C1

食品饮料、服装、木材加工等制造业;

C2

家居文体、石化与医药制造业;

C3

金属冶炼加工、设备制造、运输工具与电子设备制造业;

C4

仪器仪表与其他制造业;

I6

信息传输、软件和信息技术服务业;

M7

科研服务业;

S9

综合行业。

如果说我们的创新评估方法是将结果作为评判创新成功与否的标准,而在报告接下来的部分,我们试图从源头了解中国企业创新的驱动力。而达到这个目标,没有什么比研究机构案例更合适。

我们挑选了五家优秀且具有分享精神的中国创新企业进行剖析,它们中有转型中的国有企业、创办多年但仍处于风口的上市公司,还有在游戏这个快速发展却又被行业巨头牢牢把控的行业中的尝试突破者。

优秀不是案例选择的唯一标准,我们希望这些案例可以从多维度反映中国企业创新的现状,尽可能多地呈现中国企业创新力的方方面面。

- **华大基因:**
中国进入生命时代的领导组织,用复杂的组织架构来确保商业和梦想的协同。
- **优必选:**
前沿机器人技术与中国制造结合的成果,致力于打造未来真正作为人类生活伴侣的人形机器人,并希望其可以成为核心主动数据收集载体之一。
- **张江高科:**
一家从工业地产商向科技投行转型的国企高新技术园区运营商。
- **科大讯飞:**
打造智能语音这个当前中国人机交互最为便利的入口,并借此构建人工智能生态链。
- **英雄互娱:**
在通过刺激用户多巴胺分泌而获利的电子游戏行业中,希望利用自己独特的战略,在已有两大巨人的行业中占有一席之地。

我们希望通过对于这些企业的研究和领导者的访谈,真正给更多企业以可借鉴的思路,而非仅仅是不可触及的成功故事。

即便如此,一份报告对中国创新也只能“管中窥豹,可见一斑”,但这是起点,未来我们将会与大家分享更多我们对于中国创新的研究成果。

最后,希望大家有所收获,这也是对我们工作最佳的褒奖。

II

第二章 创新企业案例

P022-048

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- P23. 华大基因
- P28. 优必选
- P36. 张江高科
- P40. 科大讯飞
- P45. 英雄互娱

生命时代的组织新“制式”

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华大集团将自己称为组织而非传统意义的企业。

2017年7月上市的深圳华大基因股份有限公司(下称:华大基因)只是这个组织的临床和科研服务部分。

华大集团的愿景是“基因科技造福人类”,在理想和商业之间要达成平衡,一边要“赚钱养家”,一边要“造福人类”。

华大基因的上市为华大集团的理想提供了金融保障,同时也带来知名度的提升以及现代企业管理制度的完善,这些将有助于华大集团向既定的目标前行。华大集团始终相信,一个组织的价值,不仅仅是传统意义的企业价值,还应该与社会价值相协调,而在真正愿景达成之前,他们不希望受到短期因素太多的侵扰。



>> 华大集团的测序仪。

创新, 什么层次的创新?

华大集团执行副总裁朱岩梅那天随身带着一把从诺贝尔博物馆买来的折叠尺, 尺子以一厘米代表一年, 正反两面分别记录着人类社会1801年到2000年每一年最重要的科学发现和技术文化社会事件。在科学发现一面, 尺子以“瓦特将电池介绍给拿破仑”开始, 以“人类基因组计划几乎完成”结束, 后者在朱岩梅看来, 代表着一个时代的开始, “上一个世纪是工业繁盛的世纪, 而下一个世纪是生命时代的开始, 人类真正认识生命, 从这开始。”朱岩梅同时还是华大集团首席人才官和战略中心主任。

“创新分为几类, 第一类是渐进性的、持续性的创新, 比如每日的质量管理改善, 日本企业是典型代表; 第二类幅度大一些, 叫做颠覆性创新, 这类创新往往从行业的边缘开始, 颠覆原有的技术, 拓展行业的边界; 第三类是根本性创新, 比颠覆还要更彻底和深刻。”朱岩梅认为, 如果各用一个词来形容这三类创新, 第一类可以叫做改变, 第二类叫做革新, 第三类才是真正的革命。

“人类基因组计划”代表的就是革命性的变化, 华大就是其中重要的参与者。

“尺子上前199个科学发现都与中国没有关系, 只有最后这个中国才参与了, 虽然只有 ▶

1%。”朱岩梅说，“华大也是为此成立的。”

“人类基因组计划”在上世纪90年代由美国发起，与“曼哈顿原子弹计划”和“阿波罗登月计划”不同，人类基因组并不是由美国独立完成，而是加入了德国、法国、日本、英国和中国，中国也是参与其中的唯一一个发展中国家，完成了1%的工作。

1999年，怀揣爱国情怀的华大集团创始人“自作主张”，以中国代表的身份，向人类基因组计划提交了注册申请，使中国成功拿到全球顶尖基因科研圈的“门票”。“人类基因组计划”中国部分也让华大成为了中国基因测序行业的开拓者。

现在基因科技正让人类以全新的视角去认识世界，人类开始从原理层面认识生命的本质，很多行业也随之改变。

快速前进，更快一点

华大最初的目标是完成“人类基因组计划”的1%部分，而现在，“基因科技造福人类”是华大的使命，就像福特的“家家都有福特车”、Wintel联盟（微软与英特尔）的“人人都有PC”和谷歌的“人人信息可及”那样，而这里的人类指的是每一个人。

这要求基因技术是人人买得起（affordable），并且产量要足够大，人人买得到（available）。为了达到这个目标，华大集团必须迅速扩大规模，并对整个产业链具有控制权。

所有东西的起点，就是要有基因测序的市场。不是那种各自为战、小作坊式的基因测序市场，而是真正产业化的市场。如果没有，就去建一个，这也是华大过去做的事情。

基因测序仪最初只被当作大学和企业科研院所的科研实验工具使用，药厂实验室会购置一两台设备用于研发，而机器在一个星期也使用不了几个小时。

华大通过租赁或者购置测序仪，并以此推广基因测序服务的外包业务。此举大大提高了基因测序仪的使用率，随之带来的是用户成本

>> 华大基因上市敲钟照片。



降低和用户基数的扩大。这很像是从以前的每家织布缝衣，向工业化成衣制造的转型。

从租三台基因测序仪到租几十台，到后来花几亿元购买一百多台，将当时这家仪器生产公司一两年的产量全部预订。在高峰的时候，华大占据了全球基因测序市场44%的份额。

“它们（基因测序仪生产商）觉得我们太野蛮，它们就开始培养一些小的竞争者。”朱岩梅称华大高速发展引起了产业链中其他环节厂商的警惕和不安。

只有控制产业链才能确保长期发展，而在

基因测序行业，首先需要突破的就是基因测序仪生产商这个环节。2012年9月华大宣布与美国人类全基因组精准测序的创新领导者Complete Genomics达成并购协议，3个月后华大接受了光大控股领投、红杉资本等创业机构跟投的13.98亿元融资。2013年初完成收购。

2014年华大研发出了自己的测序仪，之后开始引领全球市场的基因测序价格下降。“我们之所以能够让很多大学、药厂将基因测序交给我们做，是因为我们价格实惠，并且快而准确。”朱岩梅说。

规模带来价格的降低，而价格的降低反过来推动规模扩张，对上游的控制让这种良性循环可以有序进行。随着业务的增长，可以进行对比的数据库规模也在迅速扩张，这增加了华大对于客户的吸引力。

“改变世界的秘密有两个：affordable和available，汽车、PC、网络服务、手机均如此。少而贵的奢侈品是改变不了世界的，改变世界不能靠饥饿营销。”朱岩梅说，华大要做人人都能享受到的基因测序服务，基因科技要造福每一个人。

伴随着华大成长的还有整个基因行业在国内的发展。在华大之前，基因行业在国内是一个“无人区”，大量的生物人才都聚集在这家机构。当华大开创了整个行业之后，一些人离开华大，出去创业或者加入其他公司。

很多人将华大称为中国基因行业的“黄埔军校”，但这样的“人才流失”并非都是坏事情。“我们甚至会鼓励一些人出去创业。”朱岩梅说，这样就有更多的公司可以共同完善整个产业链。当你是整个行业唯一一家公司的时候，你所需要的任何东西都要自己去完成，不是一件好事。产业链的完善，对所有参与者都是一件好事。

毕竟，对于这样一个新兴且具有远大前景的行业而言，谈零和博弈还为时尚早。

公益是最大的商业，商业也是最大的公益

华大基因上市可以给华大集团带来很多好处，比如增强金融保障、让公众和政府对华大集团有更强的认知，也会让华大集团这家由科学家建立的机构在管理方面更为规范。

但华大集团还“隐藏”着一些非上市主体，包括华大基因研究院、深圳国家基因库（由华大集团负责承建和运营）、华大基因学院、GigaScience、华大农业集团和华大智造等。

这里更像是梦想起航的地方，这些体系的运作看起来并没那么商业化，也较少受到短期盈利压力的侵扰。

“我们有平台，我们有全球最大的（基因测序）平台，而有些人想做一些事情没有平台，就可以用我们的。”朱岩梅说，“有的机构和科学家有几十年甚至上百年收集的鸟、鱼或者蝴蝶的样本，他们没有基因测序的平台去做，或者说没有钱做基因测序，我们可以用较低的价格去帮助他们完成，一起去数字化我们的地球。”

华大集团希望花三十年的时间去参与完成“Internet of living things”，也就是朱岩梅口中的“命联网”，对应的是我们熟悉的物联网（Internet of things）。

华大希望可以撰写“人体说明书”，就像是



>> 华大集团总部正面。

你买到的照相机所带的那种操作手册，说明书会告诉我们如何正确使用身体，防止可能出现的损害等。

“人体说明书”的完成需要耗费大量的资源，那些看起来赔本的买卖正是资源积累的途径。

“商业不是我们的目的，商业是我们的路径，为了实现目标，我们必须得挣钱，养活自己。”朱岩梅说，一些目标是可以商业途径实现的，另外一些是通过商业方法加快速度，还有一些目标如果通过商业化途径反而可能会阻碍了它。所以在华大这样一个创新型的组织里，科

研、教育、企业掺杂其中，而且横跨很多板块。

华大集团希望资本方向同样能认同自己的价值，对此他们充满信心。一方面，在他们看来，资本主导的物质时代正在过去。到了生命时代，具有科学和技术背景，同时又有产业化能力的人，会拥有真正的话语权。而在另一方面，他们也看到了这份事业背后巨大的商业潜力。

“最大的商业就是公益，最大的公益就是商业。”朱岩梅说，“社会价值和商业价值，最终是可以结合在一起的。”



>> 华大集团总部侧面。

让现实照亮梦想

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见过优必选创始人周剑之后，我很自然地将他与Rethink Robotics创始人罗德尼·布鲁克斯 (Rodney Brooks) 联系在一起，他们身上有着非常相同的特质，热情、蔑视主流、思维敏捷。

罗德尼是个不折不扣的机器人专家，他曾经是麻省理工 (MIT) 计算机科学与人工智能实验室主任，设计过美国第一台火星机器人和首款协作机器人Baxter，现在创办了自己的机器人制造公司，Rethink Robotics的工业机器人曾经是2015年达沃斯夏季论坛会场最吸引人的展品之一。罗德尼曾经说过，“很多人犯的错误是他们爱上了一项技术，但其实真正重要的是为人们提供价值，不是找不到客户的。所以他们必须想明白，这个令他们兴奋的产品或者系统将会如何为他们的客户提供价值。”

这个理念正在优必选得到实践。在周剑看来，创新不一定是一种技术发明，将现有技术或还在构想中的产品落地，这就是创新。

“我能看到的是一个类人的机器人。我认为未来世界会有三种人，一种是原装人、一种是机器赋能的加强人类、第三种就是机器人。优必选想要做的是家庭伴侣机器人，这种机器人可以量产的，20万人民币就可以买到，在家里可以给你端茶倒水，所有服务都能做到，我想在我有生之年可以看到。”

这是周剑能看到的目标，也是为什么优必选坚持做人形机器人的原因，其他的都是他达到目标需要去走的道路，包括2016年春晚上那540台双眼闪着蓝光的Alpha1S机器人。

商业化本身就是创新

为了满足不断增加的参观者的需求，优必选公司专门设计了一个展示中心，这里有优必选已经商业化的产品，包括Alpha1、通过语音控制的Alpha2和各款Jimu机器人。

优必选的机器人编程模式简单得会让人觉得这并不是多高科技的产品，实现的功能（天气预报或开关窗帘）你会觉得用手机的人工智能语音助手同样可以完成，在机器人讲故事的时候，伺服舵机转动的声音甚至会掩盖语音的声音。

但这已经是我们这些普通消费者能够接触到的最“有趣”的机器人了。更重要的是，这些产品正带领着优必选走在正确的道路上。

“优必选做出的产品是全球首创，是以前全球市场上所没有的东西。”周剑说，“创新不一定是一种技术发明，创新是将现有技术或还在构想中的产品落地，这就是创新。一些比较大的公司都没有在做所谓的技术发明，它们都是把现有的技术或者比较前沿的技术、能够落地的产品尽可能地找到属于它们的应用场景。”

技术的商业化创新（落地）很多时候更代表一个国家创新的实力，日本就是一个很好的例子，而在中国，这种创新能力依旧很弱。

前几年中国不断兴起的创新大部分都是商业模式的创新，众多已经建立庞大商业帝国的公司看上去都是在遵循一个标准的套路：

找到国外成功的产品，依托国内庞大的市场、用户群或者是特定的市场保护措施，迅速扩展壮大，并建立行业门槛；然后利用庞大的用户群进行服务的横向拓展构建生态链，消灭潜在

>> 优必选创始人、CEO周剑和Alpha 2。



竞争对手。

特别在互联网行业，这种模式更为普遍。投资者似乎也习惯了这种路径的依赖，当一个初创企业与潜在投资人对话时，往往需要回答这样的问题：“你做的事情在国外有没有对标的产品？”如果答案是否定的，项目获得资金支持的可能性就大幅降低。

“现在的中国应该找出一些现有的技术或者目前可以落地的技术并且迅速切换成场景，依托中国强大的制造，不管是硬件还是软件方面，做出全球第一个创新产品。”周剑认为上述套路的实践者只是为了财富去创业而已。在他看来，创业可以照搬国外的产品，在商业模式上做一些细微的改变，然后放在中国市场上，而真正

的创新并不是这样。

周剑觉得苹果是创新，因为乔布斯带领的苹果颠覆了人机交互的模式、界面，当然他觉得优必选在机器人领域是创新，另外一个创新的例子是大疆。虽然世界上做四旋翼无人机的公司很早就有了，比如以色列、法国、美国有很多公司在做同样的事情，但在大疆之前没有一家公司将无人机商业化。大疆依托中国的制造业供应链，迅速将无人机商业化，并做成了全球第一，同时把无人机的飞行控制系统做得很好。

如何保持创新力？

以技术商业化作为起点的创新企业往往因为初期产品取得成功而为人所知，但成功也意味着开拓了一个市场，吸引后来者进入。虽然先发者具有一定的优势，但这并不意味着高枕无忧，企业需要不断地创新来确保行业地位，抵御竞争者的挑战。

不断保持创新是很难的事情，优必选希望以下的策略可以增强企业的创新力：

- 将最初的以部门为中心的创新模式改变为现行的产品经理为中心的创新模式；
- 允许犯错，保持员工思维的开放；
- 提供多种激励措施，包括期权、奖金以及职位上升机会，根据员工的贡献对他们的职位进行定期的调整。

人才永远是创新的基础，没有足够优秀的人才往往会导致没有好的想法或者是好的想法不能被完美地执行。对于优必选这样的公司，对技术应用场景有好的理解力的人才可能比技术人才更为稀缺。

“很少有人可以看透事物的本质，”周剑说，“很少有人在看到一个或多个现有技术的时候会考虑如何将这个技术进行结合、应用。”

现在优必选的当家产品还都是周剑主导研发方向。“我先会有一个想法，然后去实现它，”周剑说，“Alpha 2代、Jimu机器人、Cruzr机器人等项目都是我来的。”

但随着公司的壮大，周剑现在已经没有那么多时间去完整地跟进一个产品，未来的创

新必须依靠由组织架构确保的团队来主导。他说：“未来我希望我的员工有好的想法可以自己创造出新的项目和产品，我也会调动很多资源去配合他们去完成新的产品。”

改变可能已经出现。周剑说公司的人经常质疑自己的看法，“我总是被人否定，总是被别人说这个东西你没有看透吃透。”但从他说这句话的表情来看，他乐于看到这种变化。公司开始更在意潜在客户对于产品设计的看法，而在过去这是周剑不在意的，虽然这种在意还只是存在于用户体验方面，而非产品设计理念方面。

原因是周剑坚持认为在给消费者一个产品之前，他们是不知道他们需要这个产品的。但他现在承认，“产品的细节，用户的体验还是需要去和用户去沟通，所以我们现在也开始去做一些调研了。通过他们反馈的意见我们去优化我们的交互界面等产品细节。”

目标与路径

虽然周剑说优必选不是为了财富去创业，但资金仍是一个绕不开的话题。财富的魅力在于，它可以将不同目标的人汇集在共同的事情上，而主事人需要协调各方的利益来确保企业的健康发展。

周剑说优必选当前的目标是创造出普通工作可以负担的家庭伴侣机器人，但这条路还有很长的时间要走。

“之前的技术可能要十年或许二十年才能进入市场，就像让机器人拿起茶杯倒杯水这个简单的动作可能需要很长时间的技术研发才能够实现。”周剑为优必选设立了目标，也要确保企业可以走到这一步。

周剑说优必选不能一直依赖烧投资人的钱去做研发。“我们尽可能要将现在可以做的技术做成Jimu机器人，做成Alpha，还有与迪士尼和腾讯合作。”周剑说这种策略是左脚脚踏实地，右脚向理想迈进。

在周剑看来，机器人发展有三个阶段：机器人驱动、机器人运动控制算法、人工智能（AI）。

从已发布的产品来看，优必选目前的优势是

>> 孩子和父母一起搭建Jimu机器人。



机器人驱动，特别是作为驱动核心的伺服舵机。

但要真正将机器人做成优必选心目中的样子，还需要用算法告诉机器人如何做出动作，包括走路、跑、跳跃、上下楼梯，甚至踢足球，然后还会涉及机器人AI，让可以完成运动功能的机器人有视觉、能够理解自然语言等。“要让机器人可以端茶倒水至少还需要二三十年的发展。”周剑说，虽然现在已经有模型机器人可以实现这个动作了，但是没有商业化，这个模型是没有实际意义的。

梦想和现实都需要兼顾，优必选需要脚踏实地地去考虑如何将现有技术变现，让产品团队

为公司带来不断的盈利，支撑公司对于未来的布局。优必选将其大部分资金投入到了技术研发和人才招揽上，优必选既请到了清华大学教授赵明国担任“人形机器人首席科学家”、悉尼大学教授陶大程教授担任“人工智能首席科学家”，著名的美国运动相机厂商GoPro的全球市场总监Paul Crandell也加入了优必选出任首席营销官。

“所以我们现在已经布局了很多的技术，包括我们的机器人视觉、未来的人机交互、机器人运动驱动关节伺服以及控制算法还有AI，但是我上面谈到的这些技术落地很难，”周剑说，“现

在我们所销售的产品带来的盈利是为了我们可以走到未来。我们做小的伺服舵机去卖是为了获得利润支持更大伺服舵机研发，做大的伺服舵机是为未来产品做准备。”

机器人的产业链很长，有上百种不同的技术，需要非常多的资金才能够满足技术研发和应用开发。对于优必选近期重点，周剑认为是扩大体量。“在提高销售量的同时，最近一两年我的目标是通过不同的方式，如并购使规模迅速扩大，布局最前沿、最尖端的技术。”周剑说，“体量扩大以后，利用中国的优势，我们可以迅速在全球范围内得到发展。”

寻找人机交互的核心载体

什么是人机交互的核心载体？这个问题还没有答案，却无人否认其价值，几乎所有产业的人都希望自己可以成为其中一员（哪怕只是有限的一段时间），最终的答案将会重塑未来的商业世界。

在不久前，我参加了一个智能照明的行业论坛。参会人员热烈地描绘该行业美好的未来，其中包括这样的场景：

当一个人结束一天忙碌的工作回到家中，对着家里的灯说：“灯光全开”，瞬间漆黑的房间被柔和的灯光点亮。照明系统可以根据你的位置、心情和户外光照情况进行调整，甚至你可以通过灯具控制家里的电视、空调甚至是路由器……

先不管当我们疲惫地推开大门时为何不是按一下开关而选择去喊一声“灯光全开”，这个例子向我们揭示各行业是多么希望在人机交互的大趋势中成为核心。

毋庸置疑，人与机器的交互将会越来越普遍，越来越频繁，随之产生的数据的价值也将越来越大。我们不会希望与家庭的每一台机器建

立一种新的沟通方式，这意味着人机交互将会依托于核心载体，谁拥有这个载体，意味着在未来商业世界中拥有最大的话语权。

对于成为类似核心载体的增多早已存在。2001年，微软公司推出第一代XBOX游戏主机，当时的世外桃源投资公司（Arcadia Investment Corp）分析师泰勒（John Taylor）就做出了这样的评价，“微软已经意识到在客厅拥有重要的实体产品对于他们能在未来数字娱乐产业胜出是多么的重要，这对于他们而言是一项长期的战略投资。”

只是现在战场已经扩展到了客厅之外，也不仅仅局限于数字娱乐，随之其潜在载体也在发生转变。处于风口的智能音箱承载着开发者类似的梦想，就像前文所说的，智能照明产品制造者和设计者希望他们的智能灯具也能拥有相应的地位。

并不是所有的产品都有机会成为这样的核心，从目前来看，有潜力的产品必须要具有以下几个特征：

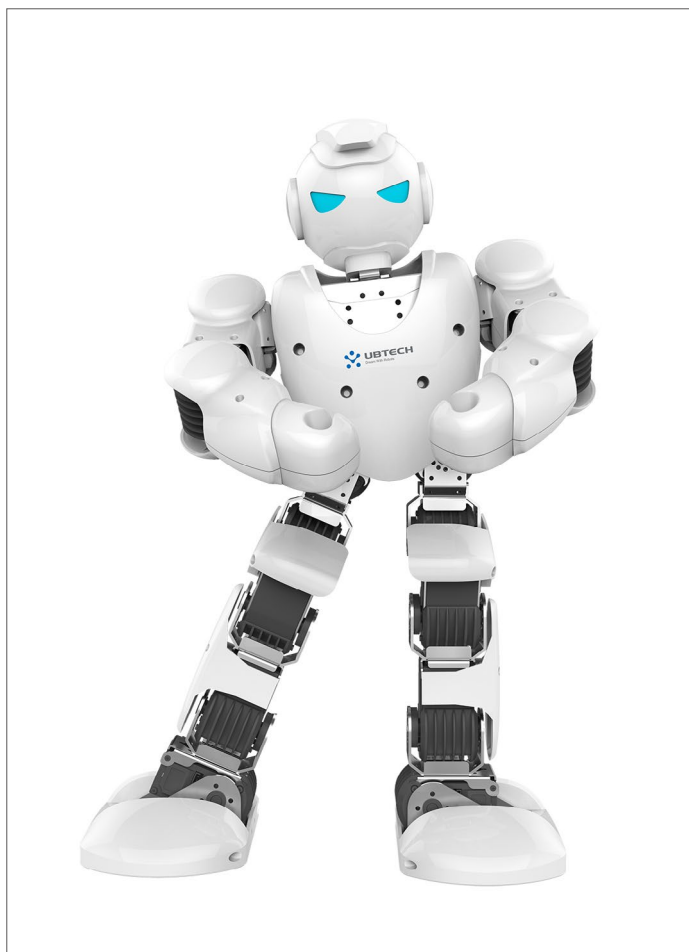
- 伴随性：产品要尽可能时刻与拥有者在一起
- 主动性：尽可能主动交互而非被动
- 自然性：尽可能适应用户本能交流习惯

在伴随性上手机占据很大优势，对很多人而言，出门没有带手机比没有带钱包更让人紧张。也因为这个原因，众多的交互都是将手机作为中心，随着功能的增多，手机的重要性也在提升，这反过来增强了伴随性。

主动性同样重要，因为一旦沟通是被动的，那么其接收的信息就是不完整的，而基于这



>> 优选的机器人Cruzr。



>> 优选商业化的产品之一，人形机器人Alpha 1。

些信息得到的结论也失之偏颇。从本质看，手机与人的沟通是被动的，人们倾向于把手机当作是一件重要的工具，而非时刻窥视自己隐私的密探。一些基于手机开发的软件竭尽所能想改变这种局面，比如很多软件试图一直在后台保持运行，或一款天气软件会试图要求得到用户的通讯录信息。对于这种行为，用户天生是抵触的，负责任的手机系统拥有者会限制这种有悖用户意愿的行动，随着智能产品对于人们生活的影响越来越大，可以预见相应的监管也会出台。2017年7月，一对美国夫妻吵架时他们的谷歌智能音箱自动拨打了报警电话，原因是该音箱识别

出了“报警”的语音指令，这次事件也引发了关于智能家电与个人隐私的争论。一旦监管到位且商业规则最终建立，在没有得到用户授权前提下，订餐软件将只会知道你喜欢吃什么，运动软件只会知道你喜欢跑步还是篮球，视频软件只会知道你喜欢看综艺还是电视剧，谁也不能得到精确的用户画像。

理解自然性，不如试想一下，抛开所有的技术障碍，你会想与什么东西建立万物沟通的桥梁。对于大部分人而言，答案应该是自己的感官或者是一个人，原因很简单，那就是自然。在人所有的感官当中，眼睛是获得信息最大的，依赖于眼睛的载体是潜在的热门，比如智能眼镜，同样眼镜在伴随性上也具有优势。人是群居的动物，这给了人形机器人天然的优势（随着技术的进步，人形机器人会越来越像真实的人类，这会加大这种优势）。对大部分人而言，与外观和行动能力与人相同的智能机器人沟通会比和一台智能音箱容易接受得多。“现如今最自然的交互就是人与人之间的交互。抛开技术等因素，从最基本的需求出发，在未来真正能够成功的交互是人形机器人的交互。”智能服务机器人制造商优选创始人兼CEO周剑认为，虽然不可能完全是机器人，但根据不同的应用场景，未来主动交互的一个分支是机器人，他同样认为智能眼镜在这方面有很好的前景，因为戴着眼镜聊天同样是很自然的过程。

从三个特性来看，自然性在未来可能更重要，技术的突破会降低伴随性的门槛，因为一旦人们习惯与一种东西沟通，就会倾向于给予交互对象更多的授权，从而解决主动性的问题。从这点来看，即使手机是当前人机沟通的核心，但在未来必将被取代。

当然争夺并不仅仅限于硬件领域，系统软件同样重要，其集中度也可能更强，就如在个人电脑时代Windows和MAC（微软和苹果）的竞争和手机时代安卓和iOS（谷歌与苹果）的对抗，过去的案例告诉我们硬件上占据优势的厂商往往会采用闭源系统来提高掌控权，而后来者则会采用开源系统来争取更多同盟取得突破，未来是否会重现历史，我们拭目以待。☑

在深圳， 创新更像是 骨子里的东西

中国每一个城市都有自己的特点，安逸、古老、美丽……但如果要用一个词形容深圳这座最为年轻的一线城市，很多人会用“创新”。

从我们的指数结果中，深圳拥有最多最为创新的上市公司，只是过大的基数让整体排名并不那么突出。但如果我们将上市公司作为中国最为优秀企业的代表，多显然不是坏事。

如果说很多城市正在努力打造自己的创新力，在深圳，创新更像是骨子里的东西。作为研究者，我们习惯于用量化的手段来分析创新，如财务数据或者专利数量，但我们同样知道这并不是创新的全部，公司甚至是城市管理者可以设法增加这些数字，但却无法操控真正的创新。所以我们以更为感性的眼光去看待深圳这座城市，去了解它创新动力所在，就像多伦多大学教授Richard Florida在其著作《创意阶层的崛起》中写道：“创造力无法像矿藏那样储备、争夺和买卖，它必须经常得到充实、更新和维护，否则就会悄悄溜走。”

对于一个城市而言，需要有创新的土壤，也要有呵护创新的环境。

对于深圳，创新的土壤就是在这片土地打拼的人，以及这些人所组成的企业。从1980年设立经济特区以来，深圳就是中国最具开拓精神创新者的梦想之地，而直到现在这座城市一直维系着这种精神，而这也成为了这个城市的一部分。

如果你是第一次来到深圳，对这座城市你会充满了矛盾的情绪，它既便利却又凌乱，既高效却又让人感到紧张，就像是一股洪流将你淹没。深圳不像一些城市，井井有条，物价低廉，

就如我们一位受访者所说的，“深圳不是这样，但是这就是城市要的包容，因为创新就是要打破秩序”。城市从来都不提供最为舒适的生活形态，但资源汇集所带来的效率、多元，以及更重要的包容使得创新最容易在这种环境下出现，深圳就是这样的地方。

与很多一线城市不同，民企在深圳占有绝对的主导地位，并不是说企业性质一定决定创新力，但民企占主导的经济格局更容易创造出更为公平更有有效竞争的营商环境，这对创新是大有裨益的。



同样这种经济结构也让城市的管理者的工作更加有效，他们没有过多的压力去“袒护”特定利益群体，而可以将精力集中于制度建设，维持城市的效率与公平，为创新提供更好的环境。

企业作为创新主体的地位被突出，而后者是最有激情的创新者，也是创新最大的得利者。

政府则专注于政策的保障，如：打通土地、产权、资本、人才、劳动力等要素市场，努力使一切创新资源自由流动；完善创新激励机制，建立无形资产评估、技术入股、技术分红、技术秘密

保护、成果转化收益分配等制度，严格知识产权执法，激发企业和全社会的创新积极性；努力处理好政府与市场的关系。

另外一些与创新相关的基础性设施也需要政府去提供，如深圳目前已建成国家超级计算深圳中心、大亚湾中微子实验室、国家基因库等。深圳还专门制定促进科研机构发展的行动计划，培育发展了一批市场导向、研发与产业化一体推进的新型科研机构。

这座城市的基因与管理者的呵护，才是深圳创新力真正的源泉。☑

张江高科：寻找社会价值与企业利润的平衡点

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对于一家国有控股且需要实现多重经营目标的上市公司，寻找社会责任与企业利益的平衡点是一项艰苦却必须要完成的任务。张江高科就是这样一家公司。

国有企业具有两个层面的含义，首先是国有，这意味着它们需要去承担社会责任，承担这些责任就需要投入；其次它们是企业，企业的目标就是盈利，企业需要自己寻找发展的资源，上市公司还要对股东负责，而利润则是回报股东的最好方式。

如何在履行社会责任的同时增强企业自身的竞争力是国有企业的核心问题。这也是我们选择张江高科作为我们案例的原因。通过对于这家公司的分析，我们认识到国有企业的转型不仅仅需要创新理念，更需要领军人物的胆略和坚持。



使命推动的转型——从人开始

在大众眼中，技术变化的产品创新讲述的故事要远比非技术变化的组织创新更吸引人，但后者可能更加重要。

张江高科总经理葛培健将公司过去三年的转型看成是从被动无奈到商业模式的探索，再到承担国家使命的一部创新故事。而这些，从一项艰巨的历史使命开始。

2014年5月23日，习近平总书记来到上海，提出上海向全球影响力的科技创新中心进军。作为上市公司的张江高科（600895.SH）成为了科创中心核心区的重要上市开发主体，这离葛培健接手张江高科总经理职务的时间不到三个星期。

但要达到这个目标并不容易。

“2014年我接手张江高科的时候，ROE（净资产收益率）长期低于6%，在资本市场已经失去了再融资的功能，面临被资本市场边缘化的窘境，”葛培健回忆，“一个被资本市场边缘化的上市公司是难以担当科创中心建设这一伟大使命的。”

想要不被资本市场边缘化，仅是宏伟口号是不够的，就需要让资本市场看到公司的价值，恢复再融资能力。

在葛培健看来，对于张江高科这样的园区运营商，“创新驱动的企业组织”的建立是企业变革和新生的关键，而这一切的基础，就是人才。在他看来，张江高科的创新力就是两条：一是围绕国家战略进行产业布局，站在世界层面看企业发展；二是重视人才培养，打造专业化、年轻化、市场化的团队。

如果说前者是任务和目标，那么后者就是手段。葛培健在2016年年初接受记者采访时曾经指出：“国有资产的最大流失是人才的流失。”

这番言论发表之前，张江高科就已经对内部人员架构进行调整：中层干部全部免职后公开招聘；10个部门总经理都是公开招聘、PK上岗、以“票”取人、三年大考；员工实行岗位配置双向选择；实行一岗一薪，调岗变薪。

对国有大型企业而言，人事一直是一个

多面张江高科

张江高科这个名字有很多存在的形态，它是一个地名、是园区的“地主”，也是一家上市公司……

张江高科技园成立于1992年7月，位于浦东新区中南部，是中国国家级高新技术园区，与陆家嘴、金桥和外高桥开发区同为上海浦东新区四个重点开发区域。

1996年4月上海张江高科技园区开发股份有限公司（下称：张江高科）在上海证券交易所挂牌上市，成为了一家社会公众公司。“上海张江高科技园股份有限公司作为浦东新区直属企业和张江高科技园区开发、运营的国有控股上市公司，承担着践行深化国企改革创新发展以及张江科学城重点区域开发建设运营的使命。”这是张江高科“十三五”发展规划开篇语，这也形象地反映了张江高科作为一个多目标主体的特性。就如张江高科总经理葛培健说的，“张江高科既要肩负上市公司的盈利责任，又要履行好企业的社会责任。”

但找到中间的平衡点并不容易。



科技投行概念下的“新三商”模式

在2014年,当人们提及张江高科(600895.SH),大家会认为这是一家以工业地产开发运营为主导的房地产企业。

的确,张江高科的一大优势是拥有可持续发展的物理空间,能为创业企业提供全生命周期的服务。并且最初的定位也是以工业地产为中心。张江高科的工业用地,在中国的土地市场上,工业用地并不是那么热门的概念。土地出售是一锤子买卖,意味着未来发展的资源的减少,也难以享受区域发展的成果,而由于张江高科特殊的历史使命,很难走出去复制其商业模式,像一般房地产商那样去其他地方拿地滚动发展,所以将张江高科作为一般房地产商来运营,优势将会丧失。2014年毕马威咨询对于张江高科的评价就是没有战略和长期发展规划,导致企业频繁利用长期的资源来应对短期的压力。

张江高科希望改变这种局面,就需要在战略层面进行转变。

“科技投行”概念可以还原张江高科高科技公司的本来面目,而要达到这个目的,就需要投行思维,将产业地产的有形资源转化为产业投资的无形资源和股权资源。张江高科希望通过“新三商”(科技地产商、产业投资商、创新服务商)这种独特模式来解决这个问题。通过“新三商”模式,实现工业地产类公司真正向“科技投行”的转型,利用“房东+股东”、“股东引房东”两种模式推动公司的可持续发展。

战略对于企业的重要性在于有了明确的目标和评判的标准,企业未来的命运不再依赖压力时的应急反应。

2015年9月25日,张江高科发布公告,将在上海联合产权交易所3.4亿元挂牌价转让持有的兴科置业100%股权及公司对兴科置业的相关债券,不到3个月后,经过100多轮公开竞价,上海信然投资有限公司以6.6亿元接手了该笔资产,差价收益超过3亿元。在复旦大学出版社出版的一本名为“科创二十年”的书中,是这样评价这笔交易的:“公司转型的一次实战论证”。

棘手的问题。但改革势在必行,就如当初他所说的:“人才流失的最大问题是没有用当其时。这种情况不能再继续下去了,再这样下去,国企就是一潭死水,动弹不得。改革则生,干等则死。”

吸引高素质的年轻人也是张江高科人才战略的一部分,从张江高科“十三五”(2016-2020)发展规划中我们就可以看到公司正注重实现员工年龄结构年轻化,规划的目标是到2020年,公司三十岁以下员工人数将增加20人,比例从10%增加至17.5%。

截至2017年上半年,张江高科向100家公司累计投资了40亿元,105个项目,其中包括以FOF方式参与了15只基金的投资。投资标的中已经上市的为28家,预披露2家,拟上市11家,其中不乏如蚂蚁金服、迈瑞生物科技、天天果园、喜马拉雅、七牛云这类独角兽公司。

从财务数据上看,这种模式是奏效的。张江高科2016年归母公司的净利润为7.27亿元,同比增长了51%,业绩和利润增速都是公司历史的新高。在这一年,投资收益实现7.97亿元,投资收益占利润总额的58%,净资产收益率达到了9.18%。



社会价值和企业成长的平衡点

张江高科真正想要实现的是公司利益与社会责任的平衡。要实现这一点,需要理念的突破,社会责任的履行并不意味着企业一定需要以牺牲公司利益作为代价,相反,两者可以相辅相成。

张江高科目前拥有张江科学城体量最大的人才公寓,名为天之骄子人才公寓。人才公寓是一项服务型的产品,要使来到张江高科园区的人才有稳定的居所。作为功能性的人才公寓在张江高科手中,成为了产业投资、科技地产的创新服务纽带,通过为园区企业提供这样的一项增值服务,从而获得对科创企业投资的先发优势,进而通过产业投资在资本市场获得回报,实现企业效益的增长。

张江高科“895创业营”项目的目的是找寻有潜力的创业项目。在五期的训练营中,海选项目约1100个,入营项目162个,获风险投资68个,信贷授信38个,项目总估值达到了100亿元。对创新的支持可以提升地区的经济活力,与此同时张江高科通过让自身孵化器和投资部配合,寻找其中的投资机会。

张江高科正努力将原本的责任转化为公司的服务优势,并依靠优势联动提升公司的价值,同时不断提升公司的服务能力,更好履行社会责任。

葛培健将这种转变归功于“去地产中心化”和“向科技投行转型”的策略。正是这些策略,让张江高科可以将社会责任的履行转换成企业发展的资源,就如葛培健所说的,“如果张江高科依然以房地产销售作为主要的收入来源,企业发展的空间将非常狭小,甚至可能死亡。”

基于语音技术的AI生态链

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一家十八年前创立的公司，正在人工智能（AI）行业拥有独特的优势。

这是对于当前科大讯飞股份有限公司（下称：科大讯飞）的写照。这家总部位于合肥的公司希望依靠语音技术的优势，打造人工智能的生态圈，并借此渗透向各个产业。

智能语音，为什么是智能语音？

Research Markets在2016年5月发布的报告显示，在全球语音市场，谷歌、微软、苹果和科大讯飞的市场份额分别为20.7%、13.4%、12.9%和6.7%。

语音市场到底有多大的魅力，能让这么多行业巨头扎堆于此？

从计算机诞生开始，人类就面临这样一个问题：如何与计算机进行沟通。人机沟通需要解决两个问题，如何让机器接收到信号，以及如何让机器理解信号的意义。

作为普通用户，我们经过了几个阶段。

· DOS时代：让计算机接收信号的工具是键盘，为了让机器理解信号的意义，我们需要去学习那些繁杂的计算机命令。

· 视窗时代：工具在键盘的基础上增加了鼠标，大部分人不再需要记住计算机命令。

但人们并不仅仅满足于此，我们正在寻找更好的人机沟通方式，要准确，而且要自然。

虽然人通过视力获取最多的信息，但语言，包括文字和语音，一直是人类最为精确的

交流工具，语言交流也是最为自然的。

科大讯飞很清楚智能语音的重要性。2000年在巢湖的半汤会议上，科大讯飞就指出：“语音是人类最自然便捷的交互方式应用，一定可以进入到社会生活每一个领域，我们的使命是实现人类和人机信息沟通无障碍。”在麻省理工学院（MIT）2016十大突破技术中，语音接口排名第三。

由于计算机最初的设计是基于英语的，这也使得更为便利的人机交互手段在中国有着更好的市场。就如MIT在报告中说的，“语音识别和自然语言相结合，为互联网创造切实可行的语音接口……中国尤其是发展语音接口的理想市场，因为触摸屏输入汉字十分麻烦，而语音技术越来越实用和有效。”

成功的语音不仅仅能让机器接收到信息，并且能够很好地理解自然语音，成为所有接口的接口。在可预见的未来，智能语音技术就像是DOS时代的键盘、视窗时代的键鼠组合、智能手机时代的触摸屏，成为每个人通向人工智能时代的第一道关卡。



着“中文语音技术必须由中国人做到全球最好，中文语音产业必须掌握在自己手上”的梦想。

智能语音技术具有典型交叉学科特点，又是赢者通吃的行业。当时虽然国外公司在中文语音识别上占据优势，但这并不意味着中国没有好的技术，更多的是没有好的整合。

中科院声学所在声学信号方面蜚声海内外；中国社科院语言所在汉语音律研究方面卓有建树；中科大在语音数字信号处理和算法研究方面领先同行。但这三个科研院所与高校之间却一直隔着一堵墙，无法形成深入的、实质性的合作。

科大讯飞在获得第一笔融资后首先要做的就是打破这堵墙，科大讯飞相继与中国科大、中科院声学所、中国社科院语言所成立语音技术联合实验室，让科研院所专注于研究、发展和创新，由企业提供统一的产业运作和转化平台，实现研究成果向产业发展的转化。

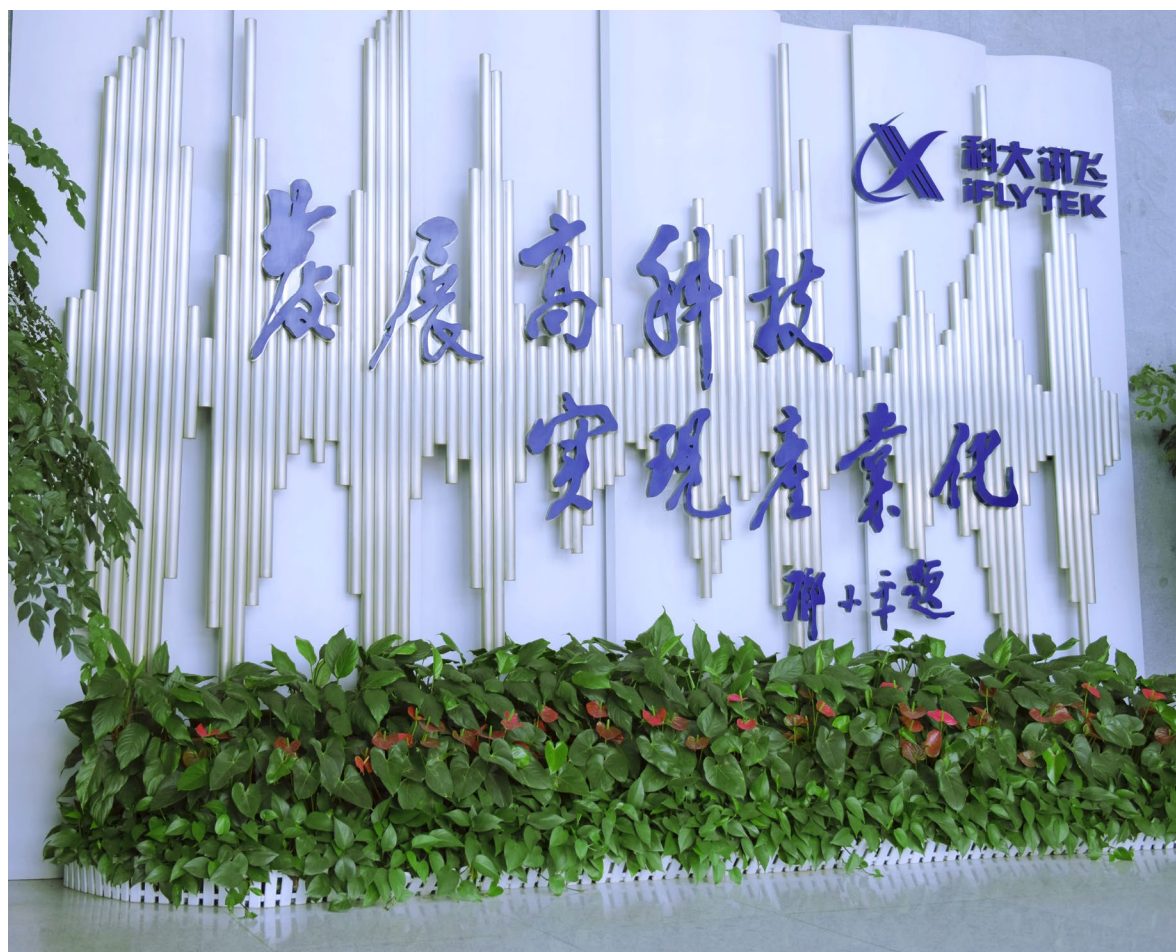
之后，在2006年科大讯飞与清华大学建立语音技术联合实验室，研究方向涉及语音识别、音频内容分析、语音检索、语言理解、数据挖掘。2010年后科大讯飞先后与新疆大学、内蒙古大学、西藏大学、云南大学等建立联合实验室，开展多民族语音及语言核心技术研究。与兰州大学、中国民族语文翻译局等共建联合实验室。在海外，2015年，科大讯飞与约克大学联合创建“讯飞神经计算与深度学习实验室”，专注神经计算、深度学习及人工智能领域的研究。2016年，科大讯飞在美国硅谷的办事处正式成立，与佐治亚理工学院展开合作。

科大讯飞将自身的创新分为两个部分，除了前瞻性的源头创新，还有跟应用研究有关的创新。科大讯飞董事长刘庆峰表示，创新因素中重要的一条就是建立产学研用互动的创新体系，而在这个过程中，要以企业为主体。 ▶

科大讯飞的智能语音技术之路

“科大讯飞股份有限公司成立于1999年，是一家专业从事智能语音及语言技术、人工智能技术研究，软件及芯片产品开发，语音信息服务及电子政务系统集成的国家级骨干软件企业。”这是科大讯飞企业介绍的第一句话，这显示了智能语音及人工智能技术对于这家公司的意义。

科大讯飞是一家典型的创业公司，由在校大学生发起，最初的创业团队为18人。根据科大讯飞提供的资料，最初的创业团队为18个人，怀揣



以智能语音为中心的AI生态

科大讯飞真正的梦想是希望语音技术可以成为整个生态大树的根系，并借此搭建整个生态系统。

2017年7月中国公布了《新一代人工智能发展规划》，这是首部国家级人工智能发展规划。

到2020年人工智能总体技术和应用与世界先进水平同步，人工智能产业成为新的重要经济增长点。

到2025年人工智能基础理论实现重大突破，部分技术与应用达到世界领先水平，人工智

能成为带动我国产业升级和经济转型的主要动力。

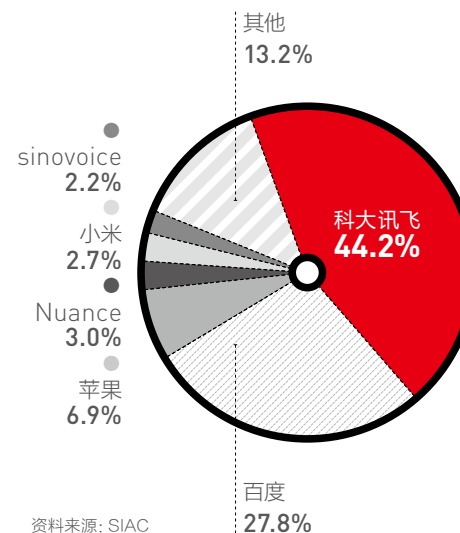
到2030年人工智能理论，技术与应用总体达到世界领先水平，成为世界主要人工智能创新中心，智能经济、智能社会取得明显成效，为跻身创新型国家行列和经济强国奠定重要基础。

中国计划在2030年前建立规模1万亿人民币的人工智能行业，相关行业市场规模达到十万亿人民币。目前中国人工智能行业BAT（百度、阿里巴巴和腾讯）仍然占据优势，但科大讯飞相信未来的人工智能绝不是一个技术跟一个技术的竞争，也不是一个企业对一个企业的竞争，而

是一个生态跟一个生态的竞争。而科大讯飞生态的起点和优势就是智能语音技术。

根据中国语音产业联盟（SIAC）的数据，2015年科大讯飞占有中国智能语音市场44%的份额，领先于排名第二的百度16.4个百分点。同样SIAC的数据显示，2012年以来，智能语音市场每年都在以40%至100%的速度增长，（2016和2017年为预测数据），市场规模将在2017年达到100亿元人民币。

2015年中国智能语音市场份额



讯飞则取得技术支持的同时介入了一个巨大的应用场景。

不仅仅需要引进中国移动这样重要的股东，科大讯飞希望公司各事业群、事业部构成科大讯飞人工智能生态圈的核心层，并在其周围聚拢庞大的创业者群体，形成了更大范围的围绕科大讯飞核心技术的产业生态。科大讯飞投资了启明科技、上海瑞元、启明玩具等数量众多的公司，其投资的优必选，也是我们案例中的一家公司，其机器人就是使用了科大讯飞的智能语音系统。

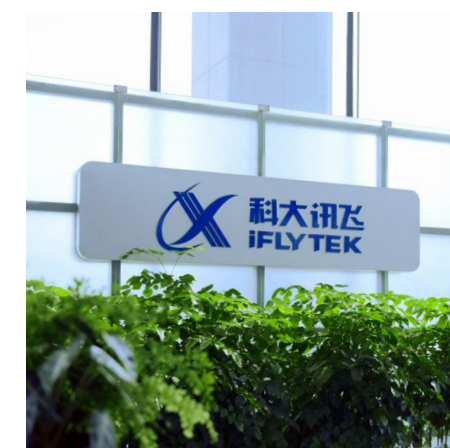
科大讯飞认为2016年是中国人工智能元年，而2017年是人工智能应用落地年，并确定了“人工智能平台 + 特定行业赛道”的定位，并提出了人工智能为全社会赋能。甚至对于公司内部起步阶段的创新，都可以通过公司、战略投资者、业务团队共同参股的方式进行孵化。

依靠语音技术的优势，打造人工智能的生态圈，并借此渗透向各个产业。科大讯飞这种战略成功与否，将决定这家公司的未来。

在2014年科大讯飞举办了主题为“语音点亮生活”的年度发布会，为参会者勾勒的是“无论你在开车，看电视，还是玩手机，只要动动嘴就能下命令的美好生活”。也是在这次发布会上，科大讯飞宣布正式启动讯飞超脑计划，研发基于人类神经网络的认知智能引擎。

同年，中国移动以参与非公开发行方式持股了科大讯飞，成为其第二大股东（目前中国移动仍持有科大讯飞12.9%股份，为持股最多的流通股股东）。

除了科大讯飞取得发展资金，这笔交易被形容为：为中国移动补充了一个技术细节，而科大



生态链，更独立还是多合作

超过80%的市场份额。

但封闭式系统带来巨大的商业利益一直是巨大的诱惑。苹果成为了目前市值最高的上市公司，其中手机业务起到了决定性的作用，虽然iOS系统的市场占有率只有竞争对手的六分之一。

在中国，生态链也是经常被提及的概念，而中国的企业更关注封闭生态链带来的巨大的利益。

包括腾讯、阿里巴巴和小米这样的公司正变得越来越庞大，并通过不断的并购来完善自身的生态体系。

一般而言，在—项核心硬件产品取得决定性优势后，企业会倾向于打造封闭式的生态链，如苹果的电脑和手机。后来的行业竞争者则依靠开放式的生态链与之对抗，有的时候这看起来像是一家领先公司与整个世界的竞争。

在中国，也是这样。腾讯依靠的是社交软件（QQ和后来的微信），而阿里巴巴则是购物平台淘宝。当然封闭和开放还取决于我们观察的角度，如果只是看电商，淘宝相对于亚马逊就更开放，后者的自营业务占据主导。小米走的是另外—条路，它在消费者心目中打造了“极具性价比”品牌的形象，然后通过品牌的衍生构建自己的生态体系。而在我们的案例中，科大讯飞走的更像是中间路线，这应该是其智能语音与人工智能业务本身的特性决定的。

但在中国，新的竞争者走的却是和微软、谷歌不同的道路。作为淘宝的竞争者，京东看起来更封闭，而在社交软件领域，根本不存在像样的竞争对手。甚至那些仍未具备基础的公司也执着于追求建立自身的封闭式生态系统，在缺乏核心关键产品引流的背景下，这些公司寄希望于依赖于资本。这种商业模式需要庞大的资金支持并极具危险性，比如目前被广泛关注的乐视。

—个新的问题是，建立封闭生态链的中国公司往往是依赖软件而非硬件取得成功，软件的特性决定了这种优势更难以被打破，这也是这些公司很难被挑战的原因。

—家公司在一个行业具有过强的实力会带来垄断的风险，在这个问题上，政府的行动也会对行业产生影响，类似的法律在中国并不完善，这也是中国现状的原因之一。📌

生态链（生态系统）的打造几乎是当前商业社会最为热门的名词，几乎无人质疑成功生态链的价值，但如何成功就是另外—个复杂话题。

对于每个企业而言，打造生态链都有自己的方法，从生态链的结构来看主要分为以下两种形态，虽然其边界并不明显：

- 尽可能封闭的生态链。企业成为生态链的中心，并尽可能拓展其业务的边界。

- 尽可能开放的生态链。企业只提供生态链的核心环节，其他业务只是为生态系统提供必要的补充。

封闭与开放一直是备受争议的话题，在生态链这个概念成为热门之前，封闭体系和开放体系之争就一直存在。真正由—家公司完全掌控的封闭生态链体系并不存在，但过去很多例子告诉我们，对其的追求—直没有停歇。

在个人电脑时代，苹果主导了封闭式的系统，而微软的视窗操作系统则是开放性系统的代表。在手机时代，苹果依旧是封闭系统的支持者，只是竞争对手换成了谷歌。

在这两个时代，微软和谷歌专注于提供操作系统，为整个行业提供基础设施并制定规则，当然微软和谷歌也出电脑和手机，却并不是核心业务。比如谷歌手机看起来更像是只是为行业提供发展方向，用其展示最新的操作系统，甚至手机制造都是找其他的手厂商代工。

微软在PC时代的竞争中取胜，虽然全球PC制造商排行榜几度易主，只有微软屹立不倒。而在手机操作市场，谷歌的安卓系统占据了

新游戏公司的突围战

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中国正成为全球最大的游戏市场，但同时行业也在快速集中，行业巨头采取的“跟随策略”让竞争对手倍感压力。

新公司需要全新的商业策略才能在市场取得成功，对于英雄互娱而言，他们需要用创新去撕开市场，但真正的挑战是如何利用创新建立的先发优势快速建立竞争壁垒。

（跟随策略：不主动追求市场创新，对于目前市场成功的游戏方式，对公司、团队进行收购，或直接开发竞品通过自身已经存在的优势取得成功。）

谁在创造游戏内容

在大部分的时候，游戏内容是开发者创造的。游戏公司聚集研发团队开发游戏并推出市场，用户则通过享受开发者为他们准备好的内容得到乐趣，甚至大部分的网络游戏也是遵循这样的套路。

在这种开发模式下，游戏的素质完全取决于开发者的能力，随着玩家对于游戏要求的上升，开发需要投入更多的人力物力。游戏开发依赖制作者的投入造成了行业天然的垄断，具有资金和团队优势的公司会逐渐控制市场，游戏玩家将游戏分为3A（通常指研发和推广费用特别高）大作和独立游戏，前者拿走大部分行业利润，后者在短暂的成功后要么被并入大的公司，要么逐步沉寂。

但竞技类游戏展现了行业不同的一面。在竞技类游戏中，人与人利用游戏进行竞争，不同的游戏对手，团队战术、游戏地图都会给玩家带来全



>> 企业文化展示之公司大事记墙板。

新的体验。可以说没有—局MOBA游戏（多人在线战斗竞技游戏）是完全相同的，这种持续不断的乐趣会让玩家从不断重复游戏中获得快感。

在竞技类游戏中，游戏公司提供游戏的基本框架和规则，很多乐趣是玩家之间提供的。星际争霸作为—款标志性的竞技类游戏，其职业选手对于游戏的理解让游戏开发者暴雪公司都感到震惊。可以说，在电竞游戏中，玩家参与游戏本身就在为游戏提供内容，这成就了全新的游戏模式。

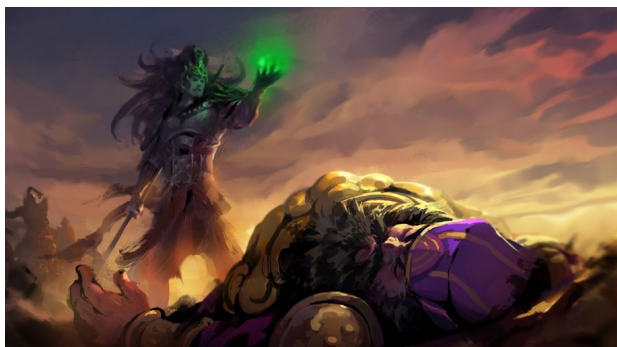
如果说竞技让玩家自然而然地参与到内容的提供，MOD开发可以让那些拥有游戏设计能力的人更主动参与游戏设计。MOD是英文modification（意为修改）的缩写，汉语音译作“模组”，指的是对于游戏的修改或增强程序。MOD通过对游戏中的道具、武器、角色、敌人、事物、模式、故事情节甚至是画面作出修改，增加游戏的内容甚至是改变游戏方式。—个优秀的MOD甚至被视为再造了—款游戏。MOD的开发依赖于游戏公司对于权限

的放开甚至提供工具。1998年，暴雪娱乐公司在星际争霸中绑定了地图编辑器。利用这款地图编辑器，玩家制作出一张名为“Aeon Of Strife”的自定义地图，成就了MOBA游戏的雏形。MOBA游戏最终在暴雪另一款游戏魔兽争霸3上真正发展并大红大紫。

玩家对于游戏内容的介入改变了游戏行业的内容生产方式。玩家参与游戏内容的生产提高了游戏的吸引力并延长了游戏的生命周期，而游戏的生命周期延长会提高用户对于游戏的黏性，进一步提高他们提供新内容的热情。

英雄互娱将其视为是打破行业巨头垄断的机会。这种商业模式可以将先发优势转化为进入壁垒，并让行业巨头的“跟随策略”成为自己的机会而非威胁。在他们看来如果自己的2000万玩家中有千分之一的人主动参与游戏MOD开发，将是任何一家公司都难以依靠自身力量去竞争的。

>> 极无双：是英雄互娱旗下三国题材无双割草ARPG手游。



>> 影之刃2：是英雄互娱旗下东方武侠竞技手游。



如运作传统体育项目那样 运作电子竞技

英雄互娱称自己是一家互联网体育公司。

从很多层面电子竞技行业都可以从传统体育行业商业化中汲取经验，率先取得突破的公司将会在未来的竞争中取得优势。

相对于那些“充值让你更强大”的游戏，竞技游戏的平衡性得到加强，如果我们以篮球为例，以前的充值模式让你的篮筐变低变大，而出售皮肤为主的盈利模式更像是用户买了一件炫目的比赛服，它或许可以让你在场上更加引人注目，但并不能改变比赛的结果。

这样游戏可以真正成为竞技，专业的比赛和偶像的出现也成为了可能。当英雄联盟职业选手faker（李相赫）从巴西传奇足球巨星罗纳尔多手中接过冠军奖杯时，对于很多年轻人，faker才是他们心目中真正的明星。

更多比赛的举办可以维持游戏的热度，从而打造游戏完整的用户梯队，即：专业选手、高频率的业余玩家加上更为庞大的粉丝人群，就像是成功的体育项目做到的那样。

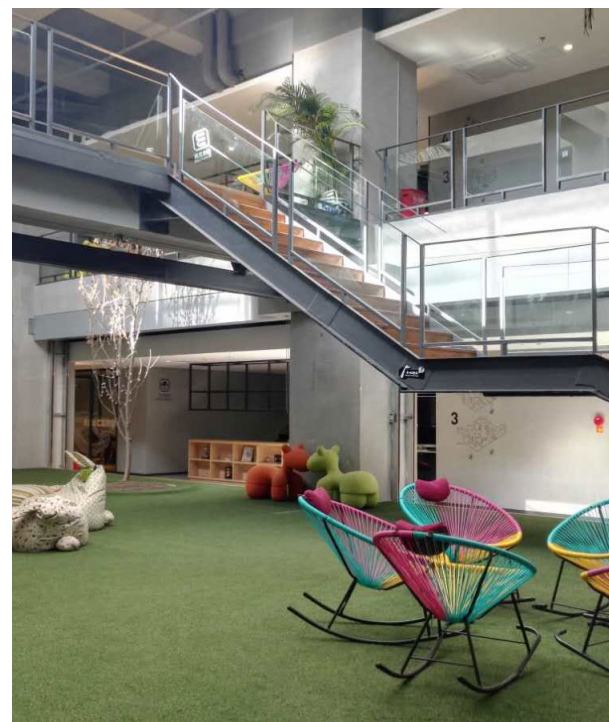
但这还不是英雄互娱想要做的全部。

英雄互娱想要让他们的全世界比赛加上国家的烙印。带有国家和民族荣誉感印记的事物往往会对市场扩大起到很大的作用，当前最好的例子就是电影“战狼2”的成功。

英雄互娱还希望那些对于潜在用户有号召力的人可以加入到体系中来，其中典型的代表就是游戏主播。主播正成为一种文化，游戏主播的出现让游戏更为娱乐化，也吸引了更多的受众。在英雄互娱看来，MOD设计者与游戏主播都可以为游戏带来价值，前者提供更多的游戏内容，而后者则带来更多的用户。

目前主播的变现途径很少，主要是靠直播时候用户的打赏，允许其设立游戏私服（私人设立服务器运营网络游戏）是一个可行的方式。在过去私服往往被认为是需要打击的侵权行为，窃取游戏制造商的劳动成果并破坏商业规则。

在英雄互娱看来，以前游戏厂商对于私服的恐惧只是因为不知道如何控制局面。英雄



>> 公司绿地休息区。

互娱甚至表示愿意提供技术支持来帮助主播运营私服，并制定合理的分成模式来使之规范化。通过更为规范的私服设立，流量拥有者可以通过流量得到收益，而之前这是他们难以获得的，就像是那些小网站通过谷歌取得广告收入那样，这种模式也会让他们更愿意为这款游戏提供服务。

新技术的出现和普及也可以带来更多的商业机会。比如人工智能可以让游戏公司将MOD更好地推广给他们的潜在用户，虚拟现实（VR）技术大幅增强用户观看比赛的体验，从而让虚拟门票的出售成为可能，这将大大增强游戏公司和比赛组织者的盈利能力。

从产品IP到公司IP

无论电子竞技游戏如何精品化，如何进行运作，其与传统体育竞技项目还是有着一个根本的不同，那就是电子竞技游戏更新换代的速度远远快于传统体育项目。50年后的足球可能与现在并没有什么不同，但50年之后的竞技游戏肯定与现在的完全不一样。

这是由于电子游戏本身的特质决定的，电子游戏的开发受制于当前的技术，而随着技术的进步，游戏的形态必将会被改变。

这就对游戏厂商提出了另一挑战，那就是除了制作出优秀的游戏，还需要将已经积累的资源（包括所有游戏的参与者）从一个游戏带到另一个游戏。而要做到这一点，关键是让用户从信赖一个产品变成信赖一家公司。

“暴雪出品，必属精品”这个可能是当前游戏行业对于游戏公司最大的褒奖。暴雪指的就是美国的暴雪娱乐，现为美国电子游戏发行商动视暴雪的独立部门公司，其依靠经典作品，如魔兽争霸、星际争霸、暗黑破坏神系列、守望先锋、炉石传说、魔兽世界在全球享有卓越的声望。其他知名的开发者IP还包括开发侠盗猎车手的Rockstar games。

强大公司IP的建立使得用户对于公司推出的每一款游戏都充满信心，并在新游戏推出时马上投入其中，从而完成公司对于资源的迁移。

如何将产品IP转化成公司IP是游戏公司能否基业长青的重要因素，目前能做到这点的中国公司仍未出现，即便是腾讯，其现象级的游戏王者荣耀都还未让玩家对于腾讯这个品牌产生“盲目”的信任。

对于英雄互娱这样的公司既是机遇也是挑战，能否成功至关重要。☑

未来游戏 靠什么赚钱？

腾讯的手机游戏王者荣耀正成为一款现象级的产品，这款免费下载的游戏正成为公司的吸金利器。在过去的几十年中，游戏产业以及其商业模式几度变迁，那么未来游戏到底靠什么赚钱？

最初的单机游戏时代，游戏可分为主机游戏和电脑游戏。在这个时代，游戏主要靠出售拷贝赚钱，不同的是主机游戏先通过较低定价，甚至是亏本的主机打开市场，然后依靠定价较高的游戏软件盈利。这也是为什么主机游戏软件价格往往高于个人电脑游戏软件的原因。直到目前，这还是单机游戏最主流的商业模式。

网络游戏的盛行开始让行业盈利模式出现了很大的分歧。

端游（客户端游戏）和页游（网页）中，盈利模式主要分为点卡（计时）和“免费游戏+收费道具”。前者的代表是暴雪公司的魔兽世界，而后者是曾经风靡中国的“传奇”，也是中国端游和页游主流的商业模式。

这种商业模式的采用与端游和页游的开发周期和投入有关。端游和页游研发周期长，其投入研发费用和后期市场推广费用都是一个较为庞大的数字。三五年开发时间加上亿元级别的投入，如果要确保产品在生命周期中盈利，就需要采取一种相对较重的商业化模式。另外，端游和页游产品中，除非是现象级的产品，日活跃用户数量只能达到十万级，采用“免费游戏+收费道具”模式的游戏就需要依靠土豪玩家的大笔投入，就是少部分的游戏玩家贡献绝大部分的

收入。这种商业模式存在几个问题，首先，土豪玩家决定了游戏的收入，这样的玩家并不多，一旦这样的玩家流失就很难弥补。其次，这种商业模式极大地挫伤了普通玩家特别是免费玩家的积极性，所以有人称在这种游戏中，免费玩家实际上是游戏公司提供给付费玩家的游戏内容。

到了手游时代，情况变得明显不同。游戏开发周期和成本大幅下降，普通游戏能达到的日活跃用户数量则大幅上升。加上普通用户很容易从一款游戏迁徙到另一款游戏，忠诚度开始下降，游戏更新换代加快。

庞大的可触及的用户基数使得土豪玩家的重要性降低，与之对应的是付费率（付费玩家占总玩家人数）上升。持续的游戏体验成为了吸引用户的重点，收费的道具也从会影响游戏平衡性的道具转变为仅仅外观不同的游戏皮肤。

快速扩大的游戏群体也催生了粉丝经济的诞生。更突出竞技性（对应的是谁充钱多谁厉害的游戏模式）让电子竞技成为可能，各大比赛出现，优秀的游戏玩家成为偶像。主播行业兴起也对行业起到了推波助澜的作用。

但这并不是游戏商业模式的重点。从业者会希望从过去的商业模式中汲取优点，比如更精品的游戏、更为稳固的用户。

具有野心的游戏公司会希望借助游戏打造一个虚拟的社会，这个虚拟社会有真实社会的影子。游戏公司负责制定整个社会规则，提供底层技术服务，而让玩家去丰富整个社会的形态。

虚拟社会一旦形成，就会建立很高的进入门槛，对于玩家而言，离开一个游戏的成本会更高，游戏的用户也会更加稳固。社会的形成会诞生很多需求，比如虚拟物品的交易、虚拟物品的运输甚至是虚拟社区的安保。游戏公司会利用满足这些需求的方式进行盈利，这点很像是现实社会政府的收入模式，不同的是，现实社会中政府收入的目的是为了更好地提供公共服务，而在虚拟游戏社会中，游戏公司提供“公共服务”是为了盈利。相比原先的盈利模式，这种商业模式在感情上会被用户更好地接受。

这可能会是可预见未来的游戏商业模式选择。📌

III

第三章 如何打造适于创新的环境

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对于企业而言，
能有良好回报的
创新环境
就是
最好的创新环境。

如何打造适于创新的环境

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创新的相关者包括政府、企业和公众。如果我们将企业部门作为创新主体，那么创新环境就是政府和公众为企业创新创造的外部条件。

推动创新是整个社会发展的需求，而企业则是逐利的实体，创新环境的打造从根本上就是在创新问题上达到社会效益和企业效益的协同。当然，一些企业可能将推动社会进步本身作为目标，但整体创新体系并不能建立在情怀的基础上。

创新在于创造，而创造很难进行路径设计。所以打造适合创新的环境就像是去呵护一个我们难以理解的东西，对于创新本身要有敬畏感，一旦我们觉得真正理解了创新的原理并开始为其设立标准的成功路径，这可能意味着我们已经远离了创新本身。



改变创新的回报模式

对于企业而言，能有良好回报的创新环境就是最好的创新环境，能改变创新的回报模式，让创新行为更有利可图是改善创新环境的重要环节。

更多的竞争前技术支持

竞争前技术指的是那些未来能应用于商业，但目前仍处于早期，且前景非常不确定的技术，这种类型的技术往往具有通用型的特征，也被称为平台型技术，比如互联网技术原型。

竞争前技术的研究开发具有行业性和区域性的特点，对于单一企业而言，往往在商业上是不经济的。但竞争前技术往往又是一个重要产业的基础，其缺失将会极大伤害一个国家在该产业上的竞争力。所以在这种技术开发上，政府应该给予更多的支持。

“在创新领域，公共资金应该投资竞争前技术。” 华大集团副总裁朱岩梅认为。

即便是一向认为政府不应该挑选技术的获胜者和失败者的美国，大部分学者也会支持政府对于竞争前技术扶持的做法。

虽然各国都认同政府支持竞争前技术开发，但具体形式并不相同。美国更看重竞争，政府让各个企业提出不同的技术路径，让这些路径在未来展开竞争，最终优胜劣汰。日本和欧洲则是更注重企业间的合作，政府出面组织研究开发合作体，进行技术攻关。前者在最大限度内保护了竞争，而后者从项目角度来看效率更高。

泛地被整个社会使用。政府将更多的市场对私人部门开放也将促进创新。虽然保护会让市场更安全，更有秩序，但同时会扼杀创新力。

更好的金融和合作环境

创新离不开资金的支持，如果合理引导社会资源进入创新领域决定了多少梦想可以成为现实。

创业企业本身的特性决定了股权融资是最为匹配的融资途径，而对于整个社会，追求稳定回报率资金占据主流。一些制度性的改革可以缓解这种矛盾。风险投资基金可以以资产组合的方式降低股权投资的风险，而基金中的基金可以让更多的投资者进入这个行业，让优秀的投资人有更好的发挥空间。对于一些较为成型的项目，结构化的融资（优先资金和劣后资金的组合）可以让有限的愿意承担高风险的资金发挥更大的作用。

另一个容易被创业企业忽视的是大型金融机构，特别是银行资源的力量。很多创业者引入风险投资基金的目的除了资金还有他们的资源和经验，但其实银行才是资源真正的集中点。

“其实金融业也是共享产业，金融业就是共享经济。” 汇丰中国工商金融业务总监方啸认为，银行能共享的除了资金，还可以与企业共享经验和人脉。作为金融体系中最为重要且历史最为悠久的机构之一，银行拥有最为强大的人脉网络，经历过无数行业的兴衰，拥有难以比拟的跨行业经验，这都可以极大促进创新企业取得成功。而对于银行而言，帮助早期创业企业是一门生意更是一项投资，这将是与这些企业成长后进一步合作最为坚实的基础。

另外一些创新来自于组织内部，不仅仅包括企业也科研院所。机构自身可能无力去承担所有的资金需求，吸引外部资金进入可以起到很好的补充。在外部资金进入之前，组织需要将创新本身变成一个可投资的实体，包括清晰的股权关系与创新者的激励。在高校中，这种问题尤为突出。

中国的道路介于两者之间，政府会挑选自己认可的企业和研究机构进行竞争前技术的研发，并采用“快烧火，慢开锅”的方式静观其变。

从结果来看，中国在竞争前技术上并没有在全球范围内取得优势，这意味着中国政府都应该更多的支持竞争前技术的开发，从而为基于此的企业创新提供更大的空间。

专利保护的双刃剑

对知识产权和创意的保护对于创新至关重要，这从法律的层面保护了创新者的利益，维护创新热情。如果一个市场抄袭盛行而不被惩罚，这相当于给了参与者错误的利益指引，每个组织都不愿意耗费资源去创新，而只是等待他人的成果，最后牺牲的是所有人的利益。

但同时，专利保护的滥用也会阻止竞争。在这样的市场中，新参与者需要耗费巨大的人力物力去躲避一个个专利陷阱，支付高昂的专利费用。

在一些行业，专利保护与社会标准价值观产生了冲突。一家公司耗费了大量的成本研发了一项新的医学技术，这项技术可以以很低的成本对抗疾病延长人类寿命。如果技术被严格的专利保护会导致绝大多数人无法从中获利，而如果缺乏专利保护，这项技术可能根本不会被研发出来。

解决这个问题同样需要政府的介入，对于这种类型的技术，政府需要在研发阶段给予支持，改变研发企业的盈利模式，让其盈利更少的依赖后期产品，而作为回报，这种技术需要更广

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更为开放的社会

创新意味着打破陈规，推动创新需要整个社会变得更加的开放，更乐于接受不同的事物。

更开放人才培养理念

在我们的访谈中，很多企业家们提到创新最为稀缺的资源就是人才，特别是那种具有开阔思维的创新型人才，这是中国从原有的利用后发优势跟随发展的战略转向实施创新驱动发展战略必将面临的挑战，人才需求结构的变化意味着人才培养的方向也需要转变。

学校不仅仅是传授知识的地方，更要去发挥每个人的潜能，学校要能接受人与人之间更多的差异，并为学生们提供成才的更多路径。

整个社会都应该变得更包容给年轻更多的空间去理解和思考这个世界，在一些国家，很多年轻人会花真正一年的时间去看这个世界，思考人生未来的方向，而在中国，这种行为很难得到认同。与毕业就成为房奴或者是一上班就思考怎么储蓄退休金的年轻人相比，创新更需要自由奔放的灵魂，这可能也需要整整一代人去改变观念。

创业者是创新人群中更为特殊的群体，他们是最为激情澎湃的创新者，也是最大的风险承担者。为他们提供帮助并建立安全垫可以帮助他们成功并降低他们的后顾之忧。

科大讯飞董事长刘庆峰建议由教育部和人社部牵头在高校或者社会各类机构中开设创业辅导课程，教授基本的创业知识和技能。刘庆峰还建议人社部牵头针对创新创业者健全失业救助体系，后者将为创业者提供安全垫。

对人才培养制度进行改革是需要很长的时间才能见到成效，但同样，其建立起来的优势也将维系很长的时间。

更为开放的企业创新环境

传统的企业只是由单独的创新部门来负责创新，但这可能会限制企业创新的能力并让创新与企业日常业务脱节。改变与创新相关的组织架构从而能让整个企业的各个部门，甚至是上下游客户都参与到创新中来，而这种由需求而来，以解决问题为出发点的创新更容易取得成功。

企业的内部创业也是推动创新的有利手段。好的创意可以在企业内部进行孵化并明确企业与创新者之间的权利和义务。

企业可以借此留住人才并找到新的业务突破口，而对于创新者而言，企业资源的注入会提高成功的概率，同时与离开企业创业相比，企业内部创业可以提供额外的安全垫，从而让他们无后顾之忧。

信息透明让社会对新事物更包容

整个社会环境是否包容对创新的影响没有那么直接，但也十分重要。新技术，特别是突破性技术的发展往往伴随着争议。比如基因技术带来的安全性和伦理问题，大数据技术引发人们对个人隐私的担忧。

商业企业会因为利益夸大新技术的好处并尽可能掩饰其风险，而公众对于他们的言论存在天生的不信任，而在觉得面临不可预知风险时公众往往会倾向于保守，并抵制新事物的出现。

中立的机构（政府、非利益相关科研机构和媒体）都需要尽力去减少信息不对称的状况，鼓励而非回避相关辩论，并在事实的基础上，政府需要去制定行业规则。

为了达到这个目标，这些机构都需要树立客观公正的形象，一旦他们不能做到，那么整个市场交流的机制就将丧失。就像是国内“转基因食品”面临的困局那样。

除了加大投入，更多的技术向商业开放也是推动创新的利器，包括政府和高校拥有的技术。

处于国家安全或其他原因的考虑，政府往往会投入大量的资源进行技术研发，其中一些成为了未来创新的底层技术，甚至主导了一个庞大行

业的出现。比如早期的互联网技术和目前流行的洋葱服务器的加密技术。

以色列的军事技术民用化是其成为创新国度的重要原因，以色列军方为军事技术设置保密清单，而在清单之外的技术被自由地用于商业开发。以色列Given Imaging公司在2001年生产的胶囊内窥镜的原理就是基于智能导弹上的遥控摄像装置，这一产品开辟了内镜技术医学应用的新领域。

高校同样承担了很多的研究工作，很多研究成果最终只形成了论文并被束之高阁。高校技术商业化很大的障碍是所有权的不清晰，由于在研发者对技术是否及多大程度上拥有所有权的问题上界定不清，使得各方无意愿和能力对技术进行进一步的商业开发。一种方法可能可以解开这个困局，就如上文我们就提到过的理念：高校利用政府的资金进行基础研究工作，当一项技术具有商业前景时，可以成立独立的商业组织，让高校、研发者与投资者共同持有股权，以商业的模式去运作。

政府将更多的市场对私人部门开放也将促进创新。虽然保护会让市场更安全，更有秩序，但同时会扼杀创新力。

寻找适合自己的创新文化

全世界存在很多创新中心，几乎成为了一个国家创新力的代表，比如美国的硅谷和以色列的特拉维夫。

很多国家都希望可以打造出这样的创新中心并付诸行动。知名的全球创新中心每年要接待很多的来访者，其中包括很多政府官员。急切地希望在本国取得类似成功的政府投入资源、政策去复制一个个像硅谷和特拉维夫那样的创新中心，但真正成功的确并不多。其中很大一部分原因是忽略了成功创新中心背后的文化支持。

工业革命时代，美国诞生了一批中产阶级，职业经理人阶层也率先在美国出现。随之出现的是享乐主义和嬉皮士文化，后者对于硅谷的崛起起到了至关重要的作用。比如苹果公司的创始人乔

布斯就受嬉皮士文化很大的影响。“自由民主的嬉皮士文化，其实是推动美国创新的重要力量。”朱岩梅说，这个文化在其他很多地方是不存在的。

以色列是另一个完全不同的例子。由于地缘政治的关系，以色列人有着强烈的不安全感，同时你又能强烈感受到他们的想象力。

以色列没有失败的文化，在这里失败根本不算是一回事，如果失败了，重新来过就好了。很多以色列年轻人在刚服完兵役之后会买一张单程票，目的地可能是去巴西、阿根廷、美国或者是亚洲国家。他们想去体验世界，他们不知道什么时候会回来。整个社会对这种行为也格外包容，一家以色列公司的人力资源部经理看到应聘人员简历中有过一段时间的空白期，他会觉得这个人可能出国游历，或有了新的想法，这是一件好事情。而在中国，这种简历往往会被认为背后有不好的事情发生。在以色列，犹太人都要服兵役。只要在部队服役三年后就成为军官，在战争来临，这些二十岁出头的年轻人必须要做出决策，而这些决策将会直接决定部下的生命。一位研究以色列的学者称，在高压下做出决定，并且承担后果，这与创业是何等类似。

所有的这些都构成了以色列创业文化的基础，而这些是难以被复制的。“以色列的创新最大的是来自于文化的因素，”以色列风险投资公司Gemini VC合伙人瓦格纳(EranWagner)认为，“包括复杂的外部环境让我们不得不创新，还有犹太人的质疑精神以及不怕失败。”

文化的形成需要漫长的时间以及特殊的背景，更多的只能被参考而非被借鉴。希望取得成功的国家需要考虑，在自身基础上怎么打造创新文化，重要的一点就是我们自己的优势在哪里？

对于当前的中国，大数据是我们的优势。

大数据正在改变很多的行业，在大数据时代，创新将不仅仅限于天才的灵光闪现，以大数据作为基础的分析将会是创新很大的来源。由于中国巨大的人口和经济规模，我们拥有巨大的基础数据来源。

同样依托于巨大体量的还有共享经济，这也是为什么很多共享经济的创意可以在中国取得比其他国家高很多的成就。☑

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IV

第四章 点评部分

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浙江大学管理学院
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中国企业正在进入 一个新的时代

浙江大学管理学院 郭斌教授

中国企业正在进入一个新的时代。这个时代往一个方向看正在对许多中国企业的竞争优势基础进行非线性的破坏，但往另一个方向对于一些中国企业而言却是最好的时代。在这个以创新和变革为典型特征的时代，中国企业在挑战与机会并存的动态变化环境中，正日益发现创新驱动正在成为通往未来的一条必经之路。

这种转变发生的诱因在很大程度上是两种力量交织的结果。一方面，随着中国制造业的崛起并成为世界工厂，一些中国领先企业正在发起对于跨国公司在国际市场乃至全球市场领导地位的冲击，从而使得跨国公司在对待中国市场的策略上日益强调基于核心技术和知识产权的战略控制，以遏制中国企业对其市场地位的逐步侵蚀。尤其是，中国市场对于很多跨国公司而言，由于中国市场的体量而在他们的全球版图中战略重要性正在上升。另一方面，尽管中国企业尤其是中国制造业企业已经日益意识到创新的重要性，但是要从原来依靠低成本和后天模仿优势的策略转向创新驱动的策略，势必需要一定的时间来完成这个转变。而中国经济新常态的特点，以及目前围绕着去杠杆去库存进行的结构性调整，也让中国企业在向创新驱动的转型过程中感受到了不少的压力。

在我们此次对中国企业创新的研究中，发现那些较为成功的企业，所抓住的典型创新和成长机会大多围绕着如下一些方面：

(1) 抓住中国市场正在发生的消费升级的机会。在过去的十年里，中国市场正在出现明显的消费升级趋势，这一方面得益于中产阶层的规模扩张，另一方面也得益于中国不断深化的城镇化进程。这意味着中国企业需要对自己的产品、技术、服务以至于能力不断进行升级，以更好地服务于不断向上迁移的市场需求。这种市场的动态性也对企业能力和战略上的柔性带来了挑战。

(2) 越来越多的中国企业开始在“足够好的市场”（good enough market）中崭露头角。与强调低成本、低价格的低端市场以及强调品牌、高质高价的高端市场都不同，“足够好的市场”强调的是如何在质量与价格之间建立一种完美的平衡，从而在性价比上尽可能地趋近于极致。这种市场策略与中国目前的市场结构能够形成非常好的匹配关系。

(3) 充分利用一些新兴技术（例如AI、大数据、物联网、在线支付、基因技术等）所带来的

增长机会，通过将技术创新与商业模式创新进行结合，来更好地满足中国市场消费者的需求。由于中国市场在消费者规模上存在的天然优势，这使得商业模式创新的优势发挥着更为良好的基础。

(4) 将中国市场中所建立的能力、产品、商业模式向国外市场进行迁移，从而获得更大的增长机会。这无疑是在这个时代所发生的一个新的趋势。近些年来，越来越多的中国企业将目光从本土市场转向了海外市场，这些企业所进行的探索实践也大大改变了世界对于中国企业的认知——以往中国企业给西方企业或者是消费者以“模仿者”或“山寨”的刻板印象，但现在一些西方媒体已经开始讨论Copy to China向To China Copy的转换，中国式创新正在日益引起人们的关注。当然，毋庸置疑，中国企业与成熟的国外跨国公司相比，目前在技术、能力整体上还存在着不小的差距。但一些中国领先公司的成功实践，无疑开启了中国企业在世界舞台中的想象力。

另外，尽管不同的企业在适应这样的一种变革大趋势中采取的策略各有不同，但在那些正在以及完成了较好的创新驱动转变的企业仍然可以观察到一些共同的特点：

(1) 在核心能力以及核心技术上的持续投资以及战略耐心。核心技术的发展以及核心能

力的构建，需要企业进行长时期的资源投入，这些投入甚至在短期会与市场绩效产生一定的冲突。保持战略耐心，就成为这些向创新驱动转型的企业中企业家们所不断坚持的努力。

(2) 成功的产品创新、服务创新以及商业模式创新，在创新过程中需要对中国市场有着深刻的理解。中国市场有着巨大的消费者基础、高度分割的市场结构以及不断动态变化的市场趋势这样的特点，企业的创新需要建立在对这些特点的深刻洞察以及高效率的利用基础之上。

(3) 通过高度嵌入高效率且较为完备的本土产业链及产业生态系统，来构建企业自身的竞争优势基础。以往对于中国企业的竞争优势分析中，人们往往只关注企业内部自身所建立的资源和能力基础。事实上，在这些研究观察中，我们可以清晰地看到，中国企业的强大，很多时候并不仅仅是源自于自身的内部因素，还源自于在过去中国制造业崛起过程中逐步建立起来的强大产业生态系统及本土供应链。那些成功的创新企业，很多都充分利用了产业生态系统，以支撑对市场需求的快速响应以及在质量与价格之间的极致平衡。

从互联网大国到互联网强国

阿里研究院 高红冰

中国互联网以及基于互联网的技术正以前所未有的速度发展，并正全方位改变中国的创新环境。

过去的五年是中国从互联网大国变成互联网强国的五年。2013年，人们谈论的是中国快速增长的电商销售数字，而到了2017年，中国式的创新成为了中国互联网发展最好的注解。

巨大的市场与技术的进步成为了互相推动的两大增长引擎。移动支付、普惠金融，成为全球金融创新的中国故事。

中国云计算和大数据技术能力实现了从追赶者到领先者的角色转变，阿里云在2016年打破cloud sort比赛世界纪录，仅用1.44美元就完成了1TB的数据排序，而就在之前一年，阿里云在数据排序效率上刷新了世界纪录。

支付宝利用互联网、云计算技术，将单笔支付费用降低至0.02元，目前服务超过4.55亿的活跃用户，500万家小微企业，150万涉农经营者，范围遍布200多个国家与地区。中国已经成为全球移动支付最为领先的国家。

在2005年时，中国的快递业务量还不到美国的十分之一，而到了2016年，中国的数字是中国的两倍。

互联网发展的浪潮成就了大批科技企业，现在中国企业已跻身全球互联网企业第一层级。截至2017年9月底，全球十大互联网公司（以市值计）中中国已经占据三席。最新数据显示，中国独角兽企业数量占全球的近三成，市值占全球独角兽企业的41%。

以云计算、大数据、电商交易平台、快递物流、信用体系和移动支付为基础的新商业技术设施的快速崛起，给了社会创新以前所未有的推动。

在新技术的支持下，生产方和需求方正以从未有过的方式进行互动。大型工厂既可以模块化生产个性化大众标准产品，也可以柔性生产（如快速翻单）大众型非标准化产品；小微企业与作坊则可以集单生产专业圈非标准化产品，也可以逆向创新生产（快速对市场做出反应）小众型标准化产品。

数据正驱动供应链创新升级，也推动了攻击侧改革，后者让产能在在线化，通过优化档期、产能商品化来解决生产线闲置问题。

创新创业文化和环境也发生了根本性变化。科技生态打造开放、透明、协同商业基础设施平台，商业生态则打造以“科技孵化”为主科创新服务平台，双生态驱动营造创业就业大平台。

中国互联网创新服务生态系统的不断演进，为全社会提供基础服务，随之整个商业业态也将发生变化。

商业形态的改变让就业创造变得更加灵活。就业被重新定义，从“公司+雇员”到“平台+个人”，改变包括：是否有工作的界限开始模糊；劳动力市场的供给和需求匹配更即时，成本更低；创业与就业的区别也不再那么明显……

技术正在改变一切。

大众创业、万象更新				
制度创新	规则创新	生活服务创新	商品创新	教育、健康、娱乐服务创新……
		商业模式创新	交易创新	营销创新 管理创新
		商业服务创新	金融创新	物流创新 制造创新
		数据产品创新		软件和工具创新
通用技术平台创新				
云计算、大数据技术				
科技创新：人工智能、量子计算、生物识别……				

CHINESE
CORPORATE
INNOVATION 2017
REPORT

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Frank Fang

The Era of Innovation

Inheriting from the past and ushering in the future, the Chinese society has entered a new phase, standing on the center stage of the world. The vibrant new era has made hundreds of millions of Chinese people enjoy the convenience and beauty of living. Reshaping innovation mechanism, inspiring creativity while cultivating emerging business types and new markets, these endeavors not only elevate people's happiness, but also infuse new energy for transforming and upgrading various fields of socioeconomy.

Innovation means to lead an era. Riding the global wave of innovation, numerous Chinese technology corporations owe their success to innovation and hard work, and are marching onto the global stage. Whether it be through foreign resource strategies or recruiting international talent at overseas research centers, Chinese corporations are gradually expanding outside the country in this emerging new age. HSBC is proud to be riding this wave alongside these corporations.

To stand out in a unique market allows for great opportunities to emerge and flourish, regardless of the challenges of the time. These times call for innovation, and innovation requires drastic change and continuous evolution. It is obvious that innovation can give life to a new economy driven by technological advancements, comprehensive health, education, and professional services. These gifts are a future brought to us by innovation. This gift inspires and encourages us to strategize a better way for

the financial industry to usher in the new era.

HSBC has always boasted a cautious and steady style. We strive to deliver powerful and true information to our clients, while standing side by side on the road to innovation. The majority of our partners are innovative companies with whom we have continually explored better methods of providing superior services based on "innovation". We are very pleased to have jointly published the "2017 Innovation Report of Corporations in China" with CBN Research Institute and School of Management Zhejiang University. The publication entails the behaviors of innovation and the innovative efficiencies of Chinese companies using big data, in the hopes to inspire ideas and actions from corporations.

Innovation is much like DNA; it cannot be mass produced or copied, and does not imply absolute causality. However, we can derive knowledge from past experiences in business. We would like to offer our gratitude to our partners at CBN Research Institute and School of Management Zhejiang University, and every company interviewed in the report for their self-less sharing on their experiences in innovation, and participations in the discussions of the pros and cons of the path to innovation.

HSBC has always grown alongside its clients. In the future, we hope to focus on product and technology as well as form partnerships with innovative companies with foresight and ambition. We shall continue to improve our products and services while we decode the new economy and explore a new era! 📌



dean of the School
of Management at
Zhejiang University

Wei Jiang

Disrupting the World by Innovating

This is an era for China, the one that would be written into human history.

In this era, we are disrupting the world by innovating in China. The most powerful force of the disruption comes undoubtedly from innovation-driven enterprises. In this era of changes, a number of leading enterprises, such as Huawei, Alibaba and Tencent, has been disrupting the world and showcasing their talents on the global stage. Amazingly, we observe that the Chinese business tycoons presiding over these enterprises, including Ren Zhengfei, Jack Ma, and Pony Ma, are creating new history along with their peers like Steve Jobs, Elon Musk and Mark Zuckerberg.

In this era, enterprises are disrupting the world by innovating business model. In the past, our understanding of innovation focused on technological level; while today we recognize that innovation is all-pervasive with every factor being permeated with a breath of innovation. Today's organizational patterns are nowhere like those back in Weber's days; today's production styles are no longer those practiced in Taylor's times; and today's firm boundaries are not those defined by Coase's theory. Indeed, innovation in today's world has disrupted the business model of companies. It is the company's power to disrupt the traditional organizational economics through changes of organizational

context, infrastructural facilities, market relationship and labor relations.

In this era, business leaders are creating new production functions by innovating the core competences. Today, the company's strategic assets are no longer capital, land, and labor as proposed by Solow, or merely technological progress as put forward by Cobb-Douglas, but enriched by new production factors comprising knowledge, intelligence etc. Entrepreneurs are restructuring new production factors through innovative practices. We are rightly proud that Chinese enterprises constitute an integral part throughout and put out the call "let's disrupt the world! To disrupt or to be disrupted."

As a pioneer of innovation research institute in China, the School of Management Zhejiang University is duty-bound to record this history. In retrospect, when the lone rangers of the University's innovation research team began their exploration of the rules of enterprise innovation 30 years ago, the term "innovation" was but a newly-engendered concept even in academic circles, let alone being "out of the world" in business community. Thankfully however, the concept of "enterprise as the main entity of innovation" proposed by our innovation research team 20 years ago received recognition by the far-sighted national leaders, despite the fact that "innovation" back in the day was for enterprises merely a fancy decoration. Even more encouraging for us is that the Total Innovation Management (TIM) theory as originally proposed by our innovation research team more than 10 years ago has turned into the nation's key strategy today. It has become a consensus that "innovation" is the prime ingredient building a company to last.

There are no bad industries, only passive enterprises. There are no ill times, only mediocre brains. Innovate or die, disrupt or 📌



CEO of
YICAI Media Group
Zhou Jiangong

Quantifying Innovation

Innovation is a company's means of survival. Indeed, the lifespan of listed companies is now getting shorter. This is also the case for a product's life cycle, along with faster generation change. Companies that fail to innovate will be rendered obsolete due to intense market competition.

What then, is innovation? The most common definition for innovation was coined by Austrian-born economist Joseph Alois Schumpeter, detailing the introduction of a new combination of production elements into a production system. Such elements should in themselves be new, as should their combination. The purpose of introducing such elements in any combination is either to improve production or to provide better products and services, thereby creating value. Any invention or line of research that does not create value cannot be considered innovation.

Who innovates? Companies or enterprises. Innovation by companies includes research and development, as well as innovations in technology, management, model, brand, and organization in order to give them a competitive advantage. A period of active entrepreneurial innovation is often accompanied by creative changes in the market's environment such as the reform and opening up of the Chinese economy, a combination of population bonus with the market, and the establishment of a

capital market. These can provide a significant impetus for entrepreneurship and the growth of companies. Sometimes, it can be a wave of technological innovation sweeping over all industries that leads to the creation of new industries, the re-invention in old industries, and cross-industry integration.

How does one quantify innovation? There are various standards for measuring innovation for different stages of a company's growth, as well as for different industries. I believe that companies with a relatively stable business model and in relatively stable industries should quantify their innovations by way of results. Innovative companies normally have higher productivity. Using similar benchmarks to compare companies' innovativeness, their economic indicators would be a significantly better resource for assessing this. Some innovative companies that are considered leaders in their own industries can even bring about positive impacts outside of their industries.

The "Report on Innovation and Development by Chinese Enterprises", jointly authored by the CBN Research Institute and the Zhejiang University School of Management, and presented by HSBC Bank (China) Company Limited, consisted of a sample of 1,264 companies listed in the Shanghai Stock Exchange to carve out a picture of the innovative ability of

Chinese companies. Five listed companies were selected to undergo an in-depth analysis. The report concludes with some recommendations for creating a more innovation-friendly environment in China.

These companies essentially represent China's industrial economy. One can see that the vast majority of such companies are in highly-competitive industries. In recent years, they have begun to devote greater attention to innovation, and as such, have made appropriate investments in this regard to improve efficiency. Consequently, they have garnered impressive results in terms of growth and return. Many such companies take active steps to embrace the Internet, big data, and cloud computing in an effort to improve their operating efficiency. At the same time, China's capital market is beginning to accommodate a greater number of innovative enterprises with greater risk and growth potential.

Chinese companies that can successfully embrace innovation are beginning to show their global value. By the same token, China's capital market is beginning to attract the world's most innovative companies.

be disrupted. This is a time to forge ahead or fall behind, a time to swim or sink. Only by seizing opportunities and thinking unthinkable will you stay ahead of the game in this great era. Armed with our mission, responsibility and passion, the School of Management Zhejiang University has always been and will continue to walk together with our partners on the path leading the future of innovation.

C H I N E S E
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I N N O V A T I O N
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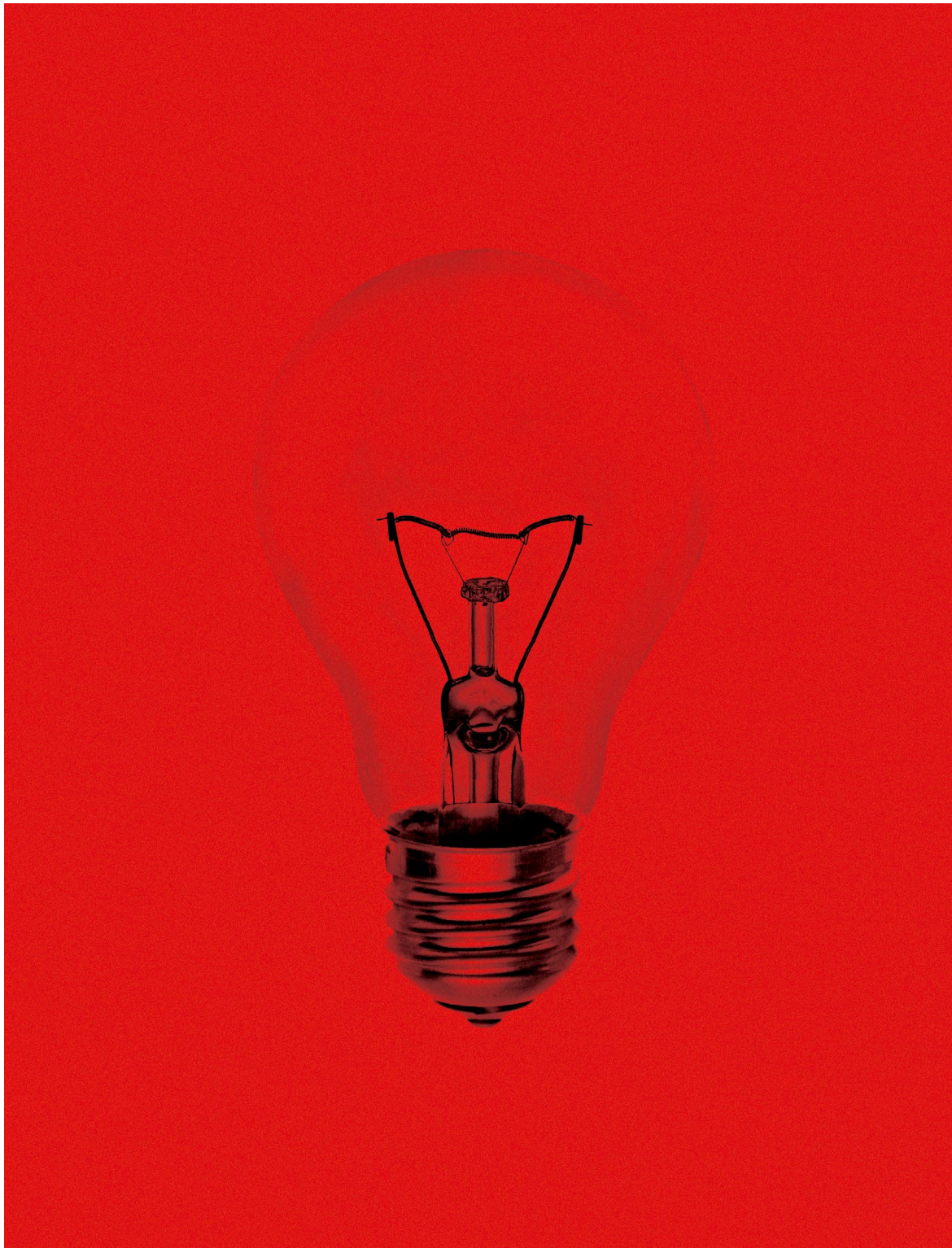
CHAPTER 1
The Innovative
Strength of Chinese
Corporations

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⋮



Innovation has become an
important force that drives
Chinese companies to be
truly competitive on the
global stage.



The Innovative Strength of Chinese Corporations

"In the age of a knowledge-based economy, the significance of innovation often surpasses that in any previous ages."

The Power of Corporations

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-
-

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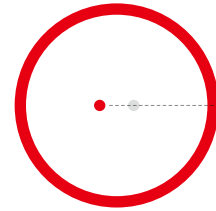
For years, China has been regarded as the world's factory, for which low cost and counterfeiting have laid the groundwork for competitiveness. However, the rapid emergence of technology-based Chinese corporations in recent years has made innovation an important force that drives Chinese companies to be truly competitive on the global stage.

The concept of "innovation" was brought up first in Joseph A. Schumpeter's *The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle* (1912), in which innovation is viewed as the process that introduces the "new combination" of production factors into the production system. The DNA of innovation has been continuously implanted into Chinese corporations and properly appropriated by these enterprises according to actual conditions. Published by Cornell University, INSEAD, and the World Intellectual Property Organization, the Global Innovation Index (GII) in 2016 indicates that China, for the first time, has broken into the world's 25 most

innovative economies¹. In essence, the purpose of innovation is to explore and utilize the business values brought by the changes of technology and market to the utmost extent.

Chinese corporations, meanwhile, are experiencing profound changes in markets and fields of technology: In terms of technology, the development of new products and technologies in Chinese industries has continued to expand. Moreover, the growth of the Internet, AI and other advanced technologies is also bringing more and more opportunities and challenges for Chinese companies to enhance their soft strength. Owing to the rapid development of Chinese economy, the population of Chinese middle class keeps increasing substantially. Consumers' consumption preference has experienced dynamic changes, among which is the trend toward pursuing products of higher quality and better services. In addition, the high-end market in China has also witnessed large-scale development. According to "2017 Forbes China Chinese Medium and High Affluent Wealth" 

Note:
The innovation index calculating method and procedure, as well as the basic data for the analyses of Chinese publicly listed companies in chapter one of this report, are derived from the Innovation Index of Publicly Listed Companies in China researched and formulated by Professor Guo Bin at the School of Management in Zhejiang University and his research team. The Innovation Index has been compiled, formulated and released on an annual basis since 2015. After discussions among the School of Management at Zhejiang University, Professor Guo Bin's research team and the CBN Research Institute, the drafting of the quantitative part and the main content of chapter one in this report were completed by professor Guo Bin's research team, based on the data analysis on the Innovation Index of Publicly Listed Companies in China for the period of 2014 to 2016.



Comparison of major innovation indices^{3, 4}

Publisher

Evaluation Project Category

Index Construction and Evaluation Methods

Research Level

Advantages

Disadvantages

	01	02	03	04	05	06	07
	European Innovation Scoreboard, Regional Innovation Scoreboard	Technology Achievement Index	Knowledge Economy Index	National Innovation Index	Global Manufacturing Competitiveness Index	Independent Innovation Capability Evaluation Index	Zhong Guancun Index
Publisher	European Commission	United Nations Development Programme	World Bank	Chinese Academy of Science and Technology for Development	Deloitte	China Economic Monitoring and Analysis Center, National Bureau of Statistics of the People's Republic of China	Beijing Municipal Bureau of Statistics, Beijing Academy of Social Sciences, Zhongguancun Innovation and Development Research Institute, Beijing Fangdi Economic Development Research Institute
Evaluation Project Category	A innovation promotion B corporate innovation C innovative output divided into 8 dimensions and 25 sub-indicators	A Technology innovation B diffusion of new technologies C diffusion of old technologies D human skills divided into 8 sub-indicators	A Human capital B intellectual capital C regional economic output D knowledge sustainability	A innovation environmental index B innovation investment index C innovation production index D innovation performance index divided into 21 sub-indicators	A Global manufacturing competitiveness index B driving factors for competitiveness scores C policy scores	A Potential technological innovation resources B technological innovation activities C technological innovation output capacity D technological innovation environments	A Innovative environments B innovation abilities C industrial development D enterprise growth E growth from fall out F internationalization divided into 14 secondary indicators and 38 sub-indicators
Index Construction and Evaluation Methods	Based on Schumpeter's definition of innovation, previous general research, and data availability indicator systems from individual countries; data from European Commission's innovation survey, Eurostat, OECD, and text databases	Weighted according to expert opinion plus general research	Weighted according to expert opinion plus general research	Weight distribution based on gradual equal-weight method	Executives give indicators, which drive national manufacturing competitiveness points according to their relative importance, and then rank the manufacturing industries of 40 countries/regions now and in five years in order of overall competitiveness	Weighted according to expert opinion plus general research	Learned from experience in preparing the Silicon Valley Index to create an open index system, which includes the monitoring of conventional indicators for science and technology park development and indicators specific to the Zhong Guancun Index
Research Level	National level, regional	National level, regional	National level	National level	National level	National level	Industrial park
Advantages	High level of regulatory conformity and reliable processing methods	Universality	Universality, considers innovation from perspective of knowledge	Strong information coverage	Universality, block contrast	Emphasis on 'independent'	High degree of assimilation with regional characteristics
Disadvantages	Driving elements coincide with characterization elements	Biased towards technological innovation	Information coverage is comparatively weak	Driving elements coincide with characterization elements	Emphasis is on full range of competitiveness rather than innovation	Based on perspective of technological innovation capacity and has its limits	Applicable to the high-tech industry in Zhongguancun but scope of evaluation has limitations

Table 1
Note: This table is based on JiangHui and ZengChaoqun (2014); Wang Zhi-hui and Liu Li's (2015) thesis but has been organized and rewritten.

Report," the wealthy class in China has reached 12,610,800 people². This means that, in domestic markets, Chinese corporations must not only maintain their advantages in the medium-and-low-end market but also enter the high-end market that has traditionally been controlled by multinational enterprises based in developed countries. In the meantime, the innovative capabilities of Chinese corporations continue to advance, which is resulting in a gradual increase in Chinese companies that have entered overseas markets, are linked to the global value chain and that stand on the competitive world stage. These corporations will no doubt need the force of innovation to face the challenges of "two markets": the domestic and the overseas markets.

In addition, the Chinese market has also become the trial field and the gold mines for innovative business models. To better cope with the changes in technology and markets, more and more companies conduct a great deal of experiments by trial and error. These innovative business models have re-defined business competition greatly, giving rise to a great deal of cross-border competition. As a result, with the continually changing dynamics of the structure of competition, the combination of business models and product (or technology)

innovation shall be an important strength for Chinese corporations to gain advantages in market competition on a global scale.

It can be said that Chinese corporations have not just copied the pattern of innovation used by international enterprises, and that the implementation of "innovation" itself has also been continuously innovated in China.

Evaluation of Corporations' innovation capabilities

Over the past 30 years, some professional organizations, scientific institutes and scholars have established various indexes about innovation in different scopes and methods for countries, regions and industries, such as the European Innovation Scoreboard, China Innovation Index, Global Manufacturing Competitiveness Index (GMCI) and the ZhongGuancun Index (see Table 1). However, scientific research and expert consultation has concluded that several common problems exist in these indexes:

First, it is in the subjective evaluation. Most of the indexes rely greatly on experts' subjective opinions (Table 2.1). Assuring that these subjective judgments are not affected by other factors is an important issue that needs to be addressed. Even if the experts involved in the related evaluation are competent enough to weigh the indexes, it remains in doubt whether they have the energy and time to precisely conduct evaluation when they face such large amounts of data and various indexes.

Second, information coverage. Traditional evaluation mainly focuses on the innovation that appears in the forms of R&D or new technology of products. Innovation that is not presented as R&D or technology, such as the enhancement of knowledge management, the change of sales channels and the innovation of business models, are easily overlooked.

Third, the availability of samples. The existing data collection relies on questionnaires. The cost of data acquisition is high, but the coverage of samples is questionable.

Fourth, the logic of defining the indexes. Traditionally, the basic thinking of innovation and the related indexes is definition first. Then there is logical explanation of the dimensions the indexes contains, which inherently presumes that various dimensions are independent from each other. The definitions of the related indexes are indisputable. However, innovation itself is a complicated concept, which has not been given a consistent definition. Traditional evaluation, moreover, often mixes driving factors and effect factors when considering the causal logic of indexes.

The assessment system we created

1.

The new innovation assessment we created can solve all four of the previous problems.

First, this assessment method is not dependent on an individual's subjective judgment and assures that indices compiled using this method are robust and independent of individuals.

Second, non-technical factors, often very important factors in considering company competitiveness and performance, are also included in the assessment.

Third, the evaluation methods we have established have lower evaluation costs and they are able to track the sample companies we surveyed (listed companies) for longer periods of time.

Fourth, we used information extraction to solve the problem of innovation lacking widely recognized concepts and dimensions. This means that we are concerned about the portion of innovation which has been realized or reflected;

in other words, the part of innovation which can reflect the contribution it has on a company's performance. We believe that innovation is truly reflected in its contribution to the creation of value. Therefore, we selected EVA as indicators for corporate performance.

In the new innovation strength assessment system, the innovation index has been divided into two dimensions, i.e., innovation competence and innovation efficiency. The underlying indicators we chose to evaluate for these two dimensions are shown in the table below.

For the former dimension, we found that the many companies did well in overall innovation. This is reflected mainly in the scale of operations; the more investments in R&D personnel and R&D itself, the more innovative output. Therefore, the basic data we used to evaluate innovation is made up of the four following parts.

First, the scale of R&D investments. This is a direct reflection of how much of a company's financial resources is in R&D.

Second, the scale of the R&D personnel. Because R&D professionals are the main carriers of tacit knowledge, this indicator can be a proxy for the

company's reservoir of tacit knowledge.

Third, the number of patents. We can treat patents as the company's embodiment of codified knowledge which can to a certain extent create and protect this company's competitive advantage.

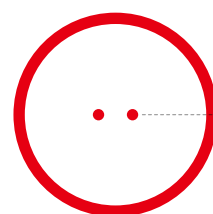
Fourth, if a company has a high degree of innovation, then it must have significant pricing power in the market. This is reflected advantageously in its average sales profit margin.

As for innovation efficiency we took into account that although some companies lack the strong financial and human resources that large companies have to invest in innovation and conduct research and development but still enjoy high efficiency in innovative output. Therefore, the basic data used to assess innovation efficiency is divided in the following three parts.

First, use innovation R&D intensity indicators, that is, the proportion of R&D investments to company sales.

Second, technical efficiency. Normally the ideal situation for companies would be to achieve the greatest potential level of output by using existing resources. However, the level of real outputs is often lower than this ideal number (i.e. potential output) because resource are not fully utilized. The degree of deviation represents the enterprise's technical efficiency. The higher the technical efficiency, the closer the company is to its maximum theoretical output. We measure technical efficiency through production function approach for both product and knowledge outputs.

Third, not just emerging internet companies but also many companies in the traditional manufacturing industry face challenges in terms of business model innovation. Therefore, we also evaluated the novelty of business models in our assessments. We assessed the extent to which a company deviates from the industry average. The greater the degree of deviation, to a certain extent, the more unique a company's business model is. ▶▶



The underlying indicators for innovation index assessment system

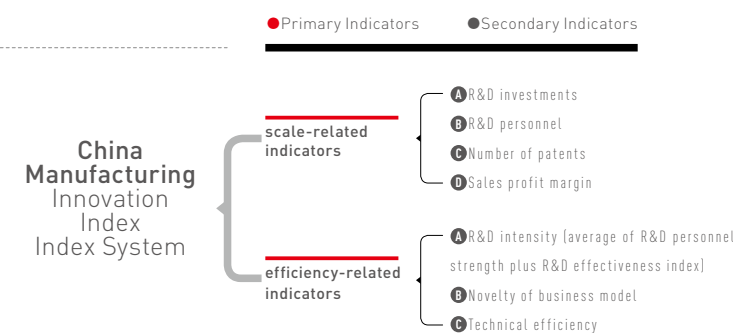


Table 2

The results of the new assessment method not only can be applied to academic research; they can also provide basic data for policy analysis. For example, which industries have the highest innovation efficiency? Which industries have the highest innovation? How have they changed in the past three years? Which industries have increasing innovation and which have decreasing innovation?

We can evaluate how a particular region is doing in innovation competition based on the region's ranking in innovation and innovation efficiency and trend analysis for governments and investors.

Data sources and measurement of underlying indicators

2.

1) Scale-related indicators

① R&D investments

Statistics on research and development investment originate mainly from the "Research and Development Expenses" section in the Wind Database; missing statistics are supplemented from the annual reports of corresponding enterprises.

② R&D personnel

The number of research and development personnel originates mainly from the "Number of Technical Staff" section in the Wind Database; missing statistics are supplemented from the annual reports of corresponding enterprises.

③ Number of patents

Statistics on the number of patents originate entirely from the Patent Search and Analysis System of the State Intellectual Property Office. The total amount of patents held by applicants that are publicly listed companies with publication (announcement) dates between January 1 and December 31, 2016.

④ Sales profit margin

Return on Sales (ROS) = net profit after tax/sales revenue; in particular, statistics on the net profit after tax and sales revenue originate from the "Net Profit" and "Operating Revenue" sections of the CSMAR, respectively.

2) Efficiency-related indicators

① R&D intensity

The intensity of R&D can be divided into two categories, namely "R&D Intensity_Expenses (R&D Investment/Operating Revenue)" and "R&D Intensity_Personnel (R&D Staff/Total Number of Employees)". The R&D intensity used in the research is the average value of R&D Intensity_Expenses and R&D Intensity_Personnel and the calculation formula is as follows:

$$\text{R\&D intensity} = \frac{\text{R\&D intensity_Expenses} + \text{R\&D intensity_Staff}}{2}$$

Sources of statistics on the R&D investment, R&D personnel, and operating revenue are as provided above. Statistics on the total number of employees originate from the "Number of Employees" section in CSMAR.

② Technical efficiency

Technical efficiency is an important indicator used to measure corporate production and management efficiency. Technical efficiency is calculated based on the stochastic frontier analysis (SFA) module provided in the Stata 14.0 software to estimate the transcendental logarithmic production functions. The specific model is shown below:

$$\ln(Q_i) = \beta_0 + \beta_1 \ln(K_i) + \beta_2 \ln(L_i) + \beta_3 [\ln(K_i)]^2 + \beta_4 [\ln(L_i)]^2 + \beta_5 \ln(K_i) \ln(L_i) + (v_i - \mu_i)$$

Specifically, Q_i , K_i , and L_i represent the increased value, fixed asset net value and total number of employees, respectively.

The calculation method of the value added is based on the income method. The calculation formula is as follows:

$$\text{Company value added} = \text{Payable employee}$$

salary + due taxes + due interests + fixed asset depreciation + loss from asset impairment + gains from changes in fair value + gains from investment + gains from exchange rates + operating profit. Specifically, in cases where the company's increased value is negative, the logarithm of the negative company's value added would generate missing values. To allow a more reasonable calculation of the innovation indicator score for such companies, a value of 0 is used to replace a missing value before calculating the technical efficiency.

The sources of statistics on the total number of employees are as provided above. Statistics required for calculating the value added and the net value of fixed assets originate from the CSMAR.

③ Novelty of business model

In order to measure the difference (i.e. level of novelty) in the average value of business models between the focal companies and other companies within the industry, we have created a multidimensional vector system with six dimensions including the ratio of the top five suppliers, the ratio of the top five clients, operating cycle, current asset to income ratio, sales expense rate, and share of revenue from non-production operation. The calculation formula is as follows:

$$\text{Novelty of business model} = 1 - \frac{V_{ij} V_j'}{\sqrt{V_{ij} V_{ij}'} \times \sqrt{V_j V_j'}}$$

In particular, V_{ij} is the vector of focus companies and V_j is the average vector of the industry.

Generation of weighted assessment

3.


Generally, there are two methods to determine weights. The first is the use of the

Delphi method to allow experts to determine the weight associated with each indicator. However, this method is more subjective. This research has adopted a statistical method which relies on secondary data in order to calculate the weight of various indicators more objectively and to ensure the objectivity of the measurement. Past research has shown that the purpose of innovation is to increase performance. Therefore, each variable's contribution to innovation would eventually be reflected on their contribution to performance. Therefore performance is used as a dependent variable and the innovation indicator is used as an independent variable to measure the weight of the indicators. The specific methodology is as follows:

1) Select dependent variables

Economic Value Added (EVA) is an indicator used to measure the creation of economic value for society by companies. Its theory originates from Nobel laureate & economist Robert C. Merton. From the most fundamental sense, the EVA is an indicator for measuring a company's business performance. What makes it different from other measurement indicators is that the EVA takes into account the cost of all capital for the generation of corporate profits. In this sense, the EVA could more faithfully disclose the economic performance of publicly listed companies and it is able to help companies determine whether they have truly created value for shareholders in the current period. The EVA statistics originate from the CSMAR.

2) Independent variables and their dimensionless quantity

Independent variables are level 2 indicators in the China Manufacturing Innovation Index system and the seven variables include the R&D expenditure, number of technical personnel, 

total number of patents, return on sales, R&D intensity, level of business model novelty, and technical efficiency.

s dimensions of the independent variables are not unified, there are huge differences across industries which may result in high levels of estimation bias. Therefore, in order to make regression comparable across industries, we shall first remove the industrial average from various indicators in the independent variables to preclude the differences among different industries. Then we shall use the following formula to place all independent variables within a range between 0-10 for regression analysis.

$$Z_i = \frac{x_i - x_{\min}}{x_{\max} - x_{\min}} \times 10$$

In particular, x_i represents the number i value measured from the independent variable x ; x_{\max} and x_{\min} represent the maximum value and the minimum value of the number i independent variable, respectively; Z_i represents the acquired value of x_i after dimensionless quantification.

3)Regression analysis and weighted calculation

The dependent variable is the EVA in 2016 and the independent variables are the R&D expenditure, number of technical personnel, total number of patents, return on sales, R&D intensity, level of business model novelty, and technical efficiency after dimensionless quantification in 2015. The control variables are the total number of employees and the age of the company in 2015. The ordinary least squares (OLS) method is adopted for regression. The first model is a base model with only a set of control variables. Each of the models from the second to the eighth adds an independent variable based on the previous model. Then we obtained the regression results for the 8 regression models.

As the regression model R^2 represents the level of interpreting power by the independent variables and control variables on the dependent variable, each additional independent variable in the regression model will lead to increase in R^2 (or cause it to remain the same). Therefore, increase in regression model R^2 resulting from adding an independent variable represents the contribution of the independent variable to the dependent variable. The calculation formula for each weighted independent variable is as follows:

$$w_i = \frac{\Delta R_i^2}{R_8^2 - R_1^2}$$

In particular, w_i represents the weight of the newly-added independent variable in the number i model on the basis of the number $i-1$ model. R_8^2 represents the R^2 of the eighth model (including the regression model of 2 control variables and 7 independent variables). R_1^2 represents the R^2 of the first model (including only 2 control variables) while $R_8^2 - R_1^2$ represents the contribution of all 7 independent variables to the dependent variable. $\Delta R_i^2 = R_i^2 - R_{i-1}^2$ represents the increase in R^2 as a result of the addition of an independent variable on the basis of the number $i-1$ model. For instance, if the second model adds "R&D investment" as an independent variable on the basis of the first model, the weight of "R&D investment" is

$$w_2 = \frac{R_2^2 - R_1^2}{R_8^2 - R_1^2}$$

It is worth noting that the input sequence of independent variables into the model will affect the weight of the independent variable. To eliminate the issue, the research included all possible sequences of entry by the 7 independent variables into the model, reaching a total of 35,280 possible combinations and conducting regression on each combination. The weight of each independent variable is then calculated and the average value of the weight of each independent variable is used as the final weight

of the independent variable.

Based on the aforementioned method, we can calculate the weight of each indicator as shown in Table 3.1:

Weight of each indicator

Name of Variable	Average Weight
R&D Expenses	0.360859
Technical Personnel Number of People	0.048225
Total Number of Patents	0.013955
Sales profit margin	0.015639
R&D Intensity	0.010289
Business Model Novelty	0.003313
Technical efficiency	0.547719

Scoring

4.

Scoring for the innovative index is based on the scores in "innovative power" and "innovation efficiency". The calculation of the "innovative power" score is based on all 7 scale-related indicators and efficiency-related indicators. The calculation of the "innovation efficiency" score is based only on efficiency-related indicators. When calculating the scores of the innovative index, each indicator undergoes dimensionless quantification without prior removal of the industrial average.

1)Innovative power score

The calculation formula for the innovative power score is as follows:

$$Y_i = \left(\sum_{i=1}^7 w_i \times x_i \right) \times 10$$

In particular, $x_1 \sim x_7$ each represents the R&D investment, R&D personnel, number of patents, return on sales, R&D intensity, level of business model novelty, and technical efficiency after

dimensionless quantification. w_i represents the weight of the number i variable. In order to maintain the value of the innovative power score within the range of 0~100, it is multiplied by 10 on the basis of

$$\sum_{i=1}^7 w_i \times x_i$$

2)Innovation efficiency score


The calculation formula for the innovation efficiency score is as follows:

$$Y_i = \left(\sum_{i=5}^7 \frac{w_i}{w_5 + w_6 + w_7} \times x_i \right) \times 10$$

In particular, $x_5 \sim x_7$ each represents the R&D intensity, level of business model novelty, and technical efficiency after dimensionless quantification. In order to maintain the value of the innovative power score within the range of 0~100, it is multiplied by 10 on the basis of

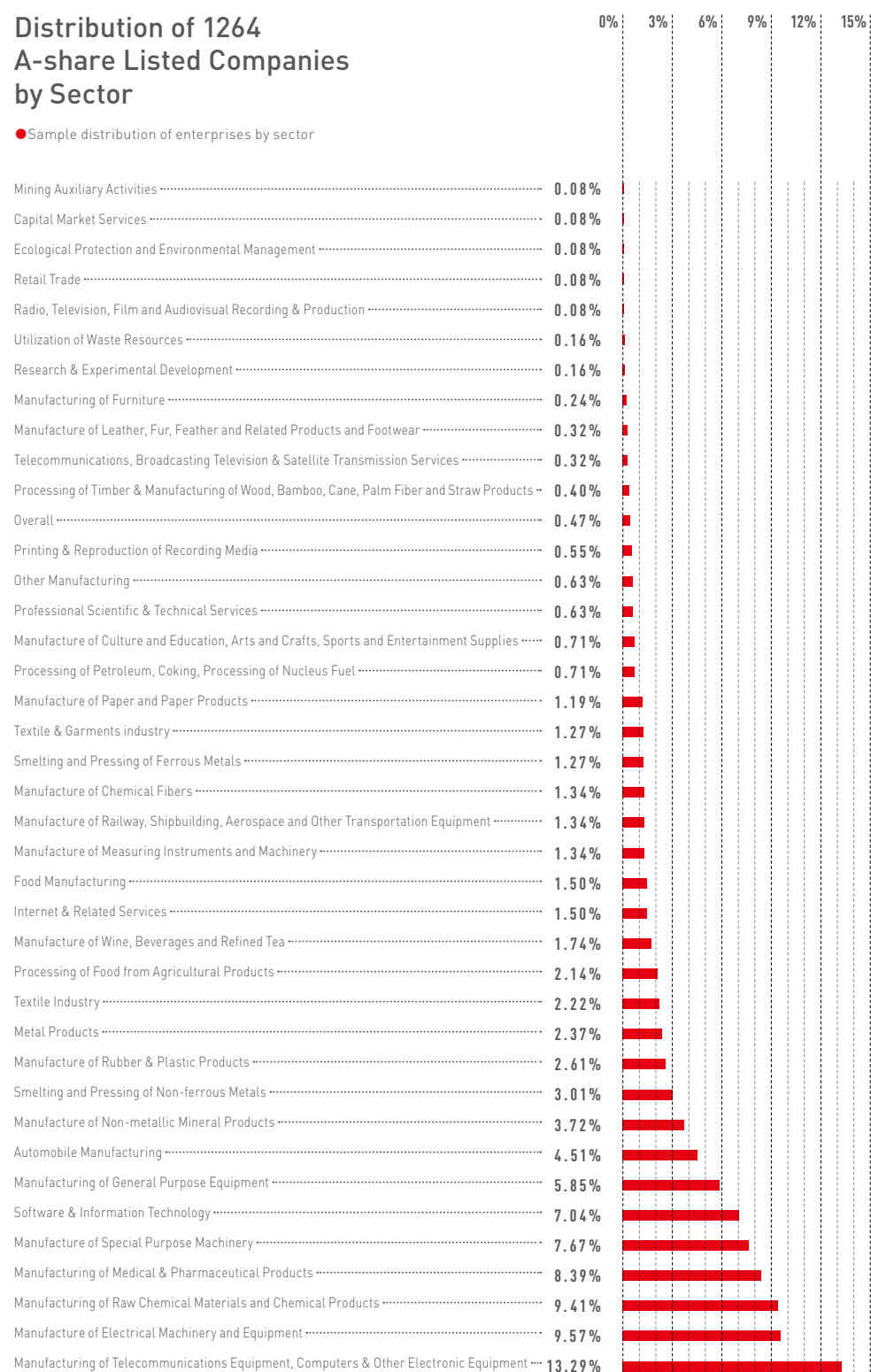
$$\sum_{i=5}^7 \frac{w_i}{w_5 + w_6 + w_7} \times x_i$$

The Current Situation in Regards to Innovation for Chinese Enterprises

Given the availability of data, we took publicly listed companies as objects of assessment in order to consider the level of innovation among Chinese enterprises. The industries of publicly listed companies we covered were in the five categories of manufacturing, information transmission, software and information technology services, scientific research, and technical services. We assessed 1,264 companies (listed companies for which data is missing were deleted) and have complete data for each company from 2012 to 2016. 

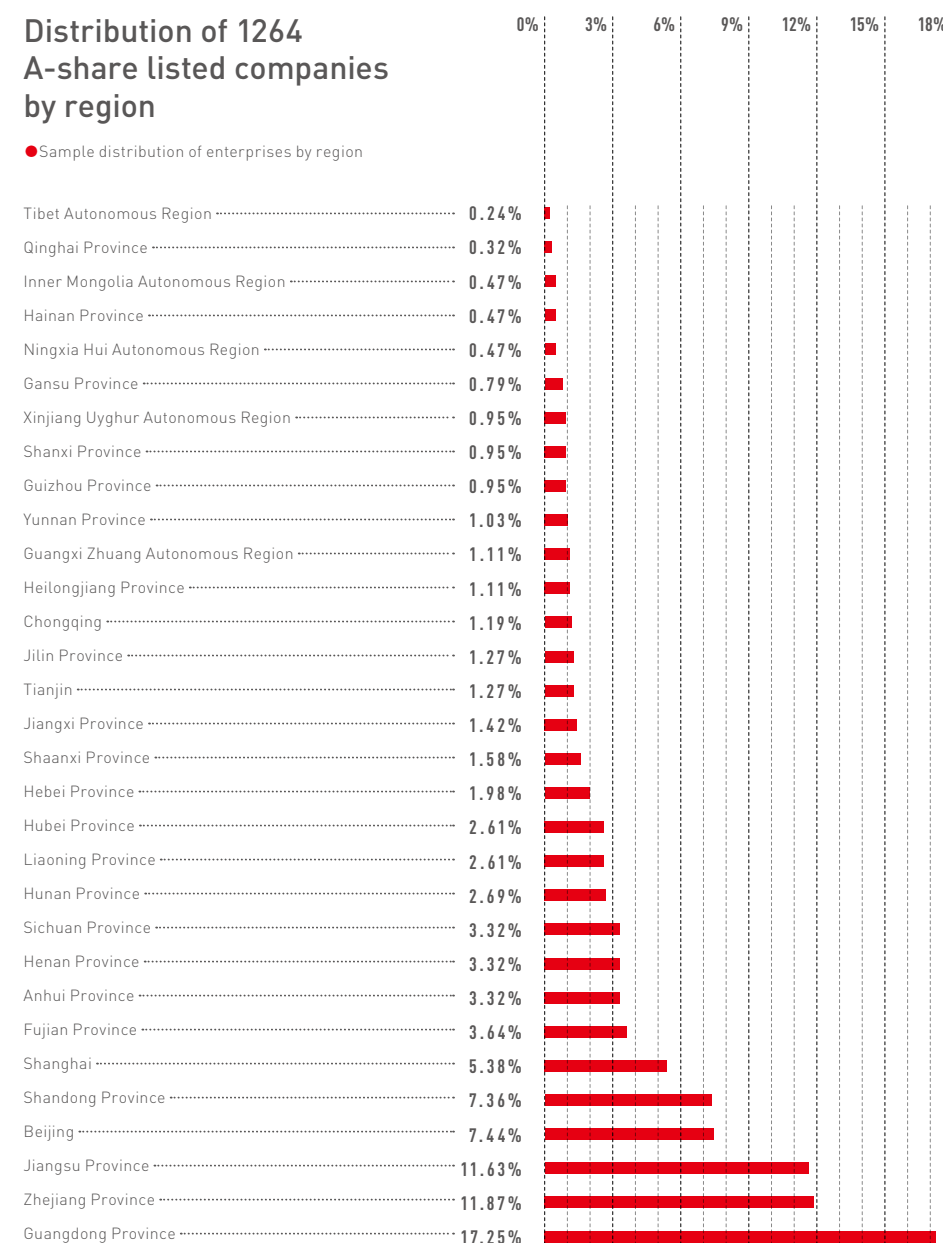
Distribution of 1264 A-share Listed Companies by Sector

● Sample distribution of enterprises by sector



Distribution of 1264 A-share listed companies by region

● Sample distribution of enterprises by region



Through the evaluation of these public companies, we have concluded that the following characteristics exist in the status of corporate innovation in China involving region, industry, and company (public companies).

Characteristics of Regional Innovation Strength Status across Provinces in China

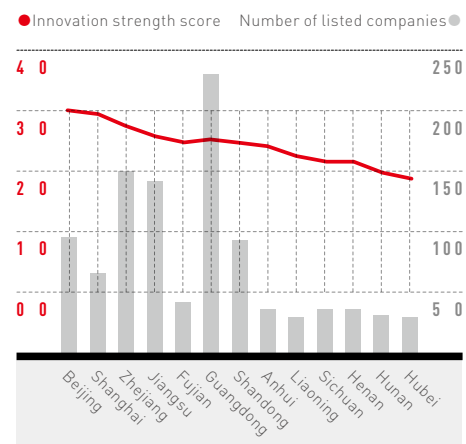
1.

Innovation strength of coastal regions retains advantageous as the gap between coastal and inland provinces widens and dispersed distribution of regional innovation strength across regions continues. As a whole, coastal regions play the leading role in terms of innovation strength.

The economic development in Beijing, Shanghai, Zhejiang Province, Jiangsu Province, Fujian Province, and Guangdong Province now occupy top positions in China. They retain abundant infrastructure and resources for innovation and they are talent highlands. Compared with companies in inland provinces, the companies in these provinces are more influenced by international and multinational companies and they value new activities a lot more. Results for comparing the standard deviation of Innovation strength in various provinces lie between 10 and 14. This illustrates the huge gap between the public companies' scores on Innovation strength within each province and it reflects the dispersed distribution of corporate innovation capabilities and the unbalanced distribution of Innovation strength in the provinces.

More specifically, Innovation strength can be categorized into three basic echelons. The first echelon consists mainly of Beijing and Shanghai whose Innovation strength rank higher than that of other provinces. The second echelon consists of Zhejiang Province, Jiangsu Province, Fujian Province and Guangdong Province. The third echelon consists mainly of a minority of coastal provinces and multiple inland provinces.

2016 Ranking of Chinese Listed Company Innovation strength by Province



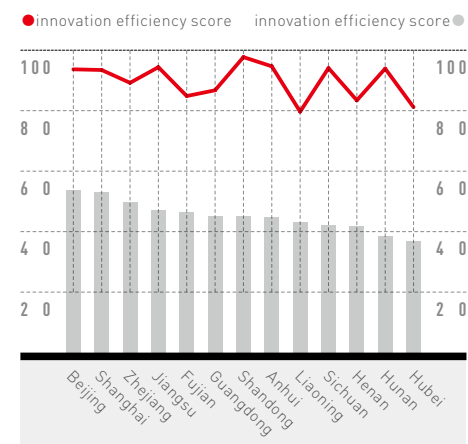
The rankings have significant correlation to current economic development levels.

2.

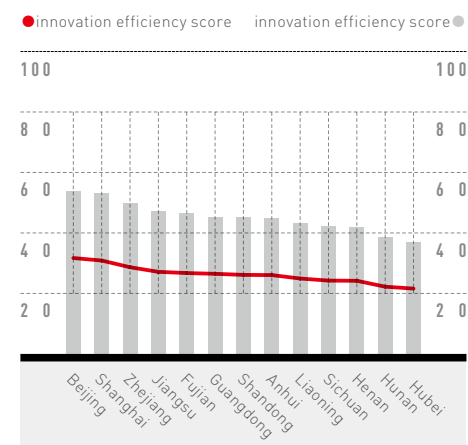
There exists a complementary relation between the development of innovation efficiency and innovation strength, and listed companies in inland regions exhibit significant within-group disparities.

The provinces' rankings by the innovation efficiency across the country are completely the same as those by the Innovation strength in the city. Hunan Province, Sichuan Province, and Anhui Province have lower average innovation efficiency scores but their maximum innovation efficiency scores are higher than Beijing, Shanghai, and Zhejiang. On the one hand, it demonstrates the rapid increase in inland innovative capabilities; on the other hand, it also demonstrates a more serious division of corporate innovative capabilities which could be a result of the uneven distribution of innovative resources. Examples include the uneven incentives provided by policies or the concentration of talents in individual companies

2016 Ranking of Listed Companies innovation efficiency by Province



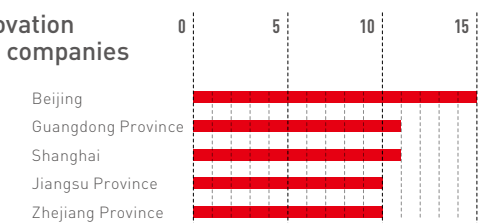
Comparison of 2016 Ranking of Listed Company Innovation strength versus innovation efficiency by Province



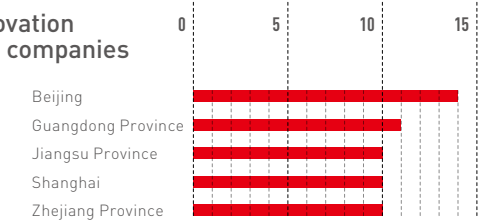
that are particularly dominant. Local government and businesses should not take these issues lightly.

From the distribution of top 100 companies in provinces in 2016, it can be seen that Beijing, the Yangtze River Delta, and Shandong Province remain far ahead of other provinces.

Distribution of Innovation strength of top 100 companies



Distribution of Innovation strength of top 100 companies

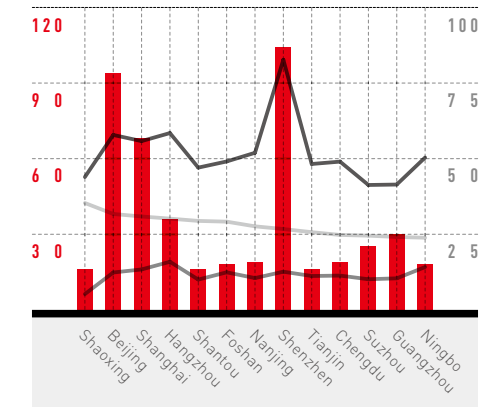


3.

Shenzhen Ranks First as Most Innovative City

In the city rankings, Shenzhen has 104 listed companies, ranking first in China. Among the top 100 most innovative companies, those in Shenzhen top the chart with the highest average scores. This means that Shenzhen is home to the most innovative companies in China.

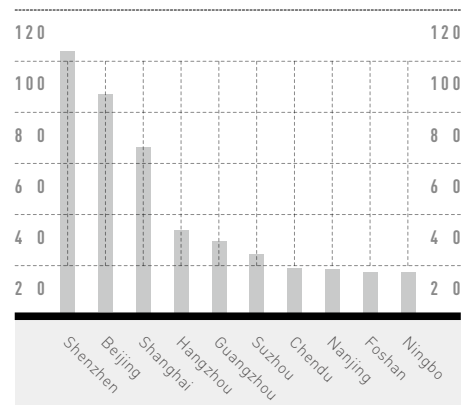
2016 Ranking of Listed Company Innovation strength by City



Note
Cities with less than 16 publicly listed companies are not included in the rankings

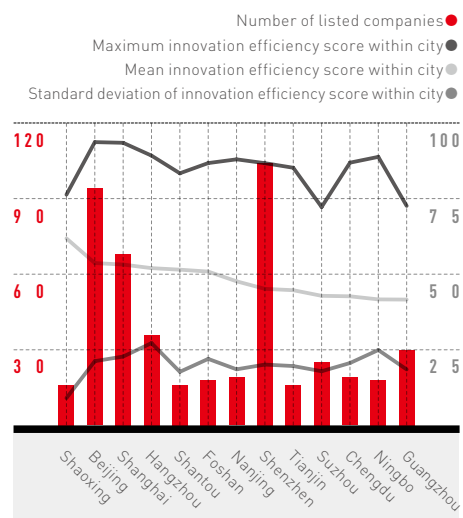
● Number of listed companies
● Maximum Innovation strength score within city
● Mean Innovation strength score within city
● Standard deviation of Innovation strength score with city

Number of Sample Companies

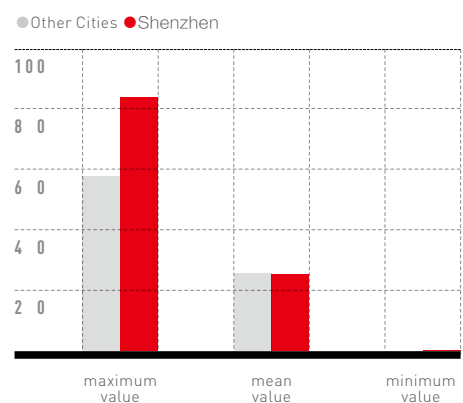


Note
Cities with less than 16 publicly listed companies are not included in the rankings

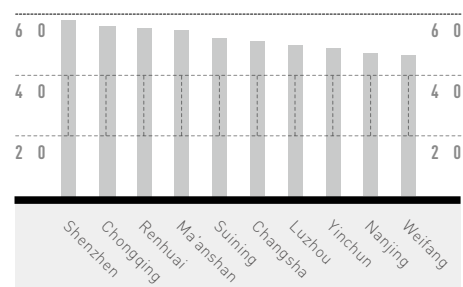
2016 Ranking of Listed Company innovation efficiency by City



2016 Innovation strength Score Status



The City-level Average Score of Innovation Strength for Top 100 Companies in 2016



Characteristics of Innovative Companies in China

1.

The main-board listed companies exhibit significant economies of scale in terms of innovation strength.

The top 100 companies on the main board of the stock exchange with Innovation strength are mostly companies with high market value that far exceed the average market value of A Share companies as well as the average market value of first-rate A Share companies. A comprehensive observation of the top 100 companies and the inclusion rate shows prominent lead retained by industries for the manufacturing of alcohol, drinks, and fine tea, automobile production, and pharmaceuticals production in terms of Innovation strength.

2.

The Innovation strength of small and medium sized private companies is impressive, proving that Innovation strength is not determined by the time of the companies' IPOs.

Private companies occupy the largest share in the top 100 small and medium companies in Innovation strength and they have the highest inclusion rate. The correlation between the time since the IPOs and corporate Innovation strength is insignificant. It can therefore be determined that the IPO time does not have demonstrable effect on the promotion of corporate Innovation strength.

3.

The top 100 innovative companies in our ranking list have a high level of coverage on the constituent firms for the Growth Enterprise Index.

There are 13 constituents on the Growth Enterprise Index whose companies belong to the CSI 300 Index and 12 of them are among the companies with top 100 Innovation strength on the innovation board. Similar indexes include the CSI 100 Index, SZSE 100 Index, and CSI 500 Index. Among the three indexes, the companies with top 100 Innovation strength on the Growth Enterprise Index account for 100%, 89%, and 70% of the indexes.

4.

Diseconomies of scale problem is found for main board manufacturing companies in terms of innovation efficiency.

In 2016, the average innovation efficiency of the top 100 companies listed on the main board

in terms of the net value of fixed assets scored only 17.93 points while the average innovation efficiency of listed companies in manufacturing was 45.08. It means that the larger a company is, the more management and restrictions are imposed on innovation and, to a certain extent, there is a negative relationship between the scale and innovation efficiency.

5.

The nature of corporate ownership has significant influence over innovation efficiency.

From the perspective of company ownership, collective enterprises have the highest average innovation efficiency, with an average score of 60.84, whereas the lowest scores were posted by local state-owned enterprises with an average score of 39.78. This may be caused by a higher adherence to the distribution principles based on the contribution of labor in collective enterprises, which facilitates closer integration of corporate and personal interests. The innovation efficiency is therefore higher than levels in state-owned enterprises with multi-layer management.

6.

Companies on the Growth Enterprise Index with earlier IPOs have higher innovation efficiency and companies established earlier have lower innovation efficiency.

The average score in corporate innovation efficiency of companies on the Growth Enterprise Index, whose IPOs occurred in 2009, was 51.09, while companies with IPOs that occurred in 2010 and 2011 scored 47.91 and 44.41 respectively. The rate is gradually decreasing. This may be a

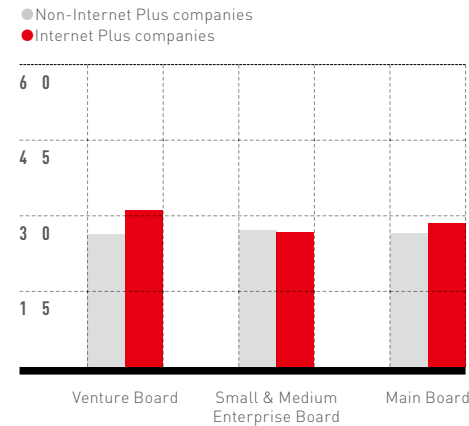
result of the exceedingly strict reviews on company qualifications for public listing that were imposed on companies on the Growth Enterprise Index in the early days. On the other hand, it may be the earlier IPO that allowed companies to obtain financing and use their accumulated experience to improve competitive efficiency. However, the relationship between the time of establishment and corporate innovation efficiency is the direct opposite of the relationship between the time of IPO and innovation efficiency. The average innovation efficiency score of 73 companies listed on the Growth Enterprise Index that were established between 1987 and 1998 was 44.23, whereas the 64 companies established between 2004 and 2010 scored 49.80 and those established between 1999 and 2002 scored 46.17. This illustrates that the earlier a company was established, the more the management is fixated on existing management models that lower innovation efficiency.

7.

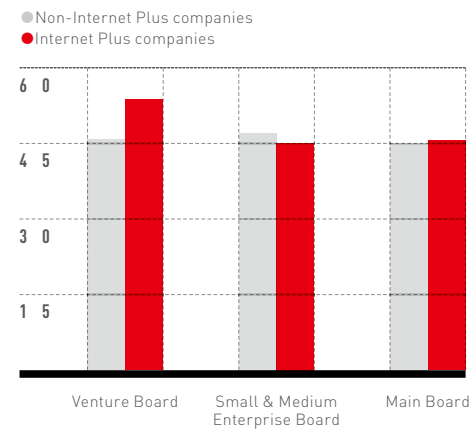
Internet Plus companies, except for those in small and medium enterprises board, are stronger in innovation strength than companies from other sectors.

The Internet Plus companies on the main board and Venture Board have higher corporate Innovation strength and efficiency, but the same phenomenon did not happen to companies in the Small & Medium Enterprise Board. The average Innovation strength and efficiency scores of Internet Plus companies on the Small & Medium Enterprise Board in 2016 were lower than those of non-Internet Plus companies.

The average innovation strength scores for Internet+ companies and non-Internet+ companies.



The average innovation efficiency score of Internet+ companies and non-Internet+ companies.



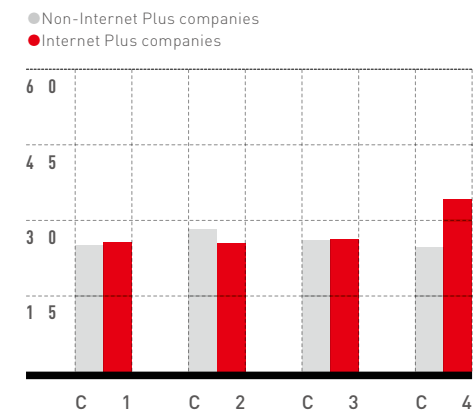
8.

The innovation efficiency of Internet Plus companies in light and heavy industries still requires improvement.

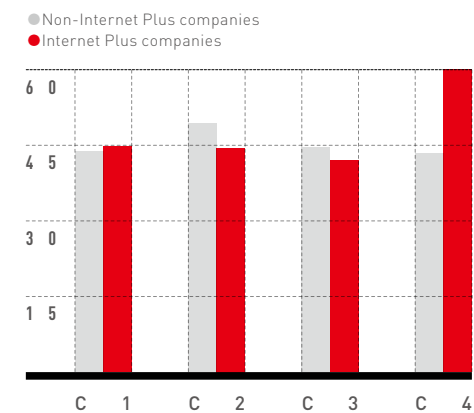
In terms of innovation efficiency, the traditional companies in C2 light industries and C3 heavy industries (with the exception of instruments) have higher innovation efficiency. Products from the chemical raw materials and heavy chemical industries are currently less featured on the Internet, which could be the reason

for such conditions. In most manufacturing industries, the average Innovation strength of Internet companies is higher than traditional companies, with the only exception in C2 light industries (except for food, cigarette, alcohol, beverage, textile, and fur industries). Investment in innovation by traditional companies in these light industries remains ahead.

The average innovation strength scores for Internet+ companies by manufacturing sectors.



The average innovation efficiency score of Internet+ companies by manufacturing sectors.



Trends: Comparison between 2015 and 2016


The "Widespread Entrepreneurship and

Innovation" policy was put forward in 2014 and the objective was mentioned again in the Report on the Work of the Government of 2015. In July 2015, the State Council published the "Opinions of the State Council on Actively Rolling out the Internet Plus Initiative". We have specifically compared the statistics from 2015 against those from 2016 in hopes of finding more information on innovation in China.

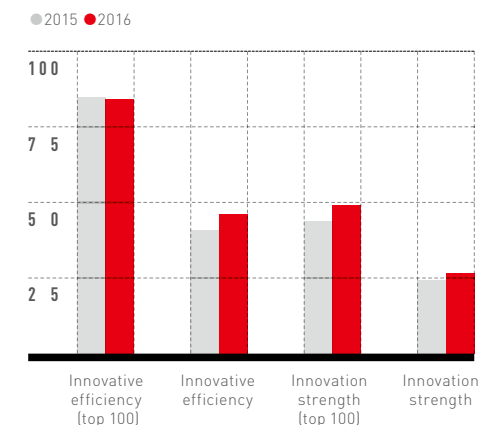
9.

Significant improvements in both innovation strength and innovation efficiency are found.

The Innovation strength and innovation efficiency score of sampled companies with IPOs in 2015 and 2016 were significantly improved, indicating that mass innovation has become a new engine for economic growth in the new era. The top 100 innovative companies performed better in Innovation strength while other companies achieved remarkable performance in innovation efficiency.

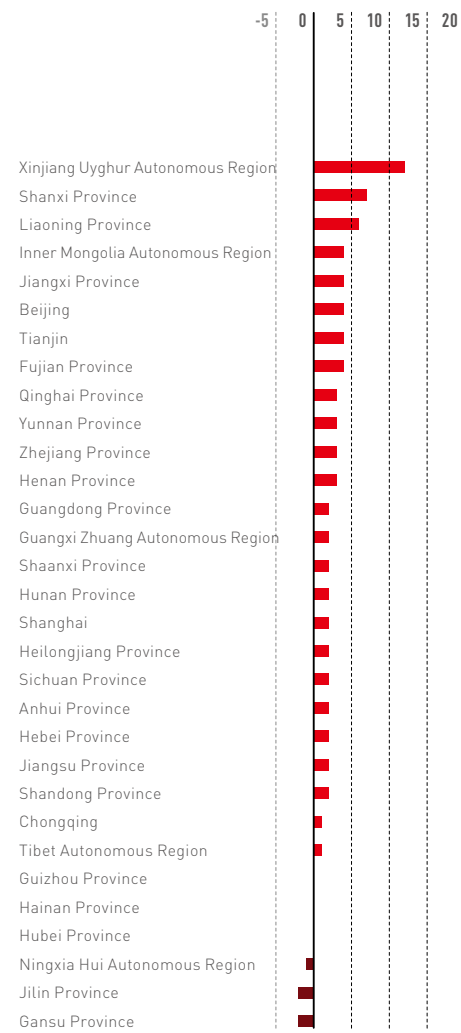
Most provinces achieved significant improvements in Innovation strength and innovation efficiency in 2016. 

Average scores for innovation strength and innovation efficiency: a comparison between 2015 and 2016.

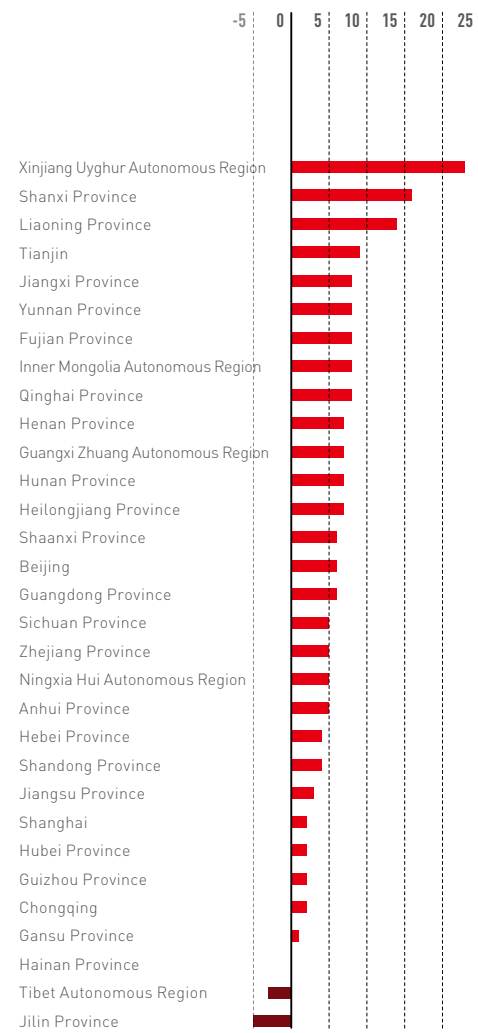


For information about the industries represented by C1, C2, C3, and C4 see P28

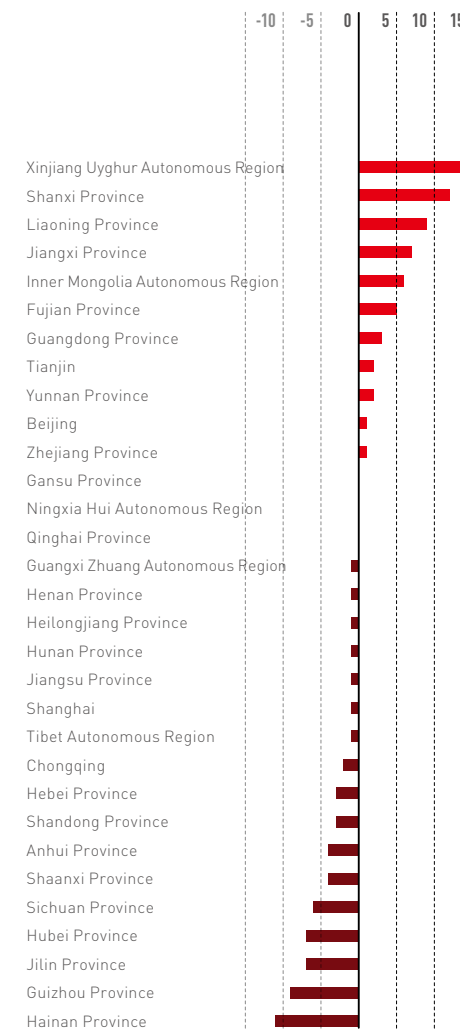
Innovation strength score changes 2015-2016



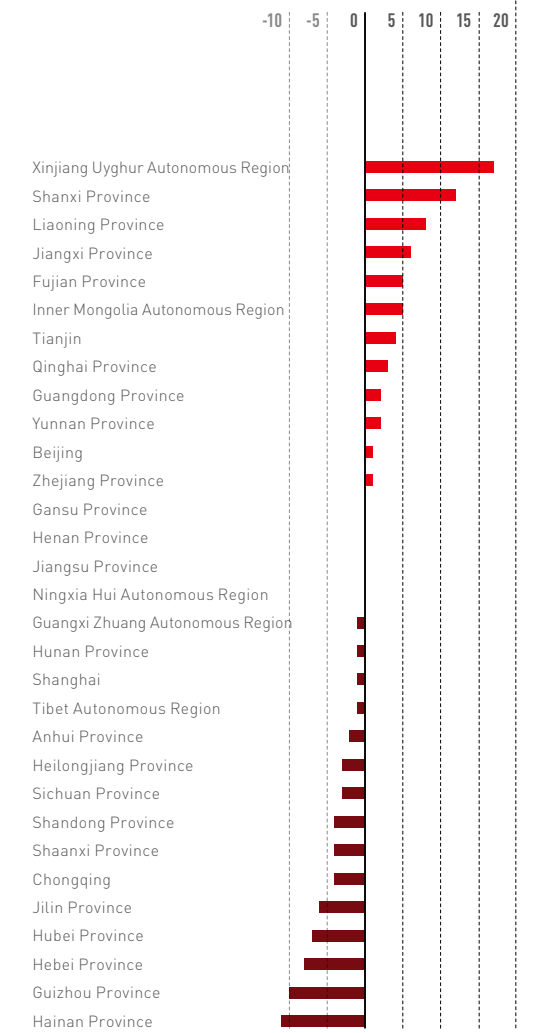
Innovation efficiency score changes 2015-2016



Innovation strength ranking changes 2015-2016



Innovation efficiency ranking changes 2015-2016

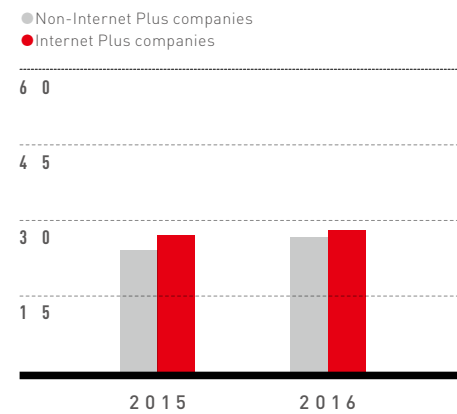


10.

Shanxi and Liaoning made swifter improvements

Except for Xinjiang, with its lower number of sample companies that caused larger fluctuations, provinces with significant improvement in rankings mainly include traditional industrial provinces such as Jiangxi and Liaoning. Under tremendous downward economic pressure, the listed companies in these provinces have also resolutely chosen the road to innovation. The price increase of industrial products in 2016 and the improvement in the margins of enterprises may have actively contributed to the change. Not only do coastal provinces have higher rankings, their relative positions among provinces across the nation have also remained stable.

Average Innovation strength score based on statistics of Internet attributes

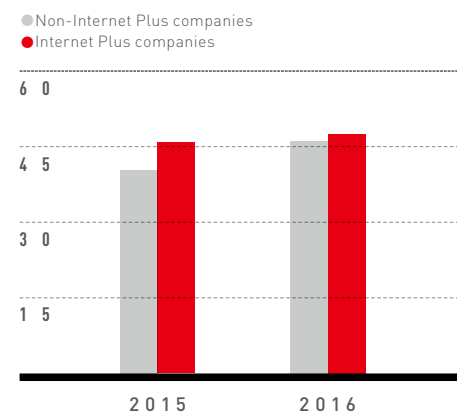


11.

Non-Internet Plus companies are catching up.

Internet Plus companies retain their relative advantage in Innovation strength and efficiency, but non-Internet Plus companies are quickly catching up in terms of their investment in research and development in recent years. More and more Chinese companies have become aware of the importance of innovation.

Average innovation efficiency score based on statistics of Internet attributes

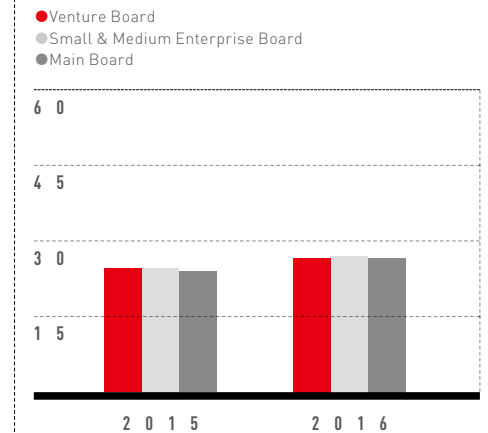


12.

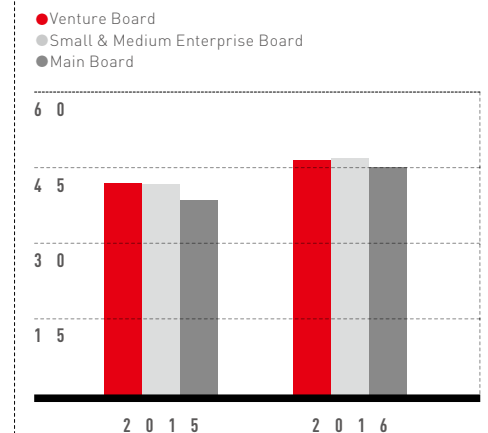
As a whole, the companies on the small & medium sized enterprises board perform the best in terms of innovation strength and innovation efficiency in 2016.

The Innovation strength scores of companies listed on the main board have increased significantly in 2016 and they are now level with companies on the Growth Enterprise Index. However, the innovation efficiency of companies on the main board remains lower than listed companies in other sectors. It is worth noting that the innovation efficiency of companies on the Growth Enterprise Index has dipped below that of small and medium enterprises. The latter gained comprehensive advantages in Innovation strength and efficiency in 2016.

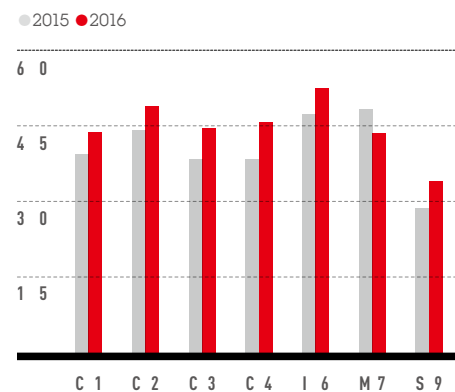
Average Innovation strength score based on statistics of publicly listed sectors



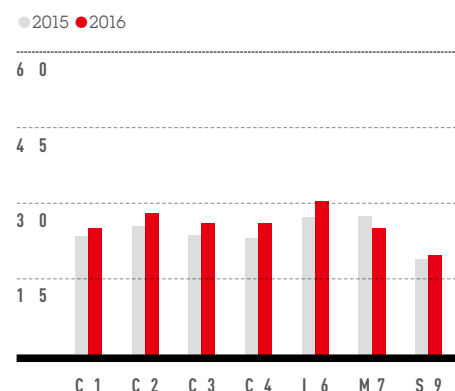
Average innovation efficiency score based on statistics of publicly listed sectors



Average Innovation strength score based on statistics of industries



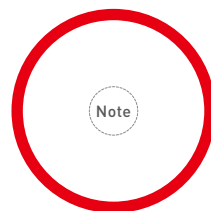
Average innovation efficiency score based on statistics of industries



13.

There is a certain degree of decline in Innovation strength in scientific research and technical service industries

From an individual industrial perspective, the scientific research and technical service industries were the ones which experienced decline in both Innovation strength and innovation efficiency. Considering the critical roles of scientific research and technical service companies in the industry innovation system, the decline in its Innovation strength and innovation efficiency is noteworthy.



- C1**
includes food and beverage, clothing, wood processing, and other manufacturing.
- C2**
includes home living and cultural products, petrochemicals and pharmaceuticals manufacturing.
- C3**
includes metal smelting and processing, equipment production, and manufacturing of transportation vehicles and electronic equipment.
- C4**
includes instruments, meters and other manufacturing.
- I6**
includes information transmission, software, and information technology services.
- M7**
is the scientific research service industry.
- S9**
is the integrated industry.

If our innovative assessment method is to apply results as the criteria for determining whether an innovation is successful or not, we will try to understand the driving force behind corporate innovation in China from the source in the coming section. To fulfill this objective, however, there is nothing more suitable than discussing cases of institutions.

We selected five outstanding innovative enterprises in China that are known for their sharing spirit for our case analysis. They include state-owned enterprises in transition, publicly listed companies that have been established for multiple years yet with looming uncertainties, and companies that seek to break through into the rapidly developing industry of gaming that has been tightly controlled by tycoons.

Being outstanding is not the only criterion for our case selection. It is our hope that the selected cases can reflect the status of innovation among Chinese enterprises from multiple dimensions and demonstrate as many different aspects of corporate innovation throughout China as possible.

● **Zhangjiang Hi-Tech:**

A state-owned operator of high-tech parks which has transformed from an industrial property realtor to a high-tech investment banker

● **BGI Genomics:**

A leading organization for China to enter into the era of life sciences that applies a complex organizational framework to ensure the synergy between commercialism and dreams.

● **Iflytek Co., Ltd.:**

It creates the intelligent voice assistant system, the most convenient portal for man-machine interaction currently available in China, and builds the AI ecological chain accordingly.

● **UBTECH:**

It is devoted to creating androids that

will be true companions in life for mankind and hopefully will become one of the core spontaneous carriers for data collection in the future, by combining cutting-edge robotics technologies and the manufacturing capabilities of China.

● **Yingxiong Entertainment Technology Co., Ltd.:**

The company hopes to secure a share by applying its unique strategy between two existing giants in the video game industry that gains profits by stimulating the secretion of dopamine among users.

It is our hope that by interviewing these enterprise researchers and leaders we can provide more businesses with ideas that are of value for them, instead of just unattainable success stories.

Even so, a single report on innovation in China can only provide a very limited view of the entire picture. This is nonetheless a start and I hope we could share more of the results of our research on innovation in China with you all in the future.

Ultimately, we also hope that you walk away with something as it is the best accolade for what we have done.

I

CHAPTER 2 innovative business cases

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0124



P91.

BGI Genomics

P96.

UBTECH

P106.

Zhangjiang Hi-Tech

P111.

Iflytek Co., Ltd.:

P119.

Yingxiong Entertainment
Technology Co., Ltd.

Constructing New "Template" in Age of Life



BGI calls itself an organization instead of an enterprise in the traditional sense.

Listed in July 2017, BGI Genomics Co., Ltd. ("BGI Genomics") is the clinical and research services branch of this organization.

BGI has the vision of "using genomics to benefit mankind". It tries to strike a balance between dreams and business where "making money to feed the family" and "creating benefits for mankind" are equally important.

Listing of BGI Genomics provided financial security for BGI's dreams. Listing also helped raise brand awareness and facilitated establishment of a complete modern corporate management system, both of which contributed to BGI's progress toward its stated goals. BGI is a firm believer that the value of an organization is not confined to its corporate value in the traditional sense, but instead should be coordinated with social values. The company would not be hampered by short term factors until it achieves its real vision.

Innovation, but on what level?

Yanmei Zhu, Executive Vice President of BGI, had with her a folding ruler that she bought at the Nobel Museum. The ruler uses 1mm to mark one year and showed on either side key scientific findings and technological, cultural



>> BGI sequencer

or social events in each year between 1801 and 2000. On the side with scientific findings, the ruler started with "Volta introduces the battery to Napoleon" and ended with "The Human Genome Project nears completion". The latter, from Yanmei Zhu's point of view, signaled the beginning of an era. "The last century was the century of industry, and the next century will be the beginning of the age of life. Mankind's real understanding of life begins here." Yanmei Zhu is also the Chief Human Resources Officer and the Director of the Strategic Planning Committee at BGI.

"There are a few types of innovation. The first type is incremental and ongoing, such as improving the daily quality control process. Japanese businesses are a good example of this type of innovation. The second type involves a greater degree of change and is known as disruptive innovation. This type of innovation often starts at the edge of an industry and pushes the boundaries forward by disrupting existing technologies. The third type is fundamental innovation, which is more complete and more extensive than disruptive innovation." If one were to describe each of the three types in only one word, Yanmei Zhu thought of the first type as change, the second as reform, and the third as revolution.

"The Human Genome Project" represented a revolutionary change. BGI was one of the key participants.

"China was not involved in any of the first 199 scientific findings on the ruler. It made a contribution, albeit as little as 1%, and only in the last one," said Yanmei Zhu. "This was the purpose for which BGI was created."

"The Human Genome Project" was initiated by the United States during the 1990s. Unlike the Manhattan Project or the Apollo Program, the HGP was not completed by the United States alone. Instead, Germany, France, Japan, the United Kingdom, and China all contributed to the project. Moreover, China was the only developing country to be involved in the project and completed 1% of the work.

In 1999, BGI founders, acting as representatives of China without consulting the authority, submitted an application to register China in the Human Genome Project. The decision succeeded in securing China a ticket into the world's top research community in genetic science. Furthermore, China's role in the Human Genome Project established BGI as a pioneer in China's

DNA sequencing industry.

Genomics is allowing mankind to understand the world from a brand new perspective. Meanwhile, mankind is beginning to take a fundamental approach in the understanding of the nature of life. Changes are happening in many sectors as a result.

Fast forward and faster

BGI's initial goal was to complete 1% of the Human Genome Project. Today, "using genomics to benefit mankind" has become BGI's mission. It is given the same status as Ford's "a car in every garage", Wintel's (Microsoft and Intel) "a PC on every desktop", and Google's "making information universally accessible". Mankind here refers to each and every individual.

It demands that genomics be affordable and produced at such a large quantity so to be available to all. To achieve this goal, BGI has to expand quickly and take control of the entire supply chain.

Everything starts with a market for DNA sequencing. The market cannot be a divided market occupied by small DNA sequencing workshops. It has to be a full sized market backed by a real industry. In the absence of a market, one will be created. To that extent, BGI had done it before.

>> Photo of BGI public listing celebration



DNA sequencers were being used as one of the lab tools and only in research in universities and corporate R&D facilities. Each pharmaceutical lab would purchase one or two for R&D purposes. The machines would not be used more than a few hours a week.

BGI promotes DNA sequencing service outsourcing by leasing or acquiring DNA sequencers. As a result, DNA sequencers were being used significantly more frequently, leading to lower user costs and a larger user base. The process resembled the shift from household

production of fabrics and clothing to industrial manufacturing of ready-to-wear clothing.

The operation started with leasing three DNA sequencers and grew to leasing a few dozens. Then it was spending hundreds of millions on purchasing more than a hundred machines and buying up one or two years' production from the laboratory equipment manufacturer. BGI, at its peak, occupied 44% of the global market share in DNA sequencing.

"They (referring to the DNA sequencer manufacturers) thought we were savages" >>

and started supporting smaller competitors." Yanmei Zhu said BGI's rapid expansion was both alarming and disturbing to suppliers in other parts of the supply chain.

Having control of the supply chain is the only way to ensure long term growth. The first obstacle that must be overcome in the DNA sequencing business is the group of DNA sequencer manufacturers. In September 2012, BGI announced a merger with Complete Genomics, a U.S. leader of innovation in whole genome sequencing. Three months later, BGI accepted a total investment of 1.398 billion dollars from China Everbright as the lead investor with Sequoia Capital as one of co-investors. The merger was completed in early 2013.

In 2014, BGI developed its own DNA sequencer, which subsequently triggered falling prices on DNA sequencers around the world. "We receive a lot of DNA sequencing orders from universities and pharmaceutical companies because we offer speed and accuracy at a reasonable price," said Yanmei Zhu.

Economies of scale leads to lower prices, which in turn fuel expansion. Control of upstream supplies allows the positive cycle to continue in an orderly fashion. As the business grows, the database available for comparison quickly becomes larger, making BGI more attractive to customers.

"There are two way to change the world: being affordable and being available. It works for cars, PCs, internet services and mobile phones. Expensive luxury goods with a limited supply are never going to change the world. Hunger marketing is not the way to change the world," said Yanmei Zhu. BGI aims to make DNA sequencing services available to all, hence using genomics to benefit all mankind.

In addition, BGI's growth is accompanied by progress in China's genomics industry. Before

>> Frontal view of BGI Headquarters

BGI, the genomics industry in China was a no-man's land. The organization amassed a large number of life science experts. When BGI created the entire industry, some left BGI to start their own businesses or join other companies.

Many refer to BGI as the "boot camp" of China's genomics industry, but loss of talent in this way is not always a bad thing. "We even encourage certain individuals to go out and start their own businesses" said Yanmei Zhu. It is a way to create more companies and a well developed supply chain. When you are the only company in a business, you have to produce everything you need. It is not a good thing. A better developed supply chain is good for everyone involved.

After all, it is still too early to discuss the zero-sum game in a new industry with great potential.

Charity is the biggest business and business is the best charity

BGI benefits in many ways from listing of BGI Genomics, such as greater financial security and more exposure for BGI in both the public and private sectors. It also allows BGI, an organization built by scientists, to implement



sequencing. We will be able to offer lower prices and help them complete their projects and make a digital world of our earth."

BGI intends to spend thirty years to participate in and complete the project, Internet of Living Things, which is what Yanmei Zhu refers to as the internet of life and corresponds to what we know as the Internet of Things.

BGI is trying to write a "Human Manual", which will resemble the manual that comes with a camera. The manual will teach us how to use our bodies properly and prevent potential damages.

The Human Manual will require a lot of resources to complete. What seem like costly deals are in fact the way to accumulate resources.

"The business is not the goal but the path. To reach our goal, we have to make money and put food on our table," said Yanmei Zhu. Some goals can be achieved through business, while others can be accelerated via commercial means. Still some goals may be hindered by commercialization. Therefore, an innovative organization like BGI involves many fields,

such as scientific research, education and corporation, and its operations span across many areas.

BGI hopes and is confident that the investors are able to identify with their values. On the one hand, the company sees the passing of a capitalism-driven economy. In the age of life, people with a background in science and technology as well as in industry will have real influence. On the other hand, the company sees the massive commercial potential behind the enterprise.

"Charity is the biggest business and business is the best charity," said Yanmei Zhu. "Social values and corporate values can be combined after all."

standard management practices.

There are still some unlisted entities hidden from view, including BGI Research, China National Genebank (built and operated by BGI), BGI College, GigaScience, BGI Agriculture Group, and BGI Manufacturing.

This is a place that looks more like where dreams take off. Operations under these entities appear less commercialized and less affected by the need for short term profit.

"We have a platform and the world's largest (DNA sequencing) platform. People who have plans but no platform will be able to use ours," said Yanmei Zhu. "Some organizations and scientists have samples of birds, fish or butterflies collected over decades or even centuries. They don't have a DNA sequencing platform, or they don't have funding for DNA

Light Up Dreams in Real Life

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Having met UBTECH founder James Zhou, I naturally associated him with Rethink Robotics founder Rodney Brooks. They share certain traits in that they are both passionate people who dismiss the mainstream and think on their feet.

Rodney is the quintessential roboticist. He was director of the MIT Computer Science and Artificial Intelligence Laboratory and designed America's first robot to land on Mars as well as the first collaborative robot, Baxter. Now he has his own robot making company, Rethink Robotics. Its industrial robots were one of the most watched products on display at Summer Davos in 2015. Rodney once said "the mistake many people make is that they fall in love with a technology. But the real important thing is to create value for people or there will be no customers. So they have to figure out how this exciting product or system will provide value for their customers."

This approach is being put into practice at UBTECH. James Zhou takes the view that innovation does not have to be in the form of a technological invention. It will be an equally innovative achievement to launch an existing technology or a product still under development.

"What I envision is a humanoid robot. I think people in the future will fall into one of three categories. One is the natural humans, one is the machine enhanced humans, and the other is the robots. UBTECH wants to make household robots.

They can be mass produced, and the price can be as low as RMB 200,000. The robots will care for humans in their homes and provide services as needed. I think this is something I will live to see."

This is the goal envisioned by James Zhou. It is also the reason why UBTECH insists on making humanoid robots. All the rest, including the 540 Alpha 1S robots with their glowing blue eyes that were presented on the New Years Eve in 2016, is the road that he has to travel before reaching his destination.

Innovation in commercialization

To receive a growing number of visitors, UBTECH has created a showroom to display commercialized UBTECH products, including Alpha 1, voice controlled Alpha 2 and various Jimu robots.

The design patterns for UBTECH robots are so simple that people would not think them to be hi-tech products. One may see some of the functions (giving weather reports or opening curtains) as being available also via voice assistants on smartphones. Stories being told by a robot sometimes cannot be heard over the whirring sound of a torque servo.

This is, however, the most "interesting" robots that consumers get to see. More importantly, these products are leading UBTECH down the

>> Zhou Jian, Founder and CEO of UBTECH ROBOTICS



correct path.

"UBTECH's products will be first of their kind and have not been seen before in the global market." "Innovation does not have to be in the form of a technological invention. It will be an equally innovative achievement to launch an existing technology or a product still under development. Some of the larger companies are not engaged in making so-called technological inventions, but instead devote themselves to developing existing or more cutting edge technologies and to finding as many application scenarios for previously launched products as possible," said James Zhou.

Commercialized innovations in technology in many ways are a better indicator of a nation's innovative capacity. Japan is a good example for this argument, while China still lags behind in terms of the innovative capacity.

There had been a constantly growing number of innovations in China several years ago, and most were innovations in business models. Many companies that had built their own commercial empires appeared to be following a standard procedure:

identifying successful products in other countries and relying on the massive domestic market, user segments or specific market protection measures to quickly expand and create entry barriers; then taking advantage of large user segments to develop horizontal service chains and eliminate potential competitors.

This is approach is particularly common in the internet industry. Meanwhile, investors seem to have gotten used to walking down the same path every time. A startup meeting with potential investors often face the question, "Is there already something like it in other countries?" If the answer is no, then the chance of receiving funding will drop significantly.

"It is time now for China to take technologies that are already in place or can be launched immediately and turn them into scenarios in order to take advantage of China's manufacturing might, in hardware and in software, to create a world's first product." James Zhou thinks followers of the standard procedure are only starting their own businesses to make money. In his opinion, one can start a business by taking products from overseas markets, making slight changes to the business models, and starting selling them directly in China, but it is not real innovation.

James Zhou sees innovation in Apple as it, led by Steve Jobs, has changed the pattern and

the interface of human machine interaction. Naturally he considers UBTECH an innovator in the field of robotics. DJI represents another example of innovation. Companies working on quadrotor drones had been around for a while in countries such as Israel, France, and the United States. They were doing the same thing until DJI came along and started commercialize drones. DJI took advantage of the supply chains in China's manufacturing sector and quickly turned drones into commercial products. The company became the world's first in the field and has developed excellent flight control systems.

How to maintain innovation momentum?

Innovative startups that have their roots in technology commercialization are often known for successful products in the early stage of their operations. However, such successes will in turn create a market and inevitably attract more latecomers to enter the market. While early entrants, to a certain degree, will have an advantage, it does not mean that they can afford to rest and do nothing. Companies have to keep striving to innovate in order to defend their positions in the business against competitors.

It is quite a challenge to maintain the innovation momentum. UBTECH is hoping that a company's innovation momentum can be boosted by adopting the following strategies:

- The original department led innovation model is replaced by the current product manager led innovation model.
- Mistakes are allowed to ensure employees keep an open mind.
- A number of incentives, including stock options, bonuses and chances of promotion, are provided and adjusted regularly according to

>>Children and parents building Jimu robots together



contributions employees make to their job.

Innovation always begins with people. A lack of excellent employees often leads to a lack of good ideas or effective execution of good ideas. For companies like UBTECH, people with a good understanding of technology applications and scenarios may be harder to find than technical personnel.

"Few people can see the nature of things," said James Zhou, "and few people look at one or more existing technologies and think about how to combine and use the technologies."

At present, James Zhou remains at the helm of research and development for UBTECH's star products. "I will have an idea and then I put it into practice," said James Zhou. "I made all the decisions in the Alpha 2, Jimu and Cruzr projects."

As the company grows, James Zhou no longer has the time to follow one product from the beginning to the end. Innovation in the future will have to be delegated to teams secured by the organizational structure. "I would like to see my employees to come up with good ideas and be able to create projects and products on their own. I will allocate a lot of resources to support their new products," he said.

Changes may have already taken place. James Zhou said his colleagues often question his

opinions. "I am always being vetoed and being told that I am not looking at the full picture." The look on his face as he said it, however, suggests that he is glad to see such a change. A company starting out would pay more attention to customer feedback on product design, to which James Zhou gave little regard in the past. Instead of product design, he paid attention only to user experience.

It was because James Zhou believed that consumers would not know what they needed until a product was introduced to them. However,

he admits now that "it is necessary to discuss product details and user experience with users, which is why we have started conducting market research. Their feedback will provide a basis for optimization of the interface and other product details."

Goals and paths

James Zhou may have said they did not start UBTECH to make money, but financing is an issue that cannot be avoided. The great

thing about money is that it keeps people with different goals focused on the same thing. A leader's job is to coordinate different interests to ensure healthy development of an enterprise.

James Zhou says the goal for UBTECH at the moment is to create household robots that can handle routines. There is nevertheless still a long way to go.

"It used to take ten or maybe twenty years to introduce a technology into the market. A simple action like having a robot pick up a glass and pour a glass of water may take an extensive period of R&D to achieve." In addition to setting goals for UBTECH, James Zhou will have to make sure the company can reach the stage.

James Zhou says UBTECH cannot stay dependent on investors' cash for R&D. "We try our best to turn existing technologies into Jimu and into Alpha. We also work with Disney and Tencent." James Zhou calls this strategy keeping the left foot on solid ground while moving the right foot on toward dreams.

James Zhou sees three stages in the development of a robot: drivers, motion control algorithms, and artificial intelligence (AI).

Judging from previously launched products, UBTECH can be said to have an advantage in the driver at present, especially in the torque servo that is the heart of a driver.

To make a robot as envisioned by UBTECH, however, requires algorithms that tell the robot how to move, including walking, running, jumping, walking up and down the stairs, and playing football, before artificial intelligence starts getting involved to give a mobile robot vision and an understanding of natural languages. "It will be another twenty or thirty years at least before a robot can bring us a cup of tea," said James Zhou. There is a model robot that can perform the action, but it is not in commercial production and so does not really mean anything.

Dreams and reality are equally important. UBTECH needs to figure out how to turn existing technologies into cash flows so that the product team can generate a constant stream of profit for the company and support the company's plans for the future. UBTECH invests most of its funding in R&D and recruitment. UBTECH has brought in Professor Ming-Guo Zhao of Tsinghua University as "the Chief Scientist of Humanoid Robots" and Professor Dacheng Tao of the University of Sydney as "the Chief Scientist of Artificial Intelligence". Paul Crandell, SVP of marketing for well known U.S. camera company GoPro, has also joined UBTECH as the chief marketing officer.

"We are now working on a variety of technologies, including robot vision, future human machine interaction, joint torque servo systems for robot drivers, motion control algorithms and AI. But as I said it will be difficult to launch these technologies," said James Zhou. "Our current products have to generate profit for the sole purpose of paving our way into the future. We produce and sell small torque servos for profit in order to support R&D of larger torque servos. We make larger torque servo in anticipation for upcoming products."

The robot supply chain is extensive and involves hundreds of types of technologies. It takes a lot of funding to support R&D and application development. UBTECH's short term focus, according to James Zhou, is on increasing volume. "In addition to making more sales, my goals in the last year or two have included growing the company through a number of ways, including mergers, and reaching into the most cutting edge technologies." "Once the volume reaches a certain size, we will be able to take advantage of China's strengths and expand quickly around the world," said James Zhou. 📍

Finding Core Vehicle for Human Machine Interaction

What is the core vehicle for human machine interaction? The question remains unanswered, and yet the underlying value is undeniable. Businesses in nearly all sectors are trying to be part of the development (if only for a short period of time). The ultimate solution will transform the business world of tomorrow.

I attended a trade conference on smart lighting not long ago. The participants were keen to paint a bright future for the industry, which included the following scenarios:

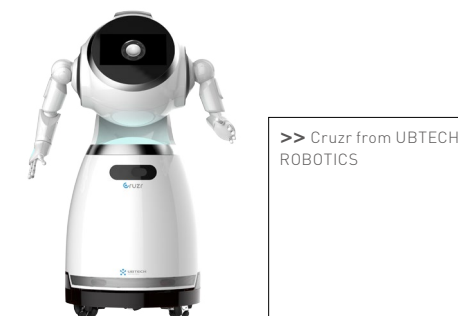
A man comes home after a long day at work and says to the lights in the house, "All lights on," and the dark rooms are instantly filled with a soft light. The lighting system will make adjustments in response to your location, mood and outdoor lighting. You will be able to control the TV set, the air conditioning unit and even the router in your house via the lights.

Never mind why we, already exhausted and pushing open the door, would choose shouting "All lights on" over flipping a switch. The example demonstrates the ambitions of businesses in different sectors trying to secure a strong position in the development of human machine interaction.

Human machine interaction will undoubtedly become more common and more frequent as time passes. The data generated will become more and more valuable. We would not want to create a new way of communicating with each machine at home. It follows that human machine interaction will rely on a core vehicle, and whoever owns the vehicle will have the most powerful influence on the business world of tomorrow.

There has been an increase in quasi-core vehicles for a long time. When Microsoft launched the original Xbox in 2001, John Taylor, analyst at Arcadia Investment Corp, said "Microsoft has recognized that owning a significant piece of real estate in the living room is key to them being a winner in digital entertainment. This is a strategic investment and part of a long-term plan for them."

Now the battlefield has expanded beyond the living room and beyond digital entertainment. Potential vehicles, as a result, are changing too. In a similar manner, smart speakers, which are quickly gaining momentum, carry the 📍



dreams of their developers. As described above, manufacturers and designers of smart lighting want to take their products to equal heights.

Not all products have the potential to stand at the core. At present, products with sufficient potential have to offer the following features:

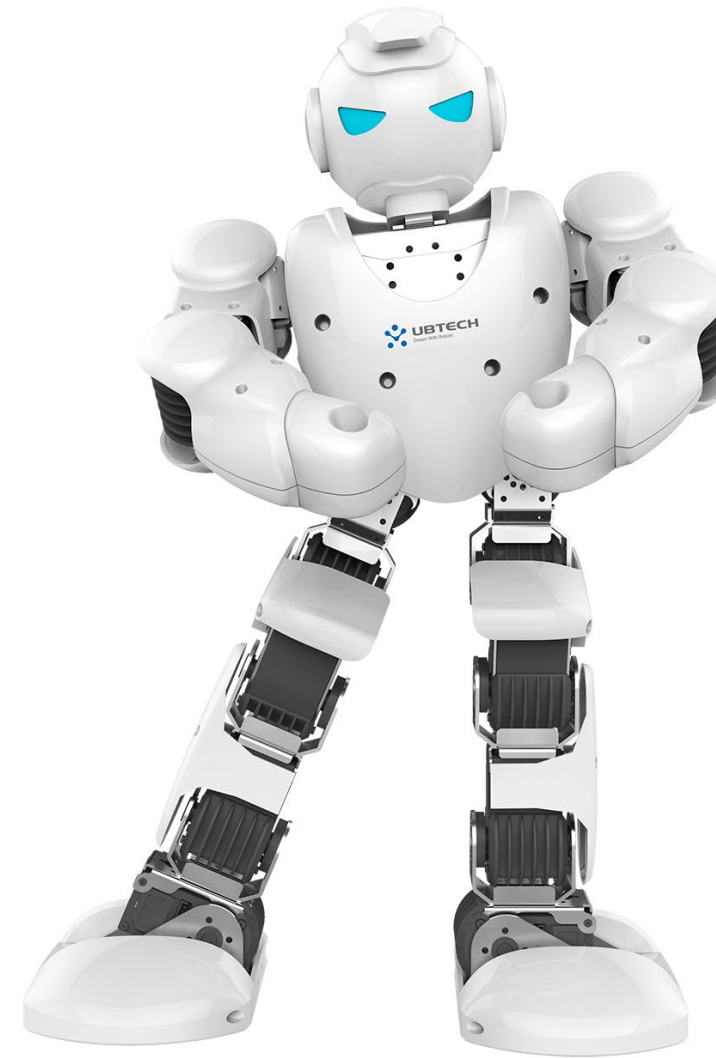
- Companionable: A product has to be at the owner's side as much as possible
- Active: Actively seeking interaction instead of passively accepting
- Natural: Adapting to the user's existing interaction habits as much as possible

Mobile phones have a great advantage in being companionable. For many people, leaving home without their phones creates more anxiety than leaving home without their wallets. This is also why a lot of interaction is mobile phone based. As the list of functions grows, the role of mobile phones also grows in importance, which in turn makes them more companionable.

Meanwhile, being active is equally important. Passive communication does not deliver complete information to users, and, therefore, decisions based on such information will likely be biased. Interaction between people and their mobile phones is essentially passive. People tend to treat mobile phones as an important tool and not an agent that constantly spies on them. Some mobile app developers are trying their best to change the

situation. For example, many apps are trying to keep running in the background, or a weather app would try to request access to the user's contact list. Users are naturally against such behaviors. Responsible mobile operating systems will restrict behaviors that leave users no choice. It is foreseeable that the growing influence of smart products on the everyday life will lead to implementation of related regulatory supervision. An American couple got into a fight in July 2017. While they argued, their Google Home smart speaker automatically dialed the number for the police because it recognized the voice command "call the police". The incident sparked a debate over the issue of smart appliances and personal privacy. Once the necessary regulations are in place and the business rules are established, food ordering apps will know only your favorite dishes, sports apps will know only your favorite sports, and video apps will know only your favorite forms of entertainment. No one will be able to acquire a complete user profile.

The need to be natural can be explained by asking this question - all technical obstacles aside, what is the thing that you would choose as the means to communicate with everything else? For most people, the answer would be either their own senses or another person for the simple reason that it is natural. Of all the human senses, the eyes receive the largest amount of information. Eye based vehicles, such as smart glasses, are potentially a popular choice. Glasses also have the advantage in being companionable. Human beings are social animals. It gives humanoid robots a natural advantage (and as technology progresses, humanoid robots will look more and more like real humans, thereby further boosting the advantage). Communicating with smart robots that look and act like humans will be more easily



>> Alpha 1, one of the products commercialized by UBTECH ROBOTICS

accepted by most than communicating with a smart speaker. "The most natural interaction is the interaction between two people. Setting technology and other factors aside and starting with the most basic needs means that the interaction to succeed in the future will be the interaction between humans and humanoid robots." James Zhou, founder and CEO of UBTECH, a smart service robot maker, thinks that, while robots cannot replace everything, one of the branches in scenario based active interaction in the future will be robots. He also

thinks smart glasses have a great future in this arena since chatting while wearing glasses will be an equally natural process.

Of the three features, being natural is likely to become more important in the future. Technological breakthroughs will lower the barrier to being companionable; and people, once used to communicating with something, will tend to grant more access to it, which effectively resolve the issue of needing to be active. It can therefore be deduced that mobile phones, though a core product in human machine communication at the moment, will inevitably be replaced in the future.

Meanwhile, the battlefield is not confined to hardware. Software plays an equally important role with possibly greater intensity. Competition between Windows and Mac (Microsoft and Apple) in the PC era and between Android and iOS (Google and Apple) in the mobile phone era are some such examples. Past examples have shown us companies with the advantage in hardware will try to use closed source software to gain more control, while latecomers will adopt open source software in an attempt to establish themselves by winning over more allies. Only time will tell whether history is going to repeat itself. ☒

In Shenzhen, Innovation is in our DNA

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Every Chinese city has its own defining attributes, whether it be leisure, ancient history, or natural beauty. But if asked which one word describes Shenzhen, China's youngest first-tier city, many would choose the word "innovative".

According to our research, Shenzhen has the highest number of listed companies that can be described as "innovative", however this figure appears less significant in the overall ranking due to the enormous base number. However, if we chose listed companies as the representatives of outstanding corporations in China, a large number is apparently a positive attribute.

If we were to assert that Chinese cities are currently striving to foster their own innovation, it would appear as though this facet is more deeply-rooted in Shenzhen. As researchers, our job is to quantify and analyze innovation such as with financial data or the quantity of patents. However, we know that there is more to innovation than simple statistics, with companies or even municipal administrators effortlessly trying to raise these numbers without managing actual innovation. Therefore, to look at Shenzhen in a more sensitive manner, we must seek to understand the city's innovative power. As described by University of Toronto professor Richard Florida in "The Rise of the Creative

Class": "Creativity cannot be stored, contested, and sold like a mine reserve; it will otherwise quietly perish without the frequently required replenishment, update, and maintenance."

With regard to a single city, a groundwork of innovation must be present as well as the preservation of the innovative environment.

And with regards to Shenzhen, it is atop this groundwork of innovation that the city's hard working residents make up its enterprises. Since its establishment as a Special Economic Zone in 1980 to the present day, Shenzhen has represented the opening up of China and its spirit of ingenuity, an attribute that has become essential to the city's culture.

Upon first visiting this city, you will surely encounter a wash of contradictory moods: it is convenient yet chaotic, efficient yet nerve-racking, and like a flood of energy, the city can drown you at any moment. Shenzhen is not like some neatly organized or inexpensive cities. As an interviewee stated: "Shenzhen isn't like that, but it is a city that demands



efficiently. They are not under excessive pressure to "shield" certain interest groups, allowing them to dedicate themselves to policy implementation, to focus on the efficiency and fairness of the city, and to create a more friendly environment for innovation.

The companies' roles as innovators are prominent. As such, they are the city's most passionate innovators and stand to benefit the most from this innovative attitude.

On the other hand, the government is focused on ensuring that policies are maintained, such as: developing factor markets such as land, property rights, capital, skilled professionals, labor, etc., and a free distribution of innovative resources; improving policies based on innovation as a motivational tool, technological contributions in exchange for shares or dividends, securing technological secrets, transferring achievements into income distribution, conducting intangible asset analyses, strictly enforcing laws regarding intellectual property rights, and encouraging innovation in corporations and society as a whole; and, managing the relationship between the government and the market.

There are other innovations related to these underlying infrastructures that must be supplied by the government, such as the existing National Supercomputing Center in Shenzhen, the Daya Bay Reactor Neutrino Experiment Laboratory, the China National GeneBank, and more. Shenzhen also established a specialized action plan to drive development for research institutions, by creating new market-oriented scientific research institutions, which integrate research and industrialization.

The city's DNA and the management of its administrators are the true sources of innovation in Shenzhen. 📍

forgiveness, because breaking norms is what is required of innovation." Urban cities will almost never provide the most comfortable living standards, but with its gathering of resources, Shenzhen brings about efficiency, diversity, and, the most important of all, inclusiveness, in which innovation is most easily bred. Shenzhen is just that kind of place.

Unlike many first-tier cities, private enterprises dominate Shenzhen. This is not to say that company characteristics necessarily determine innovation, but an economy driven by private enterprises creates a fairer and more efficiently competitive business environment, which is immensely beneficial to innovation.

In the same way, this economic structure also allows city administrators to work more

Zhangjiang Hi-Tech: The search for balance between social values and corporate profits

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For a state-owned holding company that needs to achieve multiple business objectives, finding a balance between social responsibility and corporate interests is a difficult task. Zhangjiang Hi-Tech is such a company.

There are two key facets for state-owned enterprises. The first is that they are state-owned, which means that they need to bear social responsibility, and investment is required in order to fulfill these responsibilities. The second is that they are an enterprise. Their corporate goal is to produce profits. Companies need to find their own development resources. Listed companies have to be responsible to shareholders and profits are the best way to offer returns to shareholders.

Strengthening the social competitiveness of enterprises while strengthening their own competitiveness is a core issue for state-owned enterprises. This is why we chose Zhangjiang Hi-Tech to be our case study. Through an analysis of this company, we have come to realize that transforming state-owned enterprises not only requires innovative ideas, it also takes courage and persistence from leadership.



The many faces of Zhangjiang Hi-Tech

The Zhangjiang Hi-Tech name exists in many forms. It is the name of a location. It is the name of the park's "landlord". It is also a listed company.

Zhangjiang Hi-Tech Park was established in July 1992. It is a state-level high-tech park located in the south end of the Pudong New District. Together with Lujiazui, Jinqiao and Waigaoqiao Development Zone, they make up the four key development areas of Shanghai Pudong New District.

In April 1996, Shanghai Zhangjiang Hi-Tech Park Development Co., Ltd. (hereinafter Zhangjiang Hi-Tech) was listed on the Shanghai Stock Exchange and became a public company. "Shanghai Zhangjiang Hi-Tech Park Co., Ltd., as a subsidiary of Pudong New District directly under the enterprise and Zhangjiang Hi-Tech Park development, operates state-controlled listed

companies, carries out the practice of deepening reforms and the development of state-owned enterprises. It also executes the operating mission of Zhangjiang Science City's key regional development." This is the development of Zhangjiang Hi-Tech's 13th Five-Year Plan. It also reflects Zhangjiang Hi-Tech's characteristic image of achieving multiple objectives. As Zhangjiang Hi-Tech General Manager Ge Peijian said, "Not only does Zhangjiang Hi-Tech need to bear the profitability of a listed company, it also must fulfill its corporate social responsibility."

But finding the balance between the two is not easy.

Mission-driven transformation - begins with people

In the eyes of the public, the story of technological change in product innovation is far more attractive than organizational innovation in non-technological change, but the latter might be more important.

Over the past three years, Zhangjiang Hi-Tech General Manager Ge Peijian has overseen the company's transition from passivity to a business model of exploration, and then undertook the national mission of innovation. These efforts began with a difficult historical mission.

On May 23, 2014, General Secretary Xi Jinping came to Shanghai to propose elevating Shanghai to become a globally influential science and technology innovation center. As a listed company, Zhangjiang Hi-Tech (600895) has become an important development in the science innovation center's core district. It took over management of Zhang Pei high-tech less than three weeks ago.

But achieving this goal was not easy.





You need to get the capital market to see the value of the company and restore refinancing capacity.

In Ge Peijian's view, for Zhangjiang Hi-Tech Park operators, the establishment of "innovation-driven enterprise organizations" is the key to enterprise change and new vitality. The basis of all this is talent. From his point of view, Zhangjiang Hi-Tech's innovation is twofold: The first is to focus on the national strategy regarding industrial distribution and seeing business development from a global perspective. The second is to pay attention to personnel training and create professional, youthful, and market-oriented teams.

If the former is the task and the goal, then the latter would be the means. In an interview with reporters at the beginning of 2016, Ge Peijian pointed out that, "The largest loss of state-owned assets is the loss of talent."

Prior to this statement, Zhangjiang Hi-Tech was in the process of adjusting its internal staff structure. After all mid-level managers were dismissed a competition was opened. 10 department general manager positions were open to competition, which included competing for posts, "votes" to hire people, and examinations after 3 years. Staff were assigned positions via mutual choice. One job means one salary, and changing jobs means changing salary.

For large state-owned enterprises, human resources has constantly been a difficult problem. But reforms are imperative. As he said, "The biggest cause of losing talent is that talented workers aren't given the right jobs. This situation can no longer continue. If it goes on, state-owned enterprises will be a pool of stagnant water, unable to move. Reform gives birth, and waiting brings death."

Attracting high-quality young workers is also

part of Zhangjiang Hi-Tech's talent strategy. From Zhangjiang Hi-Tech's thirteenth five-year (2016-2020) development plan, we can see the company is focusing on achieving a younger age structure among its employees. The planned goal is that by 2020, the number of employees under the age of 30 will increase by 20 people. The proportion will increase from 10% to 17.5%.

Under the Concept of the Technology Investment Bank's "New Three Business" Mode

In 2014, when people mentioned Zhangjiang Hi-Tech (600895), everyone would believe it was the leading real estate business in industrial real estate development and operation.

In actuality, Zhangjiang Hi-Tech's key advantage was possessing a physical space for sustainable development, in order to provide life-cycle services for start-up enterprises. Furthermore, the company's initial positioning placed industrial real estate as its central focus. Zhangjiang Hi-Tech's lands are all industrial lands. In China's property market, industrial land is not a very popular concept. Land sales are a one-time deal, which implies that the total resources for future development will be reduced with every sale, and makes it difficult to embark on fruitful regional development in the future. Because of Zhangjiang Hi-Tech's special historic mission, its business model cannot be easily copied and transferred to other enterprises, like how most real estate businesses would go other places and develop the land. Therefore, if Zhangjiang Hi-Tech were to operate like other real estate businesses, its advantage would be lost. KPMG Consulting's 2014 evaluation of Zhangjiang Hi-Tech indicated that there was no strategic and long-term

development plan, leading to frequent use of long-term resources to deal with short-term pressures.

If Zhangjiang Hi-Tech hopes to change this situation, change is needed at the strategic level.

The "technology investment bank" concept can also show Zhangjiang Hi-Tech high-tech company's true colors. To achieve this goal, it is necessary to have an investment-oriented mentality, and transform tangible industrial real estate resources into industrial investments in intangible resources and equity resources. Zhangjiang Hi-Tech hopes that, through the "three new businesses" (technology developers, industrial investors, innovative service providers), this unique model will solve this problem. Through the "three new businesses" model, realizing the transformation of industrial real estate companies into a "science and technology investment bank" and using the two models of "landlords + shareholders" and "shareholders brings landlords" will promote the company's sustainable development.

The essential strategy for the enterprise is to have a clear goal and a criteria for judging. The fate of the enterprise is no longer dependent on emergency responses to high-pressure situations.

On September 25, 2015, Zhangjiang Hi-Tech announced, at the Shanghai United Assets and Equity Exchange, a share transfer worth RMB 340 million, yielding a 100% stake in Xingke properties and bonds related to Xingke. Less than 3 months later, after more than 100 rounds of open auctions, Shanghai Xin Investment Co., Ltd. paid RMB 660 million for receipt of the assets, a difference of more than RMB 300 million. Fudan University Press published a book entitled "Genesis in Twenty Years", which evaluated the transaction as "a tangible example of a company's transformation."

"In 2014, when I took over Zhangjiang Hi-Tech, the ROE (net asset yield) long-term was less than 6% and it had lost the ability to refinance in the capital market. It was facing marginalization in the capital market," Ge Peijian recalls. "It is difficult for a listed company that is marginalized by the capital market to undertake the immense mission of building a center."

If you don't want to be marginalized by the capital market, grand slogans are not enough.

As of the first half of 2017, Zhangjiang Hi-Tech had accumulated investments of RMB RMB 4 billion in 100 companies and 105 projects, including the FoF method of participation in the investment of 15 funds. Out of the invested companies, 28 of them have been listed, 2 have entered pre-disclosure, and 11 are expecting to be listed. There are many unicorn companies, such as Ant Financial, Mindray Biotechnology, Fruitday Co. Ltd., Ximalaya, and Qiniu Information Technology.

The financial data show that this model is effective. In 2016, Zhangjiang Hi-Tech's parent company's net profit was RMB 727 million, an increase of 51%. Performance and profit growth both set company record highs. In that year, investment income of RMB 797 million was achieved, investment income accounted for 58% of total profits and net assets yield reached 9.18%.

The balance between social value and business growth


Zhangjiang Hi-Tech really aspires to achieve a balance between corporate interests and social responsibility. Achieving this requires a breakthrough in ideas. The fulfillment of social responsibility does not mean that companies must sacrifice their interests in exchange. On the contrary, the two can complement each other.

Zhangjiang Hi-Tech currently owns Zhangjiang Science City's largest block of apartments for workers, which is known as the Pride of Heaven Talent Apartments. Talent apartments are a service-oriented product, which allows people coming to Zhangjiang Hi-Tech Park to have a stable home. When managed by Zhangjiang Hi-Tech, talent apartments are no longer simply functional structures; instead they become a center

of innovative services such as industrial investment and science and technology real estate innovation. By providing park enterprises with such value-added services, it becomes easier to play a leading role in investment in innovative science and technology firms. These industrial investments then lead to returns from the capital market, which in turn lead to growth in business efficiency.

The Zhangjiang Hi-Tech "895 Entrepreneurship Camp" project was aimed at finding high-potential entrepreneur projects. The training camp, which involved a total of five stages, started out with 1100 total entries, of which 162 investment projects were selected, including 68 venture capital projects and 38 credit and lending projects. The total project valuation amounted to RMB 10 billion. Support for innovation can enhance the economic vitality of the region, from which Zhangjiang Hi-Tech, through its own incubator and investment department, can look for investment opportunities.

Zhangjiang Hi-Tech is trying to convert its innate responsibilities into service-oriented advantages for the company, and rely on connecting these advantages to enhance the value of the company. Furthermore, the company must continually enhance its service capabilities and better fulfill its social responsibility.

Ge Peijian attributes these changes to the "elimination of real estate centers" and "transformation into a technology investment bank" strategies. It is these strategies that allow Zhangjiang Hi-Tech to be able to implement social responsibility during the development of its enterprise resources. As Ge Peijian said, "If Zhangjiang Hi-Tech still had real estate sales as its main source of income, it would have no room for business development, or the company might not even survive." 

The ASR-based AI Ecological Chain

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A company incorporated 18 years ago that has gained a unique upper hand in the artificial intelligence (AI) industry.

This is the perfect description of what iFlytek Co., Ltd. (iFlytek) has become today. Headquartered in Hefei, this company expects to construct an AI ecological network that penetrates a wide scope of industries through its advantages in speech recognition technology.

Voice AI: Why Voice AI?

A Research Markets report released in May 2016 showed that within the global voice recognition market, Google, Microsoft, Apple, and iFlytek each accounted for 20.7%, 13.4%, 12.9%, and 6.7% of the market share respectively.

What is the charm of the voice recognition market? How has it managed to attract the participation of so many industry heavyweights?


Since the birth of the first computer, mankind has been trying to find the question to a single question: how do we communicate with computers? We are faced with two challenges when it comes to man-machine communication: how do we enable machine to receive signals? And how do we help machines understand what the signals mean?

As general users, we have already underwent a few stages of development.

· The DOS era: The only tool through which computers could receive signals was the keyboard. For the machine to understand what signals mean, we needed to learn to use complex, sophisticated computer commands.

· The Windows era: The mouse was added to the list of tools we could use alongside the basic keyboard. Most of us no longer needed to memorize computer commands.

People, however, were not content with what they had. We looked for even better man-machine communication methods that were both precise and natural.

Although people receive the largest amount of information through vision, language, including text and speech, has nevertheless always been mankind's most precise means of interaction. Language exchange is also the most natural form of communication we had access to. 

set to become the keyboard of the Dos era, the keyboard-mouse combination in the Windows era, the touch screen in the smart phone era, and the first checkpoint for every one of us on our way into the era of AI.

iFlytek's patch to voice AI technology

"iFlytek Co., Ltd., established in 1999, is a national key software enterprise dedicated to the research of intelligent speech and language technologies, development of software and chip products, provision of speech information services, and integration of E-government systems." This is the first sentence that appears in the company profile of iFlytek, an introduction that indicates the significance of intelligence voice and artificial intelligence technologies to the company.

iFlytek is a typical venture company that was started by college students. The entrepreneurial team consisted of just 18 members at the very beginning. According to information provided by iFlytek, the 18 members on the initial entrepreneurial team harbored the dream that "optimization of the Chinese language speech recognition technology has to be achieved by the Chinese people, and the development of the Chinese speech recognition industry has to be in our own hands."

The voice AI technology is typically interdisciplinary and encompasses an industry where the winner takes it all. Although foreign companies had the upper hand in Chinese voice recognition at that time, it did not mean that China did not have better technology; rather, China did not integrate what it already possessed in better and more comprehensive ways.

The Institute of Acoustics of the Chinese

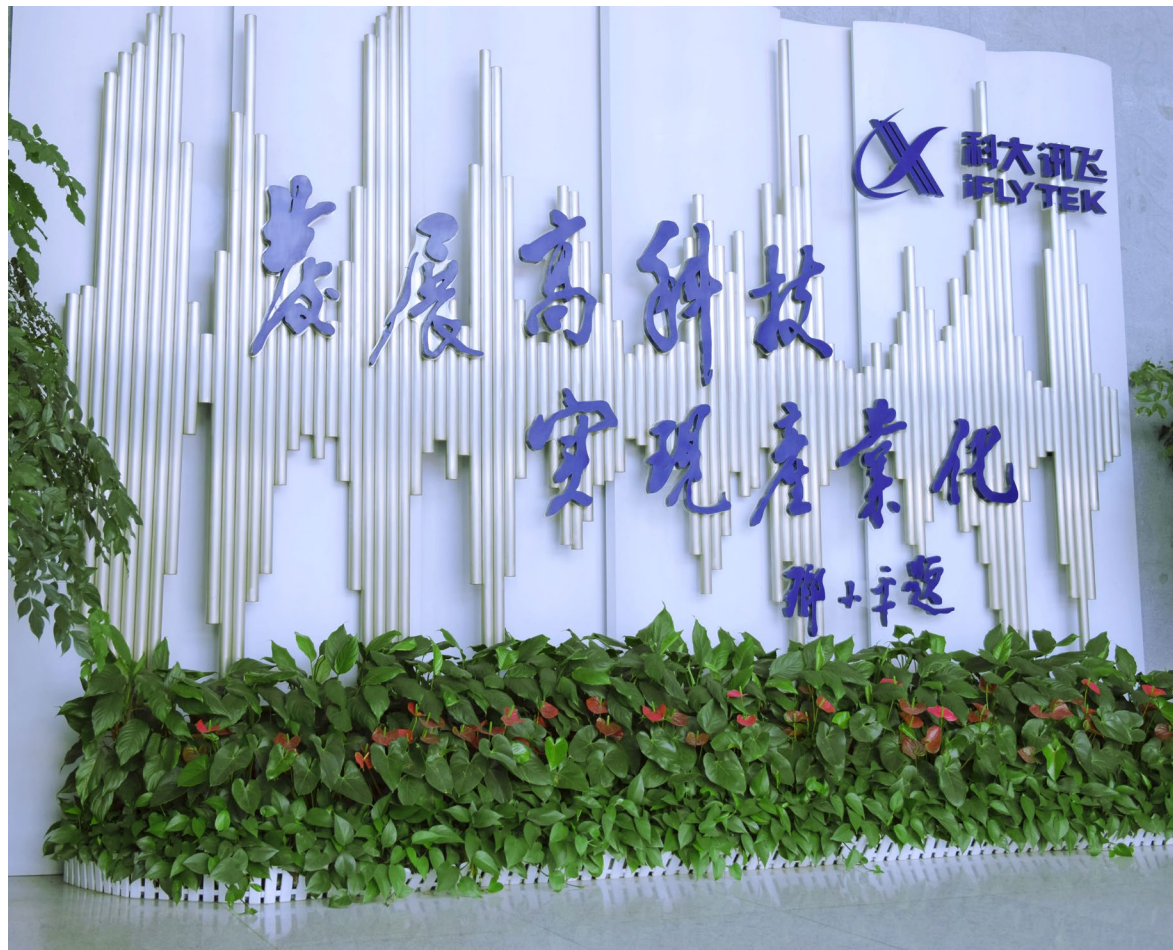


Academy of Sciences is renowned both domestically and abroad in the field of acoustic signals. The Institute of Linguistics of the Chinese Academy of Social Sciences also exhibited outstanding accomplishments in the research of Chinese prosody. Meanwhile, the University of Science and Technology of China led its counterparts in processing voice digital signals and algorithm research. These three scientific research institutes, however, had been unable to break down the barriers among

themselves and between other institutions of higher learning to form profound and substantial collaborative partnerships.

After obtaining its first batch of capital through financing, iFlytek first mission was to break down the barriers. By establishing speech recognition technology joint laboratories sequentially with the University of Science and Technology of China, the Institute of Acoustics of the Chinese Academy of Sciences, and the Institute of Linguistics of the Chinese Academy of Social Sciences, iFlytek enabled these scientific institutions to focus on research, development, and innovation. The corporate sector on the other hand was responsible for providing a unified industrial operation and transformation platform that helped to transform research outcomes into industrial developments.

Later in 2006, iFlytek set up a speech recognition technology joint laboratory with Tsinghua University to engage in research covering voice recognition, sound frequency spectrum analysis, voice indexing, language comprehension, and data mining. After 2010, iFlytek established joint laboratories progressively with Xingjiang University, Inner Mongolia University, Tibet University, and Yunnan University, among others, to engage in multi-ethnic voice and language core technological research. Joint laboratories were also created through collaboration with Lanzhou University and the China Ethnic Languages Translations Bureau. In 2015, iFlytek jointly set up the "iFlytek Laboratory For ▶▶



Neural Computing And Machine Learning” overseas with the University of York to focus on research in fields such as neural computing, deep learning, and artificial intelligence. The office of iFlytek in Silicon Valley, USA, became operational in 2016; collaborations with the Georgia Institute of Technology also commenced in the same year.

iFlytek separates its own innovation efforts into two parts: visionary original innovations and innovation associated with applied research. Qingfeng Liu, Chairman of iFlytek,

indicates that one of the important factors of innovation is to create an innovative system that facilitates interaction among the industry, the academia, and research institution with enterprises at its core.

An AI Ecology Centered on Voice AI

iFlytek core vision is to transform speech recognition technology into the root system of the whole ecological tree and to build upon it a

comprehensive ecological system.

China released its “New Generation Artificial Intelligence Development Plan” in July 2017; this is the first state-wide artificial intelligence development plan of its kind ever to be published.

· The goal is to align China’s overall artificial intelligence technology and application capabilities with that of its global counterparts by 2020 and to enable the AI industry to become a major growth point for the overall economy.

· It is hoped that, by 2025, major breakthroughs in artificial intelligence theory will have become realities, and some of technical applications developed will have achieved world-leading levels of advancement, thus enabling AI to become one of the primary drivers of industrial upgrade and economic transformation in China.

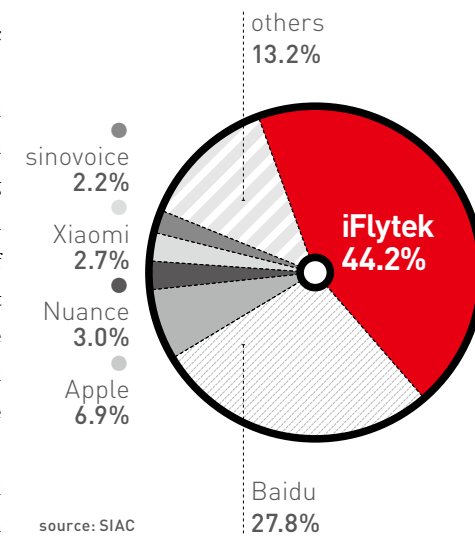
· By 2030, it is expected that artificial intelligence theory, technology, and application as a whole will have reached global leading levels of development, enabling China to be a major artificial intelligence innovation center of the world. Major accomplishments in the smart economy and smart society will in turn serve as important foundations upon which China will join the ranks of the world’s top innovative nations and economic powers.

It is China’s plan to realize an artificial intelligence industry worth RMB 1 trillion and related industries with markets reaching a value of RMB 10 trillion by 2030. Currently, China continues to keep its upper hand in artificial intelligence through BAT (Baidu, Alibaba, and Tencent). iFlytek believes, however, that competition over artificial intelligence will no longer be one technology against another or one enterprise against another; instead, it will be one ecology against another ecology. iFlytek’s starting point and

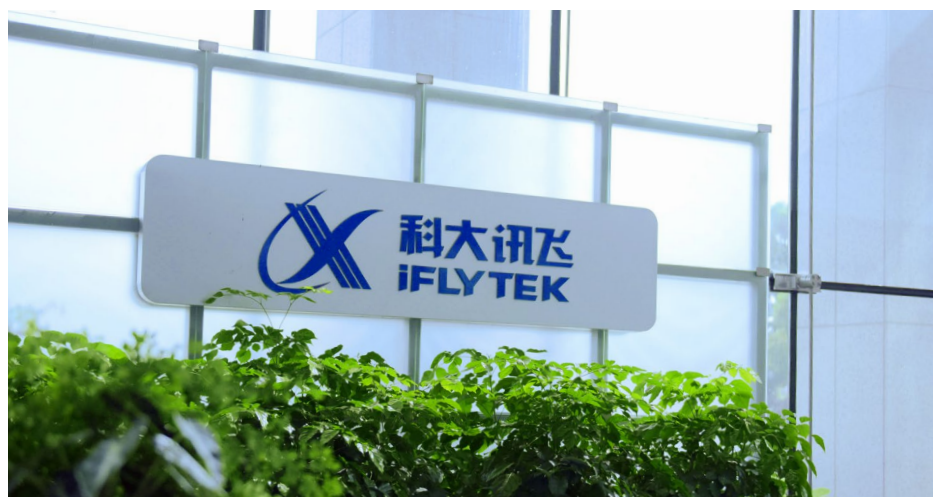
advantage in this regard, in the opinion of the company, is its capabilities in intelligent speech recognition technology.

According to data from the Speech Industry Alliance of China (SIAC), iFlytek accounted for 44% of the market share for voice AI in China in 2016, way ahead of the 16.4% of runner-up Baidu. The same set of SIAC data showed that since 2012, the voice AI market has been growing at an annual rate from 40% to 100% (data for 2016 and 2017 are estimates) and it is expected that the market size will be worth RMB 10 billion in 2017.

China voice AI market share (2015)



iFlytek held its annual launch conference featuring “Voice Lit Life” in 2014 to depict “a beautiful life where you talk to take control, driving a car, watching TV, or playing on your smart phones” to the participants. It was also through the same conference that iFlytek officially announced the taking off of its



super brain project aimed at developing engines that mimic the cognitive intelligence of the human neural network.

In the same year, China Mobile purchased shares of iFlytek through non-public offering and became the second largest shareholder of the company (China Mobile still holds 12.9% of iFlytek's shares at the moment and is the largest holder of circulating shares).

Besides iFlytek acquiring the needed development capital, this transaction was described as having supplemented the technical details for China Mobile; meanwhile, on the part of iFlytek, it has gained technical support as well as involvement in a huge application scenario.

Not only was iFlytek required to attract important shareholders like China Mobile, the hope is also to make respective business groups and departments of iFlytek remain in the core layer of its AI ecology while at the same time gathering huge entrepreneurial groups in its surroundings to form an even bigger industrial ecology that surrounds the core technology of iFlytek. iFlytek has invested in numerous

companies such as Qiming Technology, Shanghai Ruiyuan, and Qiming Toys. One of its investments, UBTECH, is also a company we have studied and reports; the company applies iFlytek's voice AI system to its robots.

iFlytek believes that 2016 marks the starting year for AI in China while 2017 is the landing year for the application of AI. The position of "AI platform + specific industrial lanes" is defined. Meanwhile, AI will also be introduced to achieve society-wide empowerment. Even for innovations that are at the initial stages of development inside corporations, these endeavors may be successfully nurtured through joint shareholding among the company, strategic investors, and operational teams.

By constructing an AI ecological network that penetrates a wide scope of industries, iFlytek expects to capitalize on its advantages in speech recognition technology. Whether this strategy results in success or failure will determine the future of the entire company. ☒

Ecological Chains - Higher Independence or Collaboration?

The creation of ecological chains (ecological systems) is one of the hottest trending concepts nowadays in the business community. Very few have ever doubted the value of a successful ecological chain; what encompasses the journey to success, however, is another complex topic.

Each enterprise has its own way of creating an ecological chain. From the perspective of structure, ecological chains are mainly divided into the following two types, although the boundaries between the two are far from distinct.

- One of these types is as closed as possible; in these types of ecological chains, the enterprise is positioned at the center and strives to expand its business frontiers.

- The other is as open as possible in that the enterprise provides only the core components of the ecological chain; all other aspects of operation only serve to provide the ecological system with necessary supplementation.

Whether closed or open systems are more beneficial has always been a hotly debated topic. The controversy over closed or open systems however has existed long before the idea of ecological chains became widely popular. A truly closed ecological system that is completely under the control of a company does not exist. Nevertheless, we have learned from many prior examples that the pursuit of such a system has never ceased.

During the era of personal computers, Apple led in the creation of closed systems while Microsoft's Windows operating system served as an example of an open system. Even in the mobile era, Apple continues to support the advantages of closed systems; the only difference is that its greatest competitor has been replaced by Google.

Throughout these two eras, Microsoft and Google have focused on providing an operating system and offering the whole industry with infrastructure as well as established rules. Granted, Microsoft and Google also sell computers and mobile phones; these products are however not at the core of their business operations. Google phones, for example, are more like the means to guide industry developments and to demonstrate the latest operating system updates; the mobile phones are even manufactured through OEM.

Microsoft on the other hand won out during the PC era. Despite several reshuffles in the rankings of global PC manufacturers, Microsoft has managed to stand tall. Within the market of mobile phone operations, Google's Android system accounts for more than 80% of market share.

The immense business interest brought about by a closed system, nevertheless, has always been a huge incentive. Apple is currently the most highly valued publicly listed company ☒

on the market and its mobile phone business exercises a decisive effect although the market share of its IOS system only accounts for one-sixth of its opponent.

Ecological chains has also become a widely prevailing concept in China. Local enterprises, however, exhibit greater interest in the immense profit that can be gained through closed ecological chains.

Companies such as Tencent, Alibaba, and Xiaomi Inc., for example, are becoming bigger scale and perfecting their respective ecological systems by means of endless acquisitions.

Generally speaking, after a core hardware product gains decisive advantages, the enterprise tends to create a closed ecological chain; examples include Apple computers and the iPhone. Late-comers in the industry, on the other hand, rely on open ecological chains for gaining market advantages, resulting in scenarios that seem as if a leading company were competing against the rest of the world.

This is also the case in China. Tencent capitalizes on social media software (QQ and later WeChat) and Alibaba on its shopping platform, Taobao. Of course, whether a system is closed or open also depends on how we look at it. If we only focus on e-commerce, Taobao is relatively more open than Amazon, the latter for which self-operated business remains a predominant part of its overall operations. Xiaomi Inc., on the other hand, has opted otherwise. By creating a brand image of providing consumers with “high cost-performance ratio,” the company has managed to build its own ecological system through branding. In the case of iFlytek Co., Ltd., it appears that the company has chosen to take the middle ground, a choice that is probably associated with its capacities in speech recognition and artificial intelligence.

In China, however, new players are taking a path that differs from that of Microsoft or Google. As an opponent to Taobao, the JD Group appears to be more closed, while in the realm of social media software, real competitors don't actually exist.

Even companies that are yet to form established foundations are devoted to pursuing and creating their own closed ecological systems. Devoid of the means to use core products for gaining traction, these companies are putting their hopes on capital. A business model like this requires tremendous capital support and is highly risky. An example is LeEco, a business that is at the moment garnering extensive market attention.

An emerging issue is that Chinese companies that have created closed system typically achieve success through software instead of hardware, and it is due to the nature of software that the market advantages and leading status of these companies are difficult to disrupt.

When a company is able to exert excessive influence on the industry, there is the risk of monopoly, while the state's efforts to tackle this issue in turn exercise adverse effects on the industry. On top of that, applicable laws have not yet been comprehensively or fully formulated, resulting in the current scenario within the China market. 📌

Breakout Battle for New Gaming Companies

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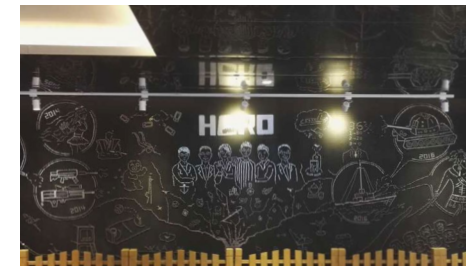
China is becoming the largest gaming market in the world, but the clustering effect is also showing signs of rapid acceleration as the “follower” strategy adopted by industry giants places increasing pressure on smaller competitors.

New companies need to have brand new commercial strategies to be successful on the market. Hero Entertainment, for example, needs to disrupt the market by means of innovation. The real challenge, however, lies in how they can capitalize on their innovation advantages to quickly create an impenetrable market barrier.

(Follower strategy is defined as a company's lack of initiative to pursue market innovation, its tendency to acquire companies or developer teams of commercially viable gaming models, or the development of competing products that become commercially successful due to the company's existing advantages.)

Who is the creator of gaming content?

Most of the time, gaming content is created by developers. Gaming companies put together research and development teams that are responsible for developing games that are then launched onto the market. Users, on the other hand, enjoy the contents prepared for them by the developers. This same pattern of



>> Corporate milestone wall, part of corporate culture display

development also applies to most online games.

Under this development model, gaming quality depends entirely on the capabilities of the developers. As demand from players for games of higher quality continues to rise, it has become necessary for developers to invest more manpower and resources. The development of games is closely associated with the commitment of its developers, resulting in the natural monopoly of the industry. Companies with vast amounts of capital and manpower will gain gradual control over the market. Players divide games into two categories, 3A games (games that generally require extremely high research, development and promotional costs) and independent games. Games in the former category draws away most of the profits while those in the latter are either acquired by large companies after short-lived success or gradually die out. ▶▶

Arena games, however, exhibit an completely different aspect of the industry. In arena games, people utilize the gaming context to compete with one another. Different counterparts, team strategies, and game maps all provide players with brand new gaming experiences. You can even say that no single set of MOBA (Multiplayer Online Battle Arena) games is completely identical to another, and it is these continuous changes that give players fun and enjoyment as they keep coming back for more.

In terms of the content of arena games, gaming companies provide the basic frameworks and gaming rules, while elements of fun and excitement are often engendered through player interaction. StarCraft, for example, is a highly iconic arena game, and professional players of the game have

acquired a level of expertise in the game that is astonishing even to the developers at Blizzard Entertainment. It can therefore be said that in arena games, players and the games themselves are adding content to the game, resulting in the creation of an all-new gaming model.

If arena games enable players to become naturally involved in the creation of gaming contents, then MOD development motivates those capable of game design to take part in the design of gaming frameworks and content. MOD is short for modification and is also translated into Chinese as “module” according to the pronunciation. The term refers to the procedure of modifying or reinforcing games. Changes can be made to props, weapons, characters, enemies, objects, game modes, plots, and even on-screen images through MOD to enrich gaming content or even alter the method of game play. Outstanding MOD games are even considered as new game entirely. MOD development is possible only if gaming companies lift access restrictions; some companies may even provide players with the necessary tools. In 1998, Blizzard Entertainment linked a map editor to StarCraft. Using the map editor, players created a custom map called “Aeon Of Strife” and engendered the prototype of MOBA games. MOBA games eventually took shape and became a big hit through Warcraft 3, another game launched by Blizzard entertainment.

The intervention of players in gaming content has changed how content is generated in the gaming industry. Player involvement in the generation of content has added to the attractiveness of the games and extended their product life cycles, which have in turn boosted user loyalty and enhanced their motivation toward the creation of new content.

Hero Entertainment regards this phenomenon as an opportunity to break up the monopoly of industry giants. This business model enables

smaller companies to transform first mover advantages into the entry barriers and convert the follower strategy of industry giants from threats into opportunities. According to Hero, if just one-thousandth of their 20 million players are able to spontaneously take part in game MOD development, it will become impossible for any single company to remain competitive using only internal resources.

Operating eSports as traditional sporting events

Hero Entertainment refers to itself as an Internet sports company.

The eSports industry can learn from the commercialization of the traditional sporting industry in many respects. Any company that first secures a breakthrough will gain the upper hand in future competition.

Relative to the operating model of “adding value to gain power,” arena games are more balanced in terms of content. If we were to take basketball as an example, the previous model of adding value would have allowed you to lower and enlarge the basket, while the profit model of selling interchangeable skins would have been similar to buying an eye-catching piece of athletic apparel. These purchases might have enabled you to attract more attention on the floor, but are in fact inconsequential toward the game’s final outcome.

By transforming games into truly competitive arenas, it is now possible to engage in professional gaming and cultivate celebrity gamers. When professional eSports player Faker (Lee Sang-Hyeok) of the League of Legends received the championship trophy from the hands of legendary Brazilian soccer star Ronaldo, for many young people, Faker was the idol they truly looked up to and revered.

By holding more contests, developers are able to maintain an adequate level of player enthusiasm and accordingly create a complete user structure for the game that includes professional players, a large group of highly dedicated amateur players, and an even bigger base of gaming fans. This is precisely the model through which traditional sports have achieved commercial success.

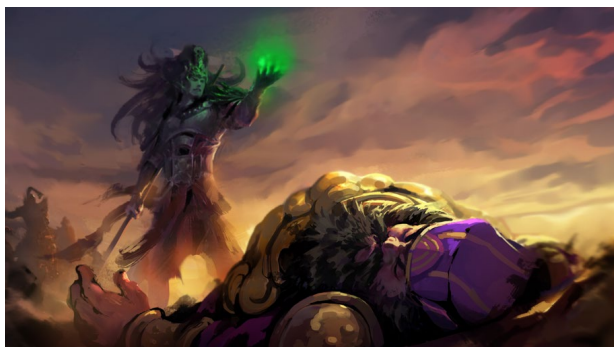
Hero Entertainment, however, is in pursuit of even more.

The company’s true aim is to bring honor to the nation through the hosting of competitions across the world. Anything that evokes a sense of honor and national pride tends to exert a huge positive influence on market expansion. The best example so far is the movie “Wolf Warriors 2.”

Hero Entertainment furthermore hopes that individuals who appeal to potential users will join the system; a typical representative in this regard would be the gaming anchor. Anchors are becoming a type of culture; game anchors in particular make games more entertaining and are able to attract a larger audience. For Hero Entertainment, both MOD designers and game anchors are able to bring high value to gaming. The former provides the game with more content while the latter attracts more users.

Anchor are currently equipped with few options for capitalizing on their efforts, and rely mostly on tips from users during live broadcasts. Enabling anchors to set up private gaming servers (setting up a private server for online gaming operations) would be a viable method of operation. Private servers used to be considered as an act of infringement that needed to be cracked down as they were deemed to have exploited the accomplishments of the game developer’s efforts and broke the rules of the gaming business.

>> Ji Wu Shuang:
A mobileARPG game based on Three Kingdoms, by Hero Entertainment



>> Shadow Blade 2: An oriental martial arts mobile phone game by Hero Entertainment



Hero Entertainment believes, however, that game developers fear the existence of private servers only because they have no control over the situation. The company has even indicated that it is willing to provide anchors with technical support for operating private servers and to establish a reasonable gain-sharing model for normalizing the practice. By setting up more regulated private servers, flow owners can profit from the flow, something that has been difficult to achieve in the past. Similar to the way small websites earn advertising income through Google, this model encourages flow owners to host games and game anchors.

The emergence and popularization of new technologies can also serve to engender more business opportunities. Artificial intelligence, for example, enables gaming companies to better promote MOD among their potential users. Virtual reality (VR), on the other hand, significantly enhances the game-watching experience and makes possible the sales of virtual tickets. All of these technological advancements will greatly improve the profitability of gaming companies and contest organizers.

From Product IP to Company IP

No matter how sophisticated eSports becomes and how games are operated, they are fundamentally different from traditional sports competitions; that is, eSports games are updated and replaced far more rapidly than traditional sports typically are. Soccer may be no different from it is now in 50 years, but arena games 50 years from now will definitely be drastically transformed.

This is the inherent nature of electronic games. The development of electronic games is


restricted by contemporary technology, but as technology advances, the way they are designed, operated, and played will inevitably change.

This brings about another challenge for game developers; that is, aside from making outstanding games, they also need to migrate accumulated resources (including all participants) from one game to another. To accomplish this goal, users must be able to trust in the company, not just the product.

“Blizzard, the symbol of excellence” might be the greatest praise that the current game industry can give to any gaming company. Blizzard refers to Blizzard Entertainment, an independent department/company affiliated to US electronic game publishing company Activision Blizzard, Inc. The company enjoys worldwide renown through the launch of unparalleled classics such as Warcraft, StarCraft, the Diablo series, Overwatch, Hearthstone, and World of Warcraft. Other well-known developer IPs also include Rockstar games from the developer of Grand Theft Auto.

The creation of powerful company IPs enables users to have complete trust in the games introduced by the company and guarantees their immediate devotion to newly launched games. This accordingly facilitates the complete transfer of company resources.

A company’s ability to transform product IPs into company IPs is crucial to its market competitiveness and sustainability. No single company in China has to date been able to accomplish this feat, not even Tencent, whose phenomenal game King of Glory has not been able to inspire “blind” trust in the Tencent brand.

For companies such as Hero Entertainment, these industry evolutions engender both opportunities and challenges; whether or not businesses can achieve success is of the utmost importance. 

How will businesses profit from gaming in the future?


The Tencent mobile game King of Glory is becoming a phenomenal product. The free-for-download app has officially become the company's most profitable product. In the past few decades, the gaming industry and its business model have undergone several transitions. How exactly will businesses profit from gaming in the future?

Previously, in the single-player gaming era, games were divided into console games and PC games. At the time, profits mainly came from the sales of game copies; the difference was that consoles were first sold at a lower price or even at a loss to expand the console game market, following which gaming software would be sold at a higher price and for better profits. This is why console game software is typically much more expensive than personal PC gaming software. Until recently, this has continued to be the mainstream business model for single-player games.

The rising prevalence of Internet games created a huge divergence in the industry's profit model.

In terms of client games and browser games, profit models consist primarily of time cards and “free game + props charges.” Blizzard Entertainment's World of Warcraft is representative of the former, while The Legend

of Mir, a game that once took China by storm, is a perfect example for the latter, which also happens to be the mainstream business model for client games and browser games in China.

The adoption of this business model is associated with the development cycles of client games and browser games, which are generally long and costly with regard to research and development as well as later-stage marketing. To guarantee the generation of profit during the product life cycle, in consideration of the prolonged three to five year development period and investment costs of up to millions of dollars, developers have come to adopt a relatively more commercially-oriented business model. Except for phenomenal products, moreover, the number of daily active client game and browser game users generally number less than 100,000 or so, meaning the “free game + props charges” model depends largely on the lavish spending of nouveau riche gamers. In other words, the majority of gaming revenue is generated by a tiny minority of gamers. There are several issues with this business model. First of all, nouveau riche gamers are the sole determinants of gaming revenue, and because this type of gamers is few and far between, their favor is difficult to regain once they lose interest. Secondly, the business model has exerted 

a huge negative impact on the motivation of ordinary gamers, especially gamers who like to play for free; some people have even come to say that free gamers are a part of the gaming content offered to paying gamers by the gaming company.

In the mobile game era, the entire situation has changed drastically. Development cycles and costs are now significantly reduced, and the number of daily active users of regular games has greatly increased. Regular users are also now able to migrate from one game to another with ease, while the rate of game updates and upgrades have accelerated due to decreased loyalty.

The greatly expanded user base has lowered the importance of lavish spenders and increased the corresponding pay rate (percentage of paid gamers against all gamers). A continuous gaming experience has become a key attraction for users. Charged props have also evolved from items that changed the balance of the game into skins that merely change the appearance and visual experience of the game.

The rapid expansion of the gaming community has furthermore propelled the birth of the fan economy. Competitiveness (as opposed to the gaming model of more top-up equals higher capability) is now a prime emphasis, a characteristic that has made possible the rise of the eSports community. New competitions are popping up everywhere, while outstanding gamers have become veritable idols. Gaming broadcasts have also boosted the growth of the gaming industry.

Despite their popularity, however, broadcasts are not integral to gaming business models. Businesses are more likely to wish to maintain the advantages of previous business models, such as luxury games and loyal users.

While some of the more ambitious gaming

companies are hoping to create a virtual society with games, a virtual society that reflects and embodies the world in which we live. Gaming companies will be responsible for establishing the rules for the entire society and providing players with basic technical services; gamers will be the people that give substance to and enrich that society.

Once the virtual society is formed, an extremely high entry barrier will be created; the cost of leaving a game would be higher, thus resulting in a higher level of stability and gamer loyalty. There are many aspects to the formation of a society, from virtual item transactions and transportation to the security of virtual communities. Gaming companies will profit from satisfying these demands in a manner similar to the current revenue model of real government agencies. The difference is that, whereas government revenue in real societies contribute to better public services, gaming companies offer "public goods and services" within virtual societies purely for profit. In contrast to previously existing profit model, this business model will be more acceptable to users on an emotional level.

It is likely to be one of the more viable gaming business models in the foreseeable future. 🎮

III

CHAPTER 3 How do we create an environment that inspires innovation?

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For enterprises, an innovative environment that offers favorable returns is the best of its kind.

How do we create an environment that inspires innovation?

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Innovative stakeholders include governments, businesses and the public. If we consider the business sector as the primary innovators, then the innovative environment is the government and the public the external conditions for enterprise innovation.

The promotion of innovation is necessary for facilitating overall social development. Enterprises are profit-making entities; therefore, in terms of the issue of innovation, the creation of an innovative environment is fundamental to the alignment of social interests with business interests. Of course, some companies may have adopted the promotion of social progress as an internal goal, but the overall innovative system cannot be predicated upon feelings.

To innovate is to create, and it is difficult to direct the path in which creativity develops. Creating an environment that inspires innovation is like taking care of something we find difficult to understand. It requires an awe of the nature of innovation; once we begin to feel that we have truly understood the principles of innovation and begin anticipating established patterns of success, we would have moved away from the inherent value of innovation itself.



Transforming the return model of innovation

For enterprises, an innovative environment that offers favorable returns is the best of its kind. An important part of improving the innovative environment is to transform the return model of innovation and allow innovative behavior to become more profitable.

Higher precompetitive technical support

Precompetitive technology refers to technologies that can be used in the future for business purposes but are still in the early stages of development and whose prospects remain extremely uncertain. These technologies are often universal and are also known as platform-based technology; one such example is prototype Internet technology.

Precompetitive technological research and development is typically industry and region-specific, and is often not commercially viable for individual enterprises. Precompetitive technology is however often an important basis of any given industry, and deficiencies in this aspect are likely to exert major negative impact upon the national competitiveness of that specific industry. Therefore it is imperative that governments give higher levels of support to this type of technological development.

"In the field of innovation, public funds

should be contributed toward investments in precompetitive technology," states Vice President Zhu Yan Mei of the BGI Group.

Even in the United States, where people have always believed that the government should not be involved in the selection of technological winners and losers, most academics are in favor of the government's practice of pre-competitive technology support.

While countries across the globe agree in the importance of government support for pre-competitive technological development, the form of support adopted is not always the same.

The U.S. believes in the power of competition. The government invites enterprises to propose different technical roadmaps that each compete among themselves for ultimate survival and success. Japan and Europe on the other hand give precedence to business collaboration by taking the initiative to organize research and development collaborations for achieving technological breakthroughs. The former protects competition to the maximum extent, while the latter is more efficient from the perspective of project implementation. In this respect, it appears that China has taken an integrated approach. The state selects enterprises and research institutions it perceives to be of potential for engaging in pre-competitive technological research and development, then sits back to wait for the outcome of its heavy-handed initial efforts.


We can see from the final outcome that China has not gained a competitive advantage in precompetitive technology on a global scale, which means that the Chinese government should be offering more substantial support to pre-competitive technological development so as to create more possibilities for enterprise innovation that are predicated upon precompetitive technological advantages.

The double-edged sword of patent protection

The protection of intellectual property and creativity is essential for innovation. It protects the interests of innovators on the legal level and maintains their enthusiasm for innovation. If infringement rampant within a market and not duly punished, this is equivalent to giving participants the wrong interest guidelines. Organizations will then be reluctant to invest resources in innovate and instead wait for the results of others, leading the ultimate sacrifice of common interest.

At the same time, the abuse of patent protection can also prevent competition. In such a market, new participants would be required to expend excessive amounts of manpower and resources for avoiding patent traps and paying exorbitantly high patent fees.

In some industries, patent protection conflicts with the standard values of society. For example, a company may have invested heavily in the development of a new medical technology that enables us to fight disease and extend human life at a very low cost. If the technology is under strict patent protection, the vast majority of people could be unable profit from its benefits; on the other hand, if the technology is lacking in patent protection, it might not have been developed at all in the first place.

This predicament similarly requires government intervention. For this type of technology, governments need to provide support in the developmental stage and transform the R&D corporate profit model so that profitability is less dependent on late-stage products. In return, the technology must be made widely available to the entire community. Governments can also take the initiative to open up more markets to the private sector, thus driving and accelerating the pace of 

innovation. Although protectionism increases market safety and order, it can at the same time stifle innovation.

Better financial and cooperative environments

Funding support is indispensable for the inspiring of innovation. The reasonable allocation of society's resources into any given field of innovation will determine just how many dreams can be transformed into realities.

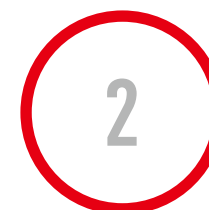
Entrepreneurial firms are of a nature such that equity financing is the most suitable method of financing, while for society as a whole, the pursuit of a stable rate of return continues to be the primary objective. Institutional reforms can server to alleviate this contradiction. Venture capital funds can reduce the risk of equity investment by means of portfolio diversification, while funds of funds allow more investors to enter the industry and enable outstanding investors to have more room for play. For some of the more well-established projects, structured financing (a combination of priority and posterior funds) enables the limited number of funds with a greater capacity for risk to play a more prominent role.

Large financial institutions, particularly the strength of resources available to banks, is something also often overlooked by startups. Many startups looking to venture capital funds for funding are also hoping to take advantage of their resources and experience. Banks, however, are in fact players that have access to the largest pool of resources.

"The financial sector is actually a sharing

industry. Finance is all about the sharing economy." According to Frank Fang, Head of Commercial Banking at HSBC Bank (China), banks can, in addition to funding, share experiences and networks with businesses. As one of the oldest and most important institutions in the financial system, banks have the most extensive networks and have witnessed countless business cycles across all sectors through which they have accumulated unparalleled cross-industry experience. All of these resources can contribute greatly toward enabling innovative companies achieve success. For banks, helping young startups constitutes more than a business transaction; it's also an investment and the best basis upon which banks can develop closer partnerships with these startups after they have attained a certain degree of growth.

Some other innovations come from within the organization, not just companies, but also scientific research institutes. The agency itself may be unable to shoulder all of the financial requirements for innovation, therefore attracting external funds can be a very good form of supplementation. Before the entry of external funds, however, the organization needs to transform innovation itself into an investable entity that encompasses clear equity relationships and incentives for innovators. This problem is particularly prominent in colleges and universities.



A more open society

Innovation means breaking stereotypes. To promote innovation, the whole community needs to become more open and more willing to accept different things.

A more open personnel training concept

During our interviews, many entrepreneurs mentioned that the most scarce resource in innovation is talent, especially the kind of innovative talents who possess open minds. This is the challenge China will face as it transitions from capitalizing on the advantages of follower development strategy to the implementation of an innovation-driven development strategy. Changes in the structure of talent demand mean that the orientations of personnel training also needs to change.

Schools are not only places to pass on knowledge; they also activate the potential of each individual person. Schools should be able to accept more differences between people, and provide students with more ways to develop their talent and potential.

The whole community should become more inclusive and give the younger generations more opportunity to understand and think about the world. In some countries, many young people spend a whole year seeing the world, thinking about their future directions in life. In China, this kind of behavior is not approved of. Compared to young people who become mortgage slaves right after graduation or who go to work immediately thinking only of the accumulation of retirement pensions, innovation requires a free


and unrestrained soul. This may require a whole generation to change their mindset.

Entrepreneurs are an even more special group of people among the community of innovators--they are the most passionate, but also the greatest bearers of risk. Providing them assistance by building safety nets can help them succeed and reduce their worries.

Chairman Liu Qingfeng, Chairman of iFlytek Co., Ltd. suggested that the Ministry of Education and the Ministry of Human Resources and Social Security should take the lead in the establishment of entrepreneurial counseling courses in colleges and universities or in various institutions in the private sector to teach basic entrepreneurial knowledge and skills. Liu also recommended the Ministry of Human Resources and Social Security to take the lead in improving the unemployment benefits system for innovative entrepreneurs to provide them with adequate safety nets.

It will be a long while before the outcomes of talent training system reform is discernible. However, in the same token, the advantages established through reform will also be beneficial over the long term.

A more open environment for corporate innovation

Innovation in conventional enterprises is typically the sole responsibility of a stand-alone department. This strategy, however, is likely to limit a company's capacity for innovation and lead to discrepancies between innovative activities and day-to-day corporate practices. Meanwhile, transforming all innovation 

related units within the organizational structure will enable all departments in a company, sometimes even upstream/downstream clients, to become participants in the process of innovation. This approach, one born out of necessity and driven by the search for solutions, is more likely to lead to success.

Intrapreneurship is another excellent way to encourage innovation. A good, innovative idea can be incubated internally, while the rights and obligations of the company and the innovator are clearly established.

Companies are consequently able to retain existing talents and identify entry points into new businesses, while innovators enjoy a higher chance of success with the injection of corporate resources. Compared to leaving a company and starting a new business, intrapreneurship provides innovators with a safety net that enables them to charge full speed ahead.

Information transparency makes society more accepting of new things

It is not immediately apparent whether the whole social environment is accepting toward the influences of innovation, yet the matter is of great importance. The development of new technologies, especially breakthrough technologies, is often accompanied by controversy. Examples include the safety and ethical issues that come with genetic technology and big data technology, which have also triggered concerns over personal privacy.

Commercial enterprises may exaggerate the benefits of new technologies and disguise their risks as much as possible; meanwhile, the public

might harbor a natural distrust of their claims and exhibit the tendency to be conservative and to resist the emergence of new things in the face of unpredictable risks.

Neutral institutions (governments, non-profit-related research institutions and the media) need to try to reduce the information imbalance and to encourage rather than avoid relevant debates. In addition, the government needs to develop industry regulations based on facts and actual data.

In order to achieve this goal, these institutions need to establish an image of objectivity and impartiality. In the instant that they become unable to maintain their objectivity, the whole market exchange mechanism becomes obsolete. A vivid example is the predicament of domestic "genetically modified foods."

In addition to increasing investment, more technology, including government and university-owned technology, have become commercially accessible and become tools for driving innovation.

In cases of national security or other concerns, governments tend to invest a great amount of resources in technological research and development, some of which become the underlying technologies of future innovation and even engender the emergence of an immense industry. Examples are early Internet technology and the currently popular onion server encryption technology.

Israel's civilian use of military technology is an important reason for why it has become a nation of innovation. The Israeli military maintains a confidential list of military

technology and releases all other technologies outside the scope of this list for free use in commercial development. In 2001, Israel's Given Imaging Corporation produced a capsule endoscope based on the working principles of intelligent missile remote control camera devices. This product has since opened up a new field in endoscopic medical applications.

Colleges and universities also undertake a lot of research work. Many research results, however, are eventually only published in the form of academic papers and are shelved and forgotten. One of the greatest obstacles to the commercialization of technology developed in colleges and universities is the ambiguity of ownership, the lack of clarity in the question of the extent to which the developer has ownership of the technology, and the willingness and capability of the parties involved to further commercialize the technology. To solve this dilemma, we can utilize an approach that draws upon the concepts we have just previously mentioned, that is, colleges and universities should use government funds to carry out fundamental research. When a technology exhibits business potential, an independent business organization should be set up to allow colleges and universities, researchers, and investors to jointly hold equity, thus formulating a commercially viable business model.

Governments can also take the initiative to open up more markets to the private sector, thus driving and accelerating the pace of innovation. Although protectionism increases market safety and order, it can at the same time stifle innovation.




The search for a suitable innovative culture

Many centers of innovation have been established around the world and have seemingly become representatives of a country's capacity for innovation; examples include Silicon Valley of the United States, and Tel Aviv in Israel.

Many other countries are also hoping to create such centers of innovation and put them into action. Prestigious global innovation centers receive a large number of visitors each year, including many government officials. Eager to achieve similar success in their own nations, many governments have invested resources and formulated policies to recreate innovation centers like Silicon Valley and Tel Aviv; few, however, have been successful in their attempts. A large part of the reason was ignoring the cultural support behind the successful creation of innovation centers.

The industrial revolution spawned the United States middle class, after which professional managers appeared for the first time in modern history. The emergence of hedonism and hippie culture thereafter played a vital role in the rise of Silicon Valley. Apple founder Steve Jobs, for instance, was deeply influenced by hippie culture. "Liberal democratic hippie culture, in fact, is an important force for driving innovation in the United States," said Zhu Yanmei. "This culture is nonexistent in many other places."

Israel, on the other hand, is a completely different story. Due to the influence of geopolitics, Israelis have a strong sense of insecurity and yet harbor great capacity for imagination. 

Israel does not have a culture of failure. Here, failure is simply not a big deal. If you fail, all you have to do is to start over again. Many young Israelis buy one-way tickets right after they finish military service to countries like Brazil, Argentina, the United States, or other Asian nations. They want to experience the world, and have no schedule for when they will return. The entire Israeli society is also particularly accepting of this kind of behavior. When an Israeli company's human resources manager sees a blank period on a candidate's resume, the general impression will be that this person might have traveled abroad, or that they might have new ideas, which is a good thing. Meanwhile, in China, track records of this kind are oftentimes considered cover ups of bad things a person might have done. In Israel, all Jews must perform military service. It takes as long as three years of military service to become an officer. When war erupts, it is these young people in their twenties who must make decisions that will directly determine the lives of the men under their leadership. A scholar who has studied Israeli culture claims that the high pressure decision-making environment and the responsibilities of bearing consequences within the military is similar to the realities of business entrepreneurship.

All of these elements constitute the basis of the Israeli culture of entrepreneurship and are extremely difficult to imitate. "The biggest contributors to innovation in Israel are cultural factors," says EranWagner, a partner at Gemini VC, an Israeli venture capital firm. "This includes a complex external environment, which leaves

us no choice but to innovate. Then there is the Jewish spirit of questioning and fear of failure."

The formation of culture requires a long period of time and special historical contexts that can only serve as points of reference and not models to appropriate. Any nation that aspires to succeed needs to consider, based upon its unique circumstances, how to create an innovative culture. An important point for consideration is where our own strengths lie.

Big data is our advantage in present-day China.

Big data is changing many industries. In the era of big data, innovation will not be limited to only flashes of genius; analyses based on big data will be great sources of innovation. Due to China's huge population and economic scale, we have access to huge amounts of fundamental data resources.

The concept of a sharing economy is predicated upon scale and dimension, which is why many innovations involving sharing economy have achieved better success here in China than in other countries. 📍

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CHAPTER 4 Concluding remarks

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A New Era of Chinese Corporations: Innovation-driven Growth

Bin GUO, professor of innovation management & strategy, School of Management, Zhejiang University

Chinese corporations are marching into a new era. To a certain extent, this era is wreaking nonlinear havoc on the foundations of the competitive advantages of many Chinese corporations. However, from another perspective, it is the best era for some Chinese corporations. In this era typically characterized by innovation and change, Chinese corporations are increasingly aware of the fact that an innovation-driven growth is necessary for future success, given this dynamic environment where challenges coexist with opportunities.

To a large extent, the driving factors for the occurrence of such changes is the result of two forces intertwining with each other. On the one hand, with the emergence of China's manufacturing sector resulting in China becoming the world's factory, some leading Chinese corporations are challenging multinational companies' leadership in the Chinese market and even the global market. As a result, multinational companies are increasingly stressing strategic control based on core technologies and intellectual property rights when it comes to their strategies for dealing with the Chinese market, in order to ward off Chinese corporations' erosion of their market leadership. In particular, the strategic significance of the Chinese market in the global deployment of many multinational companies

is on the rise due to the market's sheer size. On the other hand, despite the fact that Chinese corporations, especially Chinese manufacturers, are increasingly aware of the importance of innovation, it will invariably take time for them to complete the transition from the old strategy of relying on lower costs, imitation and late mover advantages to the new strategy focusing on innovation. In addition, this new normal for China's economy combined with ongoing structural adjustments surrounding deleveraging and destocking also create substantial pressure on Chinese corporations in their transition to innovation-driven operations.

In our research on the innovation of Chinese corporations, we found that the typical innovation and growth opportunities seized by successful Chinese corporations mostly revolve around the following aspects:

1) They seize the opportunities from ongoing upgrades in consumption in the Chinese market. In the past decade, the Chinese market has demonstrated an obvious trend towards upgrades in consumption, which is derived from the expansion of the scale of the middle class, and as well as the ongoing deepening of urbanization in China. This means Chinese corporations need to continuously upgrade their products, technologies, services, and capabilities, in order to better serve the

market requirements associated with upward mobility. Such market dynamics have also created challenges for corporations in terms of flexibility in their capabilities and strategies.

2) More and more Chinese corporations are beginning to make their presence in the "good enough market". Unlike the low-end market, which stresses low costs and low prices, and the high-end market, which focuses on brands, premium quality and prices, the "good enough market" puts a premium on establishing a perfect balance between quality and price, thereby maximizing bang for the buck as much as possible. Such a market strategy represents a very sound match for the existing market structure in China.


3) They take full advantage of the growth opportunities generated by emerging technologies (such as AI, big data, IoT, online payment, and genetic technologies, etc). Furthermore, they combine technological innovation with business model innovation to better meet the needs of consumers in the Chinese market. The large number of consumers present in the Chinese market means that it is equipped with a better foundation to fully leverage its advantages in business model innovation.

4) They transfer the capabilities, products and business models established in the Chinese market to overseas markets in order to gain more growth opportunities. This undoubtedly is a new trend unfolding in this era. In recent years, more and more Chinese corporations have been shifting their focus beyond the domestic market to overseas markets. The exploration and implementation undertaken by these corporations are causing significant changes in the way the world views Chinese corporations. In the past, Chinese corporations were stereotyped by Western corporations

or consumers as "imitators" or "knockoffs". However, some Western media are beginning to discuss the transition from "Copy to China" to "To China Copy", as Chinese-style innovation is increasingly gaining attention. Certainly, there is undoubtedly still a sizable gap between Chinese corporations and mature overseas multinational companies in terms of technologies and overall capabilities. However, the successes of some leading Chinese companies in their implementation of these strategies have undoubtedly inspired Chinese corporations to seek further results on the global stage.

Furthermore, even though different corporations may have different strategies to adapt to such changes and megatrends, some common distinguishing features can still be observed from corporations that are undergoing or have completed better transformations towards innovation.

1) They have continuous investment in core capabilities, core technologies as well as strategic patience. The development of core technologies and the buildup of core capabilities require corporations to commit resources over the long term. Such an investment may even conflict with the need for market performance over the short term. Entrepreneurs at corporations making the transition to innovation may insist upon and incessantly strive towards maintaining strategic patience.

2) During the course of innovation, it takes an in-depth understanding of the Chinese market for successful product innovation, service innovation and business model innovation. The Chinese market distinguishes itself from other markets with features such as a gigantic consumer base, highly fragmented market structure and market trends that are incessantly and dynamically changing. Corporate innovation needs to be based on 

Taking the lead on the Internet

By Hongbing Gao, AliResearch

The Internet and internet-based technologies are growing at unprecedented speeds in China and transforming the conditions for Chinese innovation.

Over the last five years, China has gained strength and begun taking the lead in the internet realm. In 2013, the discussion focused on China's breakneck e-commerce growth, but in 2017, the Chinese way of innovating has become the poster child for the progress of China's internet.

A massive market and technological advancement form the twin engines that drive each other forward. Mobile payment services and financial inclusion have become buzz words in China's narrative of innovation in global finance.

China has managed to remold itself from laggard to leader in the fields of cloud computing and big data analytics. Alibaba Cloud shattered the cloudsort world record in 2016 when it sorted 1TB of data at the miniscule cost of US\$1.44, just one year after setting a new world record.

Meanwhile, Alipay has lowered the cost per payment to \$0.02 through the use of the Internet and cloud computing technology. The service currently boasts more than 455 million active users, 5 million micro- and small-sized enterprises, and 1.5 million agriculture-related businesses in more than 200 countries and regions. China is now the world's undisputed leader in mobile payment services.

Back in 2005, the express delivery services

in-depth insights on these features as well as highly efficient utilization.

3) They build their corporation's own foundation for competitive advantages through a highly embedded, highly efficient and more comprehensive indigenous industrial chain and industrial ecosystem. People tended to pay attention only to the resources and capabilities built up internally by corporations themselves in prior competitive advantage analyses on Chinese corporations. In fact, we can clearly see from these research observations that, more often than not, the reason why Chinese corporations are becoming powerful is not only attributed to internal factors, but also to powerful industrial ecosystems and indigenous supply chains progressively built up during the course of the emergence of China's manufacturing industry. Many of those successful innovative corporations take full advantage of industrial ecosystems to support their rapid response to market needs as well as to reach the ultimate balance between quality and price. 📌

market in China was less than one tenth of the U.S. market. However, in 2016, China is producing double the volume as that in the United States.

The unstoppable progress in the Internet industry has pushed many technology firms to the height of success. Chinese businesses now stand firmly at the top tier of the world's online businesses. As of the end of September 2017, Chinese enterprises occupy three places in the world's Top 10 list of online companies by market capitalization. Furthermore, the latest statistics show that China has close to 30% of the world's unicorn startups in terms of overall quantity and 41% in terms of market capitalization.

Cloud computing, big data, e-commerce platforms, express logistics, credit systems, and mobile payment services support rapid growth in new commercial technologies and facilities, which in turn create unprecedented momentum for innovation.

New technologies enable the supply side and the demand side of the market to interact with each other in revolutionary ways. Large factories are equipped with modular production systems, which can be applied not only to manufacture standard and customized products, but also in flexible production (e.g. fast reorders) of nonstandard products on a mass scale. Micro- and small-sized enterprises are able to form clusters to produce nonstandard products or to engage in reverse innovation (responding quickly to market development) and produce standard products for niche markets.

Data are driving innovation and upgrade along the supply chain and triggering aggressive reform. The latter takes production online, and solves the issue of idle production lines by optimizing schedules and commercializing capacities.

A culture and an environment that encourages innovation and entrepreneurship are also

inspiring fundamental changes in society. Technology is being applied to create an open, transparent, collaborative business market, while commerce is being implemented to create a science incubation oriented service market. The two ecosystems blend and interact with each other to create a vast job market.

The online innovation services market in China is constantly evolving. It provides basic services for society as a whole while sending ripples of change throughout the business community.

Change in business models will inject more flexibility into the job creation process. Employment, instead of "company + employee", will be redefined as "market + individual". Changes will include a blurring line between being employed and unemployed, more responsive matching of supply and demand in the labor market at lower costs, and less obvious differences between entrepreneurship and employment.

Technology is changing everything. 📌

