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Business model–dynamic capabilities and open innovation initiatives in research-intensive organisations: A case of Australia's national science agency

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Abstract

Publicly funded national science agencies create value as innovation catalysts and through their scientific and research missions, they tackle wicked problems. Understanding how dynamic capabilities and business model innovation enable research-intensive organisations to seize the market in the mission is key to translating bold new science that has impact. We qualitatively explore how Australia's national science agency—the Commonwealth Scientific Industrial Research Organisation (CSIRO)—has pursued open innovation to support business model–dynamic capabilities in an evolving publicly funded landscape. We reflect on the value of open innovation initiatives that have allowed the CSIRO to ambidextrously pursue world-class science while achieving impact.

KEYWORDS

ambidexterity, business model–dynamic capabilities, CSIRO, missions, publicly funded research organisations

Points for practitioners

- Dynamic capabilities and business model innovation are strategic tools for publicly funded national science agencies seeking to seize the market in the mission.
- We examine a case of business model–dynamic capabilities in CSIRO.
- Open innovation has been important for CSIRO as part of an ambidextrous approach.

1 | INTRODUCTION

Publicly funded research organisations (PFROs) are a focus for public sector investment. A sub-set of these organisations, publicly funded national science agencies (PFNSAs), generate breakthrough science and research. While breakthrough activities are high risk, the upside of public sector investment in PFNSAs is significant, particularly as they have the capacity as 'mission-oriented' organisations to commercialise novel technology that can tackle grand challenges. While missions are increasingly acknowledged as critical, understanding how to implement them is a challenge. Innovation expert, Professor Roy Green, recently highlighted that 'serious and purposeful government policy based on the identification of national missions and the ability to develop an implementation strategy around those missions…' (Brookes, 2022) is necessary for Australia to get an edge through new technologies and industries. This is particularly pertinent at a time when Australia's performance in innovation implementation needs strengthening. Australia (similar to other countries such as Canada and Norway) has been weaker at innovation translation based on recent 2022 Global Innovation Index data in terms of converting innovation inputs to outputs (e.g. taking new inventions to market). Policy decisions and interactions between government–industry–PFROs in the coming years will play a major role at this critical juncture for Australia.

Discussions around capturing value through implementation suggest lessons can be gleaned from the concept of 'business models'—or the way an organisation delivers value while retaining part of the value (Teece, 2018, p. 40). Dynamic capabilities are a framework referring to the capacity to sense, seize, and transform in response to change, and they enable business model adaptation, referred to as 'business model–dynamic capabilities' (Teece, 2018). Experimenting with business models helps organisations develop new 'dominant logics', and while existing dominant logics can enable specialisation, they can limit opportunity creation (Chesbrough, 2010). The breakthrough scientific focus of some PFNSAs can result in a technology-push dominant logic that lacks market-pull. However, drawing on multiple dominant logics that respond to user and market behaviour potentially represents an asset, aligning with what Charles O'Reilly III, Michael Tushman and others refer to as 'ambidexterity'—defined here as a PFNSA's capacity to integrate market and mission logics to create impact. A technology-push and market-pull logic also aligns with open innovation or the '…inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation…' (Chesbrough, 2006, p. 2), and these processes nurturing innovation can facilitate dynamic capabilities. Hube et al. (2022)

recently explored a 'cogwheel' model of dynamic capabilities in the Australian university context, highlighting the framework's scope beyond the corporate world. We extend the discussion to the PFNSA domain, exploring how business model–dynamic capabilities and open innovation support PFNSAs to seize the market in the mission.

2 | TRANSFORMATION IN CSIRO

We examine an illustrative case of transformation in CSIRO which represents what Bent Flyvbjerg refers to as a 'critical case' (Australia's national science agency). While CSIRO comprises a formal mission program, our focus spans to the organisation's mission as an 'innovation catalyst'—developing novel science to tame the nation's challenges. Demonstrating impact is fundamental to CSIRO. To measure this, CSIRO explores factors associated with a program logic: inputs, activities, outputs, outcomes, and impact. Open innovation and co-creation are essential to impact, and relate to collective knowledge sharing and integration among multiple stakeholders to deliver and retain value, and support research translation. This case study emerged from a project involving team members who were working in CSIRO (ethics approved collaboration). Interviews were conducted with individuals both within CSIRO (managers, senior leaders) and beyond the organisation (consultant, CEO). The importance of open innovation initiatives, specifically *SME Connect* and the *ON Program*, emerged and we discuss these initiatives (see Supporting Information for research methodology details).

2.1 | *SME Connect* and *ON Program*

A dedicated 'SME Mission' in CSIRO demonstrated a focus on building the capacity of Australian industry and fostering collaboration, '…we are trying to double the number of SMEs that engage in…publicly funded R&D by 2025…' (interviewee #5, 2020). CSIRO's *SME Connect* represented a platform for collaboration and channel for research-based services to support innovation and growth of Australian small to medium enterprises (SMEs). It incorporated *CSIRO Kick-Start*, *Innovation Connections*, and *STEM+ Business*.

SME Connect engendered opportunities to access research expertise customised to SME requirements both from within and beyond CSIRO. While the focus on capability building provided uplift to Australian SMEs, it also built researchers' skills, enabling them to understand industry needs: 'We are also…upskilling mid-career researchers, getting them to think…less about their technology and more about the capabilities that they have that industry might be interested in…' (interviewee #5, 2020).

Separate to *SME Connect*, the federally funded *ON Program* was launched in 2015 to support commercialisation. Entrepreneurial training was provided to build capabilities of CSIRO researchers and outside parties seeking commercial opportunities around a technology. CSIRO Annual Report data highlight outputs from the *ON Program* include the creation of more than 60 companies and over 250 new jobs. Activities—such as discussing the proposed concept with 100 potential customers—indicated that the *ON Program* instilled an understanding of market realities distinct from research activities. As interviewee #2 explained '…this was a major thinking shift…but all the way across the board they saw the value in actually having that mindset that we're looking to deliver something that will actually be used…' (interviewee #2, 2020).

The *ON Program* enabled researchers to transition toward a focus on end users: 'there is…whole filing cabinets of descriptions of sets of skills that we don't develop as scientists, as researchers…realising what you don't know is a very powerful thing particularly if you are then supported in developing those skills by people who have them…what an amazing opportunity' (interviewee #8, 2020). As one interviewee who had deep experience of the program highlighted: '…we have had a shift in those pieces…particularly the customer focus…and people's understanding of innovation…understanding that an invention is not an innovation—that you need to extract the value from it to make it an innovation' (interviewee #3, 2020).

SME Connect and the *ON Program* are open innovation initiatives leveraged by CSIRO to capture and create value. CSIRO also has a raft of other recent open innovation initiatives—*Main Sequence Ventures* (co-founded by CSIRO) has created key opportunities for commercialisation of technologies; CSIRO formally implemented a mission program and partnered with global mission expert Professor Mariana Mazzucato; and CSIRO engaged in a collaborative project with two Australian universities examining SME–research and development (R&D) interactions.

3 | CONCLUDING REMARKS

CSIRO needs to maintain scientific and research excellence that builds trust, transparency, and reputation, in ways that tap into market logics to build relevance and impact. Such an ambidextrous focus for the CSIRO is potentially key to seizing the market in the mission, and open innovation has been central. Getting the right ambidextrous balance for CSIRO is crucial: swing too much on the market side and bold new ideas may be compromised. Similarly, targeting science that lacks clear market application presents an equally complex challenge. PFNSAs will vary with this balance depending on their positioning and objectives. While our focus is not on providing universal lessons for PFNSAs or PFROs, the insights we provide on open innovation initiatives that support business model–dynamic capabilities to seize the market in the mission may resonate with other Australian and global institutions. As indicated, converting innovation inputs into outputs is a challenge not only for Australia but for various countries internationally, and we point to the value of ambidexterity, open innovation, and business model–dynamic capabilities for PFNSAs as part of a broader multi-stakeholder system to enable innovation conversion and to tackle the commercialisation 'Valley of Death'.

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