

Exchange

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Side-by-side for safety

When it comes to studies on research and development, pharmaceutical companies sit up and take notice. And with her new work on the collocation—that is, having the two functions happen in the same geographic location—of R&D and manufacturing in the pharma industry, Gunneeta Vasudeva and her coauthors certainly have their attention.

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Vasudeva, who studies organizational arrangements for technological innovation, teamed up with her University of Minnesota colleague Enno Siemsen (a specialist in the management of knowledge within organizations) and The Ohio State University's John Gray (who has studied how organizational and geographic boundaries relate to manufacturing process compliance), to empirically measure the benefits and drawbacks of locating these two crucial business functions together. In their working paper, "Collocation Matters: Conformance Quality and the Interdependence of R&D and Manufacturing in the Pharmaceutical Industry," they find that the benefits of collocation are relatively intuitive: as organizational experts have long agreed, by keeping your R&D and manufacturing teams close together, you can increase cooperation and communication, often ironing out small problems and adapting to challenges very quickly. As part of their large-scale empirical research using archival data and in-depth interviews, the academics spoke with four top-level executives who had all worked in organizations that employed collocation and ones that did not. All four reported a strong preference for collocation, with one telling the researchers collocation

allowed for a "discourse" that "resulted in better operator awareness," so the teams at the company's collocated site "learned to troubleshoot faster" and prevent a "situation getting out of control" or any need for a shut down. Another executive said that collocation "allows for rapid exchange of product and process knowledge and history in both locations"—that is, it allows for a shared, institutional knowledge on which both teams can draw.

The drawbacks to collocation, however, were a little tougher to spot. The researchers argue that the biggest potential drawback came in not having a dedicated, single space for each function; that is, previous literature suggested a location's focus on either manufacturing or coming up with new and improved products could be lost when everything seemed to be of equal importance. As they put it in their paper, under review at *Management Science*, when the "white coats"—lab techs—and the "blue coats"—the manufacturing workers—work side by side in collocated spaces, the function of the whole operation may seem a bit blurry. Under such conditions, many have argued that each function may suffer. But, as the first executive quoted above told the professors about another, separate-facility organization in which he had worked, "we were more numbers-focused, and when issues arose, we didn't get the collective approach to solving a problem..." For his team, this meant "success rates [at both] yield and decision making were lower" when R&D and manufacturing were "siload."

Indeed, when Gray, Siemsen, and Vasudeva looked at manufacturing conformance quality (the extent to which products shipped from a given plant without defects), they were able to solve their riddle. Controlling for variables at the level of the industry, plant, and firm, they found that, as the executive had speculated, the problem-solving benefits of collocation outweighed any loss of focus that might arise. One key takeaway they note is that their "discovery casts further doubt on the notion of the separability of manufacturing and R&D activities, a notion that has been essential in the movement toward... outsourcing and offshoring..." Vasudeva goes on to explain that "Companies may need to think more carefully about the trade-offs between costs and safety. Reducing costs

From the Director



Exchange, a publication from the Medical Industry Leadership Institute, features dialogue on medical industry research and application. The content is a summary of research from both academia and the medical industry, followed by commentary on the importance

of the research and its application. Topics highlighted in *Exchange* will span all sectors of the medical industry and include commentary from leaders in the field as well as researchers from the University of Minnesota and other academic institutions.

This issue highlights research by Assistant Professor Gunneeta Vasudeva in the Strategic Management and Organization Department and Associate Professor Enno Siemsen in the Supply Chain and Operations Department at the Carlson School of Management. In their research, they use pharmaceutical patent and FDA inspection data to study the quality outcomes of pharmaceutical plants that are collocated with research and development.

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may result in higher profitability, but lower the safety and quality of products." In the context of internationalization, if companies do want to move toward offshoring, she says, they'd do well to consider offshoring their entire operation in order to maintain the benefits of collocation. Gray points out, "Our study examines separation of R&D and manufacturing within a firm, and not necessarily across great geographic distance, but outsourcing manufacturing actually puts a firm boundary between these two activities, making shared goals and free flow of information much less likely." With outsourcing, he notes: "Information flow can be restricted due to intellectual property concerns and a lack of shared goals, incentives, organizational culture, and trust." Which is to say, when it comes to innovation and quality control in drug production, collocation, whether at home or abroad, can, in many ways, cut down on waste and increase safety, leaving us all feeling a bit better. ■

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Commentary

by Mike Hess, Vice President, Bradycardia R&D, CRDM Division at Medtronic



Dr. Vasudeva and her colleagues have addressed an important issue, the relationship of physical adjacency to the overall productivity of a cross-functional team, in this case specifically the R&D and manufacturing aspects. Studies of these kinds of “soft” aspects of how to set up or operate a company are tricky, and obviously the recent personal experiences of the subjects will influence their responses.

The findings are intuitive, as the authors observe that the co-location of these functions would have benefit to both and the paper articulates some of these as related to problem-solving and a more quick response ability to solve problems. I would offer that there may be other operational benefits as well to the co-location. For one, the development of talent is more robust. Engineers who are moving up the R&D organization can have the opportunity to manage a large direct labor team, or work with supply chain, and broaden their skills, without requiring a relocation or possibly expatriation assignment. More senior site management over both functions will develop more general manager-like skills with the different types of work under their responsibility.

There can also be operational financial benefits to the company. Given the fixed infrastructure costs for large-scale manufacturing facilities—your buildings, IT systems, management, etc.—the addition of R&D staff can come at a small marginal cost, where those same engineers in a dedicated facility would incur

much more overhead for the same work. Also, some equipment may be leveraged between the two disciplines to cost advantage—both for their dedicated work and to better equip the R&D team to design for the final production environment.

However, the article does skirt some practical limitations to this approach. There are other functional co-locations that are equally valuable. For example, close collaboration between R&D and marketing is critical to capturing the voice of the customer and designing the right products. Other team members, such as those who design clinical studies, or lead regulatory submissions, also benefit from proximity to the R&D team (though they can't all always be in the same building). The authors allude to off-shoring of some work, but it is a reality that the most appropriate location for manufacturing product may not always have a ready supply of talent for the engineering or other business functions.

Ultimately, large companies should consider how to partition where work is done and put an R&D competency responsible for DFM within the manufacturing facility, with other, more upstream work in other locations to take advantage of other collaboration options. Regardless of where the individuals reside physically, this article reinforces the fact that collaboration between the R&D and manufacturing groups is critical to speed decision making, improve quality, and solve problems faster. ■