

5-2002

# An Emerging Photonic Industry: The Success Vulnerability Paradigm

David Reid

*Rochester Institute of Technology*

Richard DeMartino

*Rochester Institute of Technology*

Stelios Zyglidopoulos

*Rochester Institute of Technology*

Follow this and additional works at: <https://scholarworks.rit.edu/other>

---

## Recommended Citation

David McHardy Reid, "An emerging photonics industry: the success vulnerability paradigm", Proc. SPIE 10313, Opto-Canada: SPIE Regional Meeting on Optoelectronics, Photonics, and Imaging, 1031351 (9 May 2002); doi: 10.1117/12.2283977;

This Conference Paper is brought to you for free and open access by the Faculty & Staff Scholarship at RIT Scholar Works. It has been accepted for inclusion in Presentations and other scholarship by an authorized administrator of RIT Scholar Works. For more information, please contact [ritscholarworks@rit.edu](mailto:ritscholarworks@rit.edu).

# PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

## An emerging photonics industry: the success vulnerability paradigm

David McHardy Reid

David McHardy Reid, "An emerging photonics industry: the success vulnerability paradigm," Proc. SPIE 10313, Opto-Canada: SPIE Regional Meeting on Optoelectronics, Photonics, and Imaging, 1031351 (29 August 2017); doi: 10.1117/12.2283977

**SPIE.**

Event: Opto-Canada: SPIE Regional Meeting on Optoelectronics, Photonics, and Imaging, 2002, Ottawa, Ontario, Canada

## An Emerging Photonics Industry: The Success Vulnerability Paradigm

David McHardy Reid, College of Business, Rochester Institute of Technology, NY, 14623

Richard De Martino, College of Business, Rochester Institute of Technology, NY, 14623

Stelios C. Zyglidopoulos, College of Business, Rochester Institute of Technology, NY, 14623

This paper sets out to examine the internationalization processes of a sample of companies drawn from a cluster of photonics companies. Twenty CEOs were interviewed, face to face. Using content analysis combined with a grounded theory influenced approach the texts of these interviews were appraised. In this way the internationalization theory was critiqued and some insights developed into the international strategy process. Some salient findings emerged, some of strategic significance to the companies in the photonics cluster.

### Cluster Reputation Harnessing

According to our informants in the industry, Reputation is a very important competitive dimension in the photonics related industries especially in distant markets. However, these photonics companies are Small Medium Enterprises (SMEs) and since SMEs rarely have much of a reputation of their own, either because they do not have the resources to promote more aggressively, or because they have been recently founded and are still unknown to a greater circle, cluster reputation can serve as a substitute for company reputation. And, the Rochester cluster seems to have a reputation for quality in photonics. As one executive revealed,

*Rochester is seen to some degree throughout the photonics market in the world as being one of the centers of excellence of optics .... A place where optics is done well, you think of the bay area, you think of Boston you think of Germany. Rochester is one of them.*

This reputation of the cluster can assist the internationalization process of SMEs of the area in three, at least, ways. First, it can assist by reducing the legitimating expenses required by a new firm. Second, it can allow a firm to charge premium prices and position itself on the higher end of its respective market. And, third, it facilitates the finding (or the 'being found') by customers.

In reducing the legitimating costs of a new SME, cluster reputation assists in this respect because foreign customers or potential collaborators in the field must be aware of the photonics arena in Rochester, if nothing else because of Xerox, Kodak, and Bausch & Lomb, whereas, it is highly unlikely that the same foreign parties will have heard of a newly founded firm in the area with 50-100 employees<sup>1</sup>. Therefore, this familiarity with the area provides legitimacy for a firm located in that area. In other words, between two equally unknown firms, a foreign customer will feel 'safer' in working with a Rochester firm rather than working with a firm located in another area of the country that is not known for its photonics expertise. In the absence of any other information, location delivers credibility. This can reduce legitimating costs for SMEs because their needs to advertise, promote themselves, and establish their own reputation as an internationalizing vehicle are reduced.

Second, cluster reputation enables photonic firms of the area to charge premium prices and position themselves on the higher end of their respective markets. As the more labor intensive, low cost, standardized activities relocate to developing areas of the world, like China, U.S. firms come under intense price pressures. Executive interviewed complained they are typically competing against foreign manufacturers with lower prices. Therefore, the ability of US firms to move towards a higher value added position in the competitive space, over the long term, could play a significant role in their survival and enhance competitiveness in a globalized environment. Cluster reputation assists this ability of photonic

---

<sup>1</sup> Although, a number of relatively small but highly specialized firms of the area do have an international reputation of their own, something that only adds to the area's reputation for photonics.

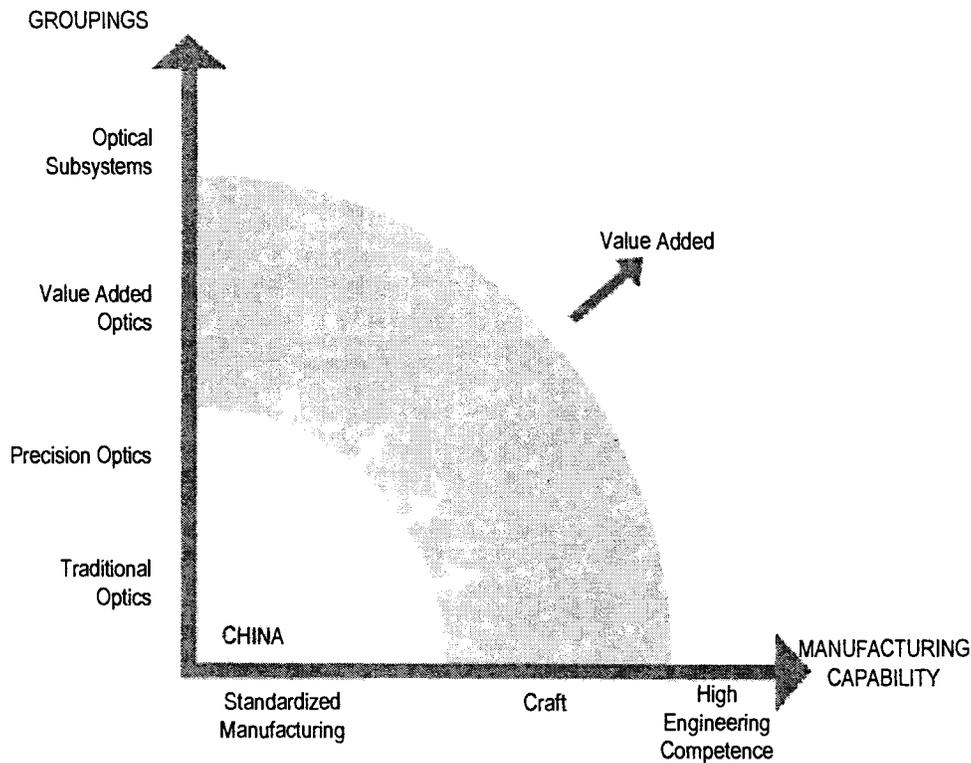
firms to move towards a higher value added position because it attracts photonics related talent to the area, and helps generate a 'critical mass' of expertise, which can be drawn on by SMEs in their internationalization efforts.

Third, these photonics SMEs, quite often, are not actively involved in trying to locate and sell to foreign customers. A great number of SMEs, just wait to be discovered by prospective customers, or by a prospective agent at photonics trade shows, which all of the firms investigated use as a marketing tool. In these situations, cluster reputation can be seen as an 'heuristic' that facilitates the search by potential foreign customers and distributors for the 'right' – from their point of view – company to do business with. So, cluster reputation can assist with the making sense, by foreign customers and distributors of the plethora of offerings available internationally. And, since the cluster's reputation is a positive one, for photonic related products, it should be expected that it does not act simply as a 'heuristic', but most importantly as a positive rule of thumb for foreign parties trying to locate an international collaborator within the photonics field.

### Strategic Opportunity and Vulnerability

Figure 1 depicts how the more arcane the technology becomes the more value is added in the execution. On the vertical axis we can see that the photonic SMEs exist in four gradations: Traditional Optics, Precision Optics, which takes the art to a higher degree, Value Added Optics which refers to the incorporation, typically, of higher value lasers. Optical Subsystems require more engineering and component wizardry. To drive along the X axis requires increasingly elevated engineering skills.

Figure 1 Manufacturing Capability and Operations

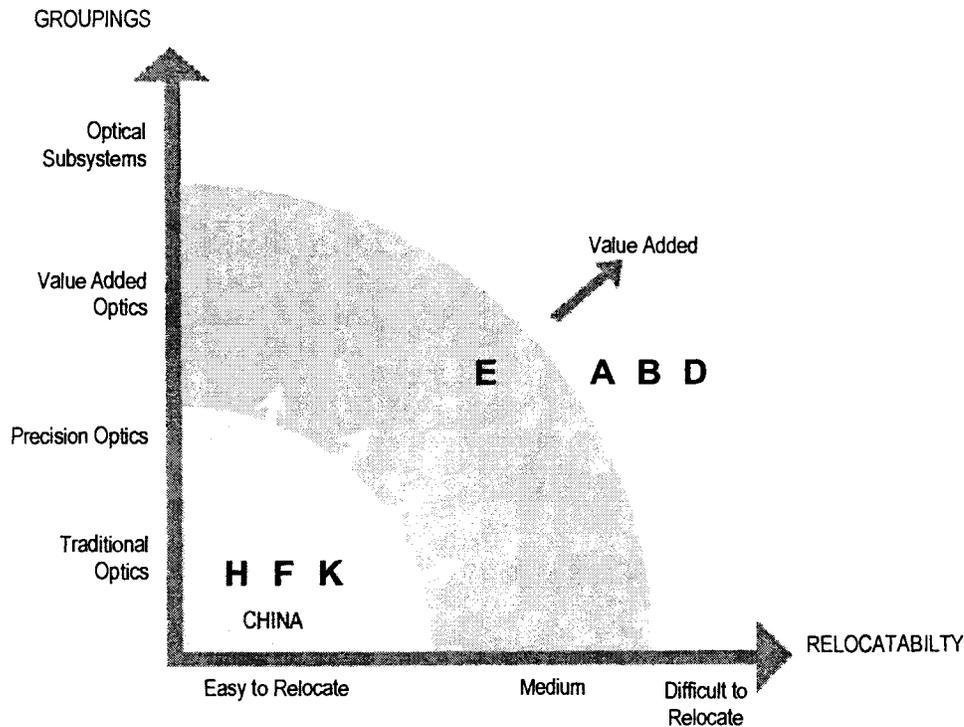


Basic optics is now a low value added technology and as Figure 2 illustrates is easily relocated to lower cost manufacturing countries. China has been singularly successful in attracting this kind of industry. Indeed, two of these sampled companies already own and control operations there. Both of these axes can be thought of as axes of strategic vulnerability with zones of concentration close to the origin portending high vulnerability. Looked at from the perspective of say China these axes are symbols of

opportunity as PRC-based businesses begin to push along the axes. As the President of Corning Greater China recently revealed to the first author:

*We have Chinese competitors in all of our businesses. Which speaks to just how far and quickly the Chinese have come in driving up the technology curve. In a relatively short space of time it has gone from the market [China] being too unsophisticated for Corning to enter and now it has Chinese competitors.*

Figure 2 Strategic Vulnerability



So, as Figure 2 indicates companies H, F, K appear to be vulnerable to being replaced by lower-cost foreign enterprises. The more secure situation is that of A, B, and D, for example, which remain ahead of the strategic vulnerability curve. As the curve is constantly radiating outwards, the zone of operations of the emerging economies is increasing. Therefore companies hoping to survive gallantly must strive to stay outside this expanding envelope.

### Conclusions

When we conceived this study there were a number of tacit hypotheses that we held. Specifically we expected these industrial/technical markets to be so well defined that the companies would be de facto international. For example, several of our sample companies make prisms devices for fiber optic cable relays. There are only five or so producers of this end product and they are spread across the globe. To that extent this expectation was met. We expected that the senior managers, coming, in some cases, from international companies, such as Kodak, Xerox as well as Bausch and Lomb, might also make them more internationally oriented. There was little emergent evidence that this was true.

Having performed this study in July and August 2001 and conducted a preliminary analysis we have learned much about this cluster of photonics companies. The study has revealed much about the internationalization process they go through as well as the stages they are at and their attitudes towards

engaging in international business. One emergent result is that we have identified a useful success: vulnerability paradigm.

Next we shall complete the analysis of the remaining seven interview transcripts; review the questions we asked, before following with a second wave of thirty more interviews. This, we envisage, will provide an unrivalled understanding of this important industry.