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## Mission
*The Industrial Geographer* (ISSN 1540-1669) publishes articles and research notes that focus on a broad range of economic issues across all economic sectors and explore issues at all scales from the firm to the globe. The journal encourages submissions that are theoretically driven empirical research, papers with an applied and planning thrust, and papers that explore directions for future research. Individuals interested in organizing a special issue should contact the editors or a member of the editorial board.

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# Estimating the Cost and Benefit of Hosting Olympic Games: What Can Beijing Expect from Its 2008 Games?

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## ABSTRACT

Cities who host the Olympic Games must commit to significant investments in sports venues and other infrastructure. It is commonly assumed that the scale of such and event and the scale of the preparation for it will create large and lasting economic benefits to the host city. Economic impact studies confirm these expectations by forecasting economic benefits in the billions of dollars. Unfortunately these studies are filled with misapplications of economic theory that virtually guarantee their projections will be large. Ex-post studies have consistently found no evidence of positive economic impacts from mega-sporting events even remotely approaching the estimates in economic impact studies. For the 2008 Summer Olympic Games in Beijing, it appears China will take these massive investments in venues and infrastructure to a new level. If organizers of the Beijing Games base their expectations on economic impact studies from previous Olympics, they are sure to be disappointed. The potential for long term economic benefits from the Beijing Games will depend critically on how well Olympics related investments in venues and infrastructure can be incorporated into the overall economy in the years following the Games.

## INTRODUCTION

"Mega-events" such as the Olympic Games require large sums of public money to be spent on venues and infrastructure improvements. In order to justify the use of public funds, economic impact studies are often commissioned which invariably project large inflows of money that will have a long-term positive effect on the economy by such means as job creation and visitor spending. Events of the scale of the Olympic Games, which attract large amounts of money from outside a local economy, are forecasted to have economic impacts in the billions of dollars.

Ex-post studies, however, have consistently found no evidence of positive economic impacts from mega-sporting events even remotely approaching the estimates in economic impact studies. In a study of the impact of Super Bowls on local economies, Philip Porter (1999) found "no measurable impact on spending associated with the event. The projected spending and spillover benefits of regional impact models ever materialize" (Porter 1999, p. 61). Porter's explanation is that capacity constraints in the hotel industry cause room prices to increase with no change in occupancy rates. Higher rates contribute to the crowding out of regular traffic and net spending in areas other than hotel rooms changes little or not at all.

Longer term sports programs, usually involving stadium subsidies to attract or keep professional teams, have also failed to deliver on projected economic benefits. Even for cities that usually are considered success stories for sports development strategy, such as Baltimore (Hamilton and Kahn 1997) and Indianapolis (Rosentraub 1994), empirical research does not find evidence of statistically or economically significant positive impacts.

In July of 2001, Beijing was awarded the 2008 Summer Olympic Games. Most people assume that such an event will bring enormous economic benefits to the host city not just during the event, but for years afterward. "The scale of the organisation, facilities and infrastructure required for such a huge undertaking are such that the Games cannot but have substantial economic effects" (Sydney 2000 Games, p. 2). But what exactly are these economic effects, and how do they affect the quality of life of local residents?

The relevance of studies such as these to the Beijing games depends in part on the similarity of the economic conditions in China to previous hosts. It seems logical that a less developed country will have more to gain from long term growth opportunities. Matheson and Baade (2003) argue, however, that the prospects of mega-sporting events are even worse for developing countries. The opportunity costs of providing state of the art facilities are much higher and lack of modern infrastructure requires significant additional investment.

In what follows, misconceptions that lead to the overly optimistic forecasts of economic impact studies will be explained, with a closer look at impact studies from recent Olympic Games. Finally, the plan for the Beijing Olympics will be examined to see how China's experience may compare to other Games.

## THE FALLACY OF ECONOMC IMPACT STUDIES

Economic impact studies have become standard operating procedure for supporters of public funding for sports teams or events. Their prevalence has led to acceptance of their findings by the public, media, and even academic circles with little or no critical evaluation. Because of the high profile of such events, large (and positive) economic effects are taken as given; the studies confirm what is already believed. Short et al (2000) provides an example of a typical statement: "The promise of worldwide exposure and economic gain has made hosting these major and regularly scheduled sporting affairs a lucrative goal for aspiring cities around the world" (Short 2000, p. 320).

Sports economists, on the other hand, have found economic impact studies lacking both in theory and practice. Ex-post studies have consistently failed to find evidence of any economic benefits related to sports teams and facilities. In examining recent retrospective studies, Coates and Humphreys (2003, p. 6) concluded "building new sports facilities and attracting new professional sports teams did not raise income per capita or total employment in any US city." A closer look at the methodology of such studies reveals an appealing but fundamentally flawed line of economic reasoning that virtually guarantees a forecast of large economic benefits.

The simple elegance of economic impact studies, injections of money circulating over and over in an economy to create a multiplier effect, has an alluring "something-for-nothing" quality that is hard to refute. The mistakes made in economic impact studies are so numerous that making a lucid counter-argument can be difficult. Critics have focused primarily on the following areas of misapplication: treating costs as benefits, ignoring opportunity costs, using gross spending instead of net changes, and using multipliers that are too large.

In many cases the cost of constructing stadiums, which to a large degree is spent on hiring construction workers and purchasing materials from local suppliers, is counted as a benefit to the local economy. This is arguably the most egregious error in economic impact studies. It is backward-looking in that it looks at the production aspect of the project and ignores the effect of the actual consumption of the product. The following quote exemplifies the bizarre logic of this type of accounting:

> *The initial construction of a $10 million sports facility provides an initial impact of $10 million on the local economy. This is the direct impact. Clearly, the construction of the facility will require concrete, steel, construction workers, and so forth. The money spent on these materials and services comprises the indirect expenditures, or the indirect impacts.* (Hefner 1990, pp. 4-5)

Clearly, the initial cost of the project has now been counted as a benefit not once, but twice; directly and indirectly. If the economy is at full employment, the workers needed for the stadium would have been doing something else: public investment crowds out private investment. During a period of high unemployment it could be argued that the project gives jobs to people who would otherwise be idle, in which case the expense of the stadium is at best a transfer from one group to another; still not a benefit. And because this method ignores the function of the project, the same employment effects could be accomplished if the government would “simply give the money to the workers as unemployment insurance, or employ half the workers to dig a hole and the other half to fill it up” (Noll and Zimbalist 1997a, pp. 61-62).

Counting construction costs as a benefit is also an example of a more general error of economic impact studies: failure to recognize opportunity costs. Alternative uses of local dollars such as a hospital, education funding, or even letting taxpayers keep their money and spend it on what they want are not considered. Instead, dollars for the initial investment are assumed to have come out of thin air. Will the economic impact of the expenditure on the project be fundamentally different from the impact that would have occurred if local residents had spent an equal amount in the economy? The answer is yes, but not necessarily in the way the economic impact model suggests. The effect will be redistributive, putting money into the construction sector, and taking it away from other sectors, with the fairly safe assumption that expenditures by the general population would be more broad-based and thus less obvious.

Obtaining a value for the initial impact of a team or event is the first step in any economic impact study. The initial impact is then magnified through the use of a multiplier, based on the idea that money brought into a local economy will be respent over and over, becoming income for others in the economy.

In this way a multiplier also magnifies the errors made in calculating initial impact, especially by once again failing to recognize opportunity costs. The multiplier is applied to any new spending in the economy regardless of the source. If the multiplier does not depend on the spending source, then it is useless in the comparison of alternative projects—the multiplier cancels out.

Critics of economic impact studies have used proper application of basic economic principles to show that the methodology of impact studies greatly overestimates the impact of sports teams, stadiums, and events, but they have accepted the mercantilist premise of economic impact studies that the path toward wealth is through increasing exports. Mercantilist thought denies the existence of mutually beneficial exchanges. Trade becomes a zero-sum game where the winner is the seller and the loser is the buyer. All that matters is the money trail. Since local spending does not bring money into the economy, spending by local consumers is meaningless: "Their expenditure associated with the sports events is merely likely to be switched spending, which offers no net economic stimulus to the community, and it should not be counted as economic impact" (Crompton 1995, p. 26). By elevating the importance of exports over the local consumption critics have embraced the notion that only projects that generate exports are valuable.

If increasing net exports is the way sporting events benefit a local economy, then the Olympic Games should be an event that makes a noticeable contribution to an economy. Perhaps no other sporting event draws more visitors so geographically dispersed or showcases the host city as visibly as the Olympics. Economic impact studies prepared for recent Olympic Games contain many of the mistakes listed above. Not surprisingly the projected impacts have not come to fruition.

Why does the use of economic impact studies persist even in the presence of harsh criticism from the economics field? Delaney and Eckstein (2003) propose powerful groups who will benefit from the project, which they refer to as "local growth coalitions," use these studies as one tool in promoting events. While the economic impact studies "do not destroy the legitimacy of academic research, they rationalize continuing to pursue questionable social policies" (p. 37). The air of authority with which the findings of the study are presented create enough confusion in the public to deflect the criticisms of economists.

In addition to the standard projections of economic impact, Olympic studies also include longer term benefits sometimes referred to as the "Olympic Legacy." These legacy effects, derived from positive publicity from the Games, include increased tourism after the Games, attraction of business, and infrastructure investments that improve the urban environment. Legacy impacts are generally not incorporated into the economic impact numbers, but rather offered as an additional, unquantifiable benefit. The lack of any ex post study that finds improvements in economic growth or living standards due to mega-events should cast some suspicion on the legacy effects of Olympics, or at least the ability of such effects to be transformed into real economic benefits to the local economy. Baade and Matheson (2002) found "the evidence suggests that the economic impact of the Olympics is transitory, one-time changes rather than a 'steady-state' change" (p. 28).

It has also been argued that the Olympic Games can advance a city in the hierarchy of "world cities." According to Short et al (2000), "some of the most important global spectacles are sports mega-events such as the Olympics which reach a worldwide television audience and offer perhaps the best stage upon which a city can make the claim to global status" (p. 320). The world cities concept is closely related to the Olympic legacy, especially regarding tourism, which is seen as a modern arena of economic competition among cities. "During this latest phase of globalization, when tourist attractions are highly prized, many cities are repackaging the old with new accommodations or accessibilities to re-present themselves as living history and to take advantage of the global tourism economy" (Short 2000, p. 319). It is easy to see how a city such as Beijing would find the Olympics appealing in this context.

## A BRIEF EXAMINATION OF ECONOMIC IMPACT STUDIES FROM RECENT OLYMPICS

### *Atlanta (Summer 1996)*

For the 1996 Summer Games in Atlanta an economic impact study was prepared for the state of Georgia. As one might expect, the study predicted significant economic benefits to the host city and state. The Games in Atlanta did have a definite impact on net exports in Georgia, but there is precious little evidence of extraordinary economic performance in Atlanta due to the Games, bringing into question who actually benefits from increased exports and how this affects the local economy.

In an ex post study, Baade and Matheson (2002) found a modest boost in employment that was short-lived. Even according to their most positive estimates, "the City of Atlanta and the State of Georgia spent $1.58 billion to create 24,742 full- or part-time jobs which averages out to $63,860 per job created (pp. 28-29). A recent study by the Upjohn Institute estimates that a new job adds about fifty cents in economic benefit to a local economy for every dollar of wages, so job creation alone certainly cannot justify the public expense for the Atlanta Games (Persky 2004, p. 1).

Table 1 summarizes the economic impact projections of the Atlanta study. The impact of the Atlanta Games was projected to be $5.1 billion. The source of the impact was nearly equally divided between direct spending by the Atlanta Committee for the Olympic Games (ACOG) for staging the games and spending by out-of-state visitors.

**Table 1: Projected Output Impact of 1996 Olympics on Georgia's Economy ($1994)**

| Expenditure Category | Total Spending | Direct and Indirect Expenditures | Induced Output Impact | Total Output Impact |
|---|---|---|---|---|
| Direct Spending by ACOG | 1,529,758,000 | 1,141,903,000 | 1,444,322,740 | 2,586,225,740 |
| Other Spending | 20,000,000 | 20,000,000 | 23,944,000 | 43,944,000 |
| Spending by Out-of-State Visitors | 1,265,363,037 | 1,145,994,764 | 1,364,364,452 | 2,511,359,220 |
| Grand Total | 2,815,121,037 | 2,307,897,764 | 2,832,631,192 | 5,141,528,960 |

Source: Atlanta Committee for the Olympic Games and The Selig Center for Economic Growth, (1995).

Direct impact was primarily through spending by ACOG, whose budget was comprised of private funds. While expenditures were adjusted downward to account for money that flowed directly out of Georgia, the study made no attempt to determine what percentage of the funding came from sources in Georgia. From a net inflow standpoint, this led to overestimation of economic impact. Ticket sales comprised 25% of ACOG revenues and are the largest single source of measurement error (see Table 2). Tickets purchased by Georgia residents should not be included in impact calculations based on net exports.

Fiscal impacts were not reported. This may be because state and local tax revenue projections of $200 million by ACOG did not cover the $353.9 million in government spending for the games ($92.2 million was federal expenditure).

Spending by out-of-state visitors before, during, and after the Olympics was estimated at $1.265 billion and only slightly adjusted downward for leakages to $1.146 billion. The estimates make no attempt to assess the impact the Olympics will have on other tourism; for the rest of the economy it is business as usual.

In reality, data and anecdotal evidence strongly suggest the Olympics had a significant crowding out effect on the rest of the tourism industry. Table 3 shows convention attendance in Atlanta, which had been increasing steadily over the previous ten years, fell ten percent from 1995 to 1996. Hotel occupancy rates fell from 72.9% in 1995 to 68% in 1996 despite the Olympics. Macroeconomic indicators in Georgia and Fulton County show no discernible break in the pattern of per capita income growth or unemployment rates (State of Utah 2000). Due to the disruption caused by the Olympics, hotels and restaurants that would be expected to benefit from increased tourist traffic were actually hurt. "In other parts of town, many hotels and restaurants reported significantly lower than normal sales volume during the Games. Even shops and resorts in areas up to 150 miles away reported slower than normal

**Table 2: Sources of Budget for Atlanta Olympics**

| Source | Percent of Budget |
|---|---|
| Broadcast Rights Fees | 33.0 |
| Cash Paid by Sponsors | 29.5 |
| Ticket Sales | 24.7 |
| Licensed Merchandise | 1.9 |
| Other Revenues | 11.0 |

*Source: Atlanta Committee for the Olympic Games (1996)*

**Table 3: Atlanta Tourism Indicators**

| Year | Number of Conventions | Convention Attendance | Number of Visitors | Hotel Occupancy |
|---|---|---|---|---|
| 1988 | 1,623 | 1,737,800 | N/A | N/A |
| 1989 | 1,662 | 1,800,792 | N/A | 61.80% |
| 1990 | 1,721 | 1,883,546 | N/A | 62.20% |
| 1991 | 1,854 | 2,152,386 | N/A | 60.40% |
| 1992 | 2,105 | 2,503,522 | N/A | 63.10% |
| 1993 | 2,321 | 2,753,412 | 6,058,000 | 67.40% |
| 1994 | 2,410 | 2,985,641 | 7,009,900 | 71.90% |
| 1995 | 2,560 | 3,102,455 | 7,342,000 | 72.90% |
| 1996 | 2,280 | 2,780,000 | 6,695,000 | 68.00% |

*Source: State of Utah, Governor's Office of Planning and Budget*

business during the summer of 1996" (French and Disher 1997, p. 390).

Along with crowding out on the demand side, local businesses and workers must also deal with temporary entry on the supply side. Although the Atlanta economic impact report makes no mention of entry by either workers or firms, the Atlanta experience serves as an example of how entry can bring into question if area residents actually benefit from growth in the tourism sector. The Centennial Olympic Park in downtown Atlanta served as the focal point for entry of corporations who sponsored the Games. To some extent the Olympics in Atlanta were self-contained. Entry of corporations and workers from outside the Atlanta area made the Olympics an economy unto themselves. Much of the income would go to firms and workers who are not permanent residents of the local economy.

Many local businesses that did not have prime access to Olympic venues were caught in a vice between a reduction in regular business on the one hand and increased competition from entry of firms on the other. The lofty projections of the impact of the Games on the Atlanta economy gave local businesses unrealistic expectations about how they would be affected. The reality was so much below expectations that some vendors who leased vending space for the Olympics from the city sued Atlanta, claiming they were misled about business prospects. Entry drove out above normal profits and those who paid in anticipation of them were greatly disappointed (*Lubbock Avalanche Journal* 1997).

Atlanta's Olympic experience is consistent with Porter's argument concerning hotel capacity constraints discussed earlier. Hotel revenues during the Games nearly doubled while occupancy rates stayed about the same (State of Utah 2000, p. 17). In this way, sectors that have fixed costs high enough to discourage entry for a temporary event are able to capture short-term monopoly rents through higher prices. Just like real estate, hotels become a scarce resource that captures rents. Industries with lower entry costs, such as restaurants or merchandise sales, have monopoly profits competed away. Even when there is a net increase in visitors, impacts are focused on the lodging industry while other sectors have any impact from visitors countered by reductions in regular business.

Legacy effects listed in the Atlanta study emphasized three categories: facilities, media exposure for Atlanta and the state of Georgia, and community benefits. "The long-term beneficial effects on decisions regarding investment, trade, corporate relocation, government spending, convention sites, the location of major sporting events, and vacation plans will likely be among the most enduring, yet statistically untraceable, legacies of the Games" (Humphreys and Plummer 1995, p. 6).

The study also claims, "world-class facilities will be among the most enduring legacies of hosting the 1996 Olympics" (Humphreys and Plummer 1995, p. 4). The facilities noted by the study include the Horse Park, Shooting Range Complex, and Rowing Center; none of which are likely to be heavily used after the Games. The primary facility, Olympic Stadium, became the new home stadium for Atlanta Braves baseball. Instead of providing a venue of high quality and instant historical significance for future track athletes, the stadium now serves as yet another chapter in the story of public subsidies for professional sports teams. Overall, Baade and Matheson (2002) found "only 31 percent of the ACOG expenditures were in areas that could reasonable be expected to provide a measurable economic legacy" (p. 30).

Atlanta's media exposure from the Olympics was not all positive. Traffic problems were oft-cited during the first week, but then overshadowed by the Centennial Park bombing. "As a result of the traffic congestion, administrative problems, security breaches and over-commercialization, Atlanta did not receive the kind of media attention it would ideally have liked" (Essex and Chalkey 1998, p. 194).

### *Salt Lake City (Winter 2002)*

The State of Utah included expected migration in its economics impact study of the 2002 Winter Games in Salt Lake City. The relationship between jobs and population growth was not lost on those who prepared Utah's economic impact report. In fact the job growth projections were used to estimate the population growth "based on the historical relationship between job growth and population growth" (p. 15). What was lost is that job creation is not necessarily a net benefit to the current residents of Utah if population growth absorbs the jobs.

Table 4 shows population and employment impacts from 1996 to March of 2002. There are roughly three new jobs available for every four migrants into Utah during this period, and about eleven jobs for every ten migrants between the ages of 18 and 65. Migrants of working age are projected to be slightly less than the number of new jobs created. If the majority of migrants between the ages of 18 and 65 plan to work, then most of the job creation due to the Olympics is countered by an increase in the labor force. The employment prospects of current residents of Utah improve only slightly.

The Utah study cites many of the same Olympic legacy effects as in the Atlanta study with one interesting difference. The Utah study surprisingly predicts population growth from the Olympics will be temporary, despite the transformational effect they will have on the economy. Instead, Olympics related migration into Utah "declines to zero within a year of the Games" (p. 2). Urban growth was already putting a strain on infrastructure and resources before the Games. Evidently the Olympic legacy that showcases your city to the world only attracts people when you want them to be there.

### *Sydney (Summer 2000)*

The *Economic Impact Study of the Sydney Olympic Games* by the University of Tasmania along with Arthur Andersen (1999) purports to have been prepared "using the most up-to-date modelling techniques . . . and detailed financial information available" (p. 1). Unfortunately, it was also prepared using the most fundamental flaws in economic impact analysis, just like all of the studies that came before.

**Table 4: Expected Job Creation and Migration due to the Utah Olympics**

| Change In: | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | Jan-02 | Feb-02 | Mar-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Pop. | 103 | 1,572 | 3,231 | 7,038 | 9,781 | 16,661 | 3,802 | 337 | 24,034 | 31,695 | 12,017 |
| 18-65 | 71 | 1,042 | 2,127 | 4,464 | 6,404 | 10,925 | 2,424 | 233 | 15,322 | 22,983 | 7,661 |
| Jobs | 78 | 1,148 | 2,383 | 5,243 | 7,317 | 12,590 | 6,409 | 256 | 15,415 | 25,070 | 9,655 |
| Jobs/Pop | 0.76 | 0.73 | 0.74 | 0.74 | 0.75 | 0.76 | 1.69 | 0.76 | 0.64 | 0.79 | 0.80 |
| Jobs/18-65 | 1.10 | 1.10 | 1.12 | 1.17 | 1.14 | 1.15 | 2.64 | 1.10 | 1.01 | 1.09 | 1.26 |

*Source: State of Utah, Governor's Office of Planning and Budget*

The report identifies three sources of direct expenditure: infrastructure construction, operation of the Games, and visits by spectators and participants; along with an induced impact: visits due to publicity and awareness of the Games. All four of these expenditure sources then contributed to the indirect impact (p. 4). (The Sydney and Atlanta studies reverse the use of the terms "indirect" and "induced.") Revenues from ticket sales and visitor spending, and expenses from construction and Games operation are treated exactly the same. There is no recognition of the opportunity costs of devoting capital and labor resources to the Games.

The study projected an increase in the Gross State Product of New South Wales of $5.1 billion, which coincidentally is the same as the total output impact projected for Georgia from the Atlanta Games. Two fifths of the impact is projected to go towards household income (about $2 billion). Corresponding estimates for Australia as a whole are about 25% higher.

Some legacy effects from the Sydney Games are incorporated into the economic impact calculations. Specifically, international tourism after the Games is considered the third phase of Olympic impact. Other legacy effects are barely mentioned in the study.

The facilities legacy appears to be one of expense. Sydney had plans for the long-term use of many of its venues, but four years later the arena that housed gymnastics and basketball is in receivership and "the State Government has been propping up other uneconomic venues since the Olympics to the amount of about $46 million a year" (*Sydney Morning Herald*).

### *Beijing*

The Beijing Organizing Committee of the Olympic Games (BOCOG) is charged with the planning and administration of the 2008 Games. Detailed information on Olympic financing and predicted economic impact are not available for two reasons— the games are still four years away, and it is not necessary for Chinese officials and Olympic organizers to use the overstated findings of an economic impact study as a public relations tool.

Still, there are some indications of the objectives and the scope of the Beijing Olympics. Essex and Chalkey examined each of the modern Olympic Games (begun in 1896) in terms of their impact on urban change. They divided the Games into three categories: low impact (minimal infrastructure investment, such as Mexico in 1968 and Los Angeles in 1984), Games focusing mainly on additional sports facilities (such as Atlanta in 1996), and Games stimulating transformations of the built environment (such as Tokyo in 1964 and Montreal in 1976). As the Games have grown in stature, so have the ambitions of host cities, so more recent games are more likely to be in the third category. This certainly appears to be the case for Beijing.

Beijing's hopes of the transformational power of the Olympics point to China's ambitions on the world stage. In a classification of world cities, Derudder et al (2003) classify Beijing in their second tier as a "major regional world city" along with cities such as Washington, Hamburg, and Cairo. China may see the Games as an opportunity for Beijing to join or even surpass the three Asian first tier cities: Tokyo, Singapore, and Hong Kong.

According to December 2001 budget forecasts (see Table 5), capital investments on venues and non-sports infrastructure will be US$14.257 billion. Of this only about 13% (US$1.872 billion) will be spent on sports venues and the Olympic Village, which is three times larger than spending on venues for Atlanta. Table 6 shows the planned investment on Olympic venues. Of the 37 facilities listed, 16 are new and almost all but three require some type of upgrade. The biggest projects are Wukesong Indoor Stadium (US$282.65 billion) for basketball and National Stadium (US$246.71 billion) for athletics and ceremonies.

Surprisingly, 60% of the Non BOCOG budget is for environmental protection. It appears that Beijing intends to use the Olympics as a catalyst for environmental improvements in the areas of air quality, water conservation, waste disposal, clean energy development, and "greening up" of the landscape. Transportation improvements are part of the environmental improvements. Plans include expansion of public transportation systems and conversion of city buses to clean energy. The transportation plan addresses a wide range of topics, everything from highway construction and pollution control to teaching English to cab drivers and improve the driving habits of the general population.

Every host of the Olympic games sees it as an opportunity to showcase their country to the world with the hope of encouraging long run tourism or investment increases. For Beijing, emphasis in this area appears to be on the environment and technology, especially communications. The Beijing Olympic Action Plan is more reminiscent of a Worlds' Fair than a sporting event. "We shall energetically develop science and technology and be determined to make the Beijing Olympic Games be a window and stage of showing Chinese new/high-technology and innovative strength simultaneously (p. 2)".

The BOCOG budget (Table 5) actually projects a small surplus, but this does not mean the Olympics will pay for themselves. Included with revenue are subsidies from the national and municipal government (US$50 million from each) and a lottery expected to generate US$180 million. In addition BOCOG receives an indirect subsidy by being granted tax-exempt status. The exemption includes revenues from foreign sources such as broadcast rights and sponsorships. The IOC has also been granted tax-exempt status, which among other things will exempt athletes who win prize money from income tax. This is unusual in that governments often include fiscal impacts, net increases in tax revenue, in their evaluation of economic benefits. For Beijing, fiscal impacts will only exist for indirect spending. This could be considered a more direct form of tax-increment financing.

Of course the capital investments outlined in the Non BOCOG budget dwarf the revenues and expenditures of BOCOG. The question is: how much of the capital investment should be considered a cost of the Olympic Games? Ideally, many of these investments will have long term value, but assessing that value, and more importantly how that value compares to the opportunity cost of foregoing alternative capital investment opportunities, is no easy task.

Often events such as the Olympics are given credit for governments making investments in infrastructure that would have been done much later or not at all. However, the economic conditions that led to these projects not being pursued prior to the Olympics are not likely to have changed greatly.

It may well be the case that Olympics cause investments to be made too soon, instead of preventing them from being made too late. For example, according to BOCOG there are currently 458 hotels with 84,812 rooms in Beijing, which is, "so many hotel rooms that tourists visiting the city will have no trouble finding a place

**Table 5 BOCOG BUDGET**

| Revenues | US$ m | % | Expenditure | US$ m | | % |
|---|---|---|---|---|---|---|
| Television Rights | 709 | 43.63% | Capital Investment | | 190 | 11.69% |
| TOP sponsorship | 130 | 8.00% | Sports Facilities | 102 | | 6.28% |
| Local sponsorship | 130 | 8.00% | Olympic Village | 40 | | 2.46% |
| Licensing | 50 | 3.08% | MPC and IBC | 45 | | 2.77% |
| Official Suppliers | 20 | 1.23% | MV | 3 | | 0.18% |
| Olympic Coins Program | 8 | 0.49% | Operations | | 1419 | 87.32% |
| Philately | 12 | 0.74% | Sports Events | 275 | | 16.92% |
| Lotteries | 180 | 11.08% | Olympic Village | 65 | | 4.00% |
| Ticket Sales | 140 | 8.62% | MPC and IBC | 360 | | 22.15% |
| Donations | 20 | 1.23% | MV | 10 | | 0.62% |
| Disposal of Assets | 80 | 4.92% | Ceremonies and Programs | 100 | | 6.15% |
| Subsidies | 100 | 6.15% | Medical Services | 30 | | 1.85% |
| Others | 46 | 2.83% | Catering | 51 | | 3.14% |
| | | | Transport | 70 | | 4.31% |
| | | | Security | 50 | | 3.08% |
| | | | Paralympic Games | 82 | | 5.05% |
| | | | Advertising and Promotion | 60 | | 3.69% |
| | | | Administration | 125 | | 7.69% |
| | | | Pre-Olympic events and coordination | 40 | | 2.46% |
| | | | Other | 101 | | 6.22% |
| | | | Surplus | 16 | | 0.98% |
| Total | 1625 | | | 1625 | | |

Source: BOCOG, www.beijing-2008.org

BOCOG NON BUDGET (City, Regional, or State Authorities and Private Sector)

| Capital Investments | Construction Cost (US$ m) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
| Planned Non Olympic Expenditure | | | | | | | | | |
| Environment Protection | 1000 | 1000 | 1500 | 1500 | 1500 | 1300 | 827 | 0 | 8627 |
| Roads & railways | 547 | 592 | 636 | 636 | 636 | 313 | 313 | 0 | 3673 |
| Airport | 12 | 30 | 31 | 12 | 0 | 0 | 0 | 0 | 85 |
| Olympic Related Expenditure | | | | | | | | | |
| Sports Venues | | | 213 | 425 | 496 | 283 | 12 | 0 | 1429 |
| Olympic Village | | | | | 111 | 159 | 135 | 38 | 442 |
| Total | 1559 | 1622 | 2380 | 2573 | 2743 | 2055 | 1287 | 38 | 14257 |

that suits their specific needs" (www.Beijing-2008.org). BOCOG also projects that by 2008 there will be 800 hotels with 130,000 rooms. Will there be too many hotels or will tourism growth make up the difference?

Capital infrastructure expenditures are nearly nine times larger than the revenue and operating expenses of the Games; they will not pay for themselves during those two weeks. After the Games the sports venues (see Table 6) will for the most part be turned over to organizations that can utilize the facility for their sports. Was Beijing so lacking in sports and recreational facilities that nearly $2 billion can be productively invested, or could those resources be put to a more effective use? For these organizations having state-of-the-art facilities is surely a wonderful thing, but probably not a wise investment from a social welfare standpoint, as shown by the Sydney experience.

In short the degree to which capital infrastructure investments are worthwhile depends on how useful they can be after the Games. Many projects, such as transportation, communication, and environmental improvements certainly provide social benefits. But if the benefits of such projects outweigh the costs, why would an Olympic Games be necessary for spur the project forward, especially in China, where public affirmation in a political marketplace is not necessary? Instead of being a catalyst for beneficial long-term investment projects, the Olympic Games are more likely to divert attention and resources away from such projects. The extent to which infrastructure investments can be utilized after the Games will be the primary determinant of their economic success.

## CONCLUSION

To date there has not been a study of an Olympics or other large-scale sporting event that has found empirical evidence of significant economic impacts such as increases in household income. For the reasons stated above, it is unlikely that anyone ever will. Is there anything unique about the Beijing Olympics that may make their effect different from previous Olympics, either positively or negatively?

One possible difference is the due to the opportunity cost of labor in China. If surplus or misallocated labor resources exist in China, job creation from the construction and operation of the Games could be considered a transfer with zero net social cost instead of an opportunity cost. Of course this would be true of any project, so the question of whether alternative infrastructure investments would be more valuable remains.

China may have more to gain in the areas of tourism and investment if they are able to project a positive image to the rest of the world. Certainly more potential exists for tourism growth in China than in more established destinations in Europe or North America. This could explain the ambitious plans for infrastructure investment in the areas of environment and technology.

**Table 6 Total Investment in Facilities (US $ M)**

| Sports Facilities | BOCOG Budget | | | Non BOCOG Budget | | | Total |
|---|---|---|---|---|---|---|---|
| | New | Upgrade | Subtotal | New | Upgrade | Subtotal | |
| National Stadium | | | | 246.71 | | 246.71 | 246.71 |
| National Indoor Stadium | | | | 45.67 | | 45.67 | 45.67 |
| National Swimming Center | | | | 107.51 | | 107.51 | 107.51 |
| CIEC Hall A | | 6.00 | 6.00 | | | | 6.00 |
| CIEC Hall B | | 4.00 | 4.00 | | | | 4.00 |
| CIEC Hall C | | 3.00 | 3.00 | | | | 3.00 |
| CIEC Hall D | | 7.00 | 7.00 | | | | 7.00 |
| Olympic Green Archery Ground | | | | | | | 0.00 |
| National Tennis Center | | | | 43.92 | | 43.92 | 43.92 |
| National Hockey Stadium | | | | 68.02 | | 68.02 | 68.02 |
| Olympic Sports Centre Stadium | | 12.00 | 12.00 | 12.99 | | 12.99 | 24.99 |
| Olympic Sports Centre Gymnasium | | 7.00 | 7.00 | | 27.69 | 27.69 | 34.69 |
| Olympic Sports Centre Softball Field | | 8.00 | 8.00 | | 20.16 | 20.16 | 28.16 |
| Ying Tung Natatorium | | 8.00 | 8.00 | | | | 8.00 |
| Beijing Shooting Range | | 3.50 | 3.50 | | | | 3.50 |
| Beijing Shooting Hall | | | | 37.51 | | 37.51 | 37.51 |
| Laoshan Velodrome | | | | 42.68 | 3.31 | 45.99 | 45.99 |
| Laoshan Mountain Bike Course | | 4.00 | 4.00 | | | | 4.00 |
| Road Cycling Course | | | | | | | 0.00 |
| Wukesong Indoor Stadium | | | | 282.65 | | 282.65 | 282.65 |
| Wukesong Baseball Field | | | | 31.77 | | 31.77 | 31.77 |
| Fengtai Baseball Field | | | | 28.48 | | 28.48 | 28.48 |
| Forbidden City Triathlon Venue | | 3.50 | 3.50 | | | | 3.50 |
| Shunyi Olympic Aquatic Park | | | | 74.85 | | 74.85 | 74.85 |
| Beijing Country Equestrian Park | | 15.00 | 15.00 | 101.01 | | 101.01 | 116.01 |
| Shoutiyuan Sports Hall | | | | 34.22 | | 34.22 | 34.22 |
| Beihang Gymnasium | | 1.75 | 1.75 | | | | 1.75 |
| Beitida Sports Hall | | | | 13.03 | | 13.03 | 13.03 |
| Capital Indoor Stadium | | 7.00 | 7.00 | | | | 7.00 |
| Workers' Stadium | | 3.50 | 3.50 | | | | 3.50 |
| Workers' Indoor Arena | | 3.50 | 3.50 | | | | 3.50 |
| Tiananmen Beach Volleyball Ground | | | | | | | 0.00 |
| Qingdao International Marina | | | | 87.59 | | 87.59 | 87.59 |
| Tianjin Stadium | | | | 83.21 | | 83.21 | 83.21 |
| Qinhuangdao Stadium | | | | 36.14 | | 36.14 | 36.14 |
| Shenyang Wulihe Stadium | | 1.75 | 1.75 | | | | 1.75 |
| Shenyang Stadium | | 3.50 | 3.50 | | | | 3.50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Olympic Village | 40.00 | | 40.00 | 442.48 | | 442.48 | 482.48 |
| MPC | | 30.00 | 30.00 | | | | 30.00 |
| IBC | | 15.00 | 15.00 | | | | 15.00 |
| Media Village | | 3.00 | 3.00 | | | | 3.00 |
| Total | 40.00 | 150.00 | 190.00 | 1820.44 | 51.16 | 1871.60 | 2061.60 |

Source: BOCOG, www.beijing-2008.org

A potential negative that may be particularly acute for Beijing is displacement of local residents. The Olympic Village is slated to be converted to housing, but the number of new venues and the environmental program to "green up" the city are certain to decrease the livable space in a city of 13 million. Will Beijing's Olympic lead to temporary inconvenience or even permanent displacement for its poorest residents?

Long term affects such as these involve a great deal of speculation and may be difficult to evaluate even after the fact. What experience does teach us, however, is that China should not expect the types of effects predicted by economic impact studies. Theory and reality show they simply do not exist.

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# Information Accelerated Radical Innovation From Principles to an Operational Methodology

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## ABSTRACT

Recognition since the mid 20th Century that scientific technology is the key driver of economic development and job growth, has sparked increasing collaboration of government, industry and academia in commercial areas outside the historical focus areas of defense, public health and transportation. Notwithstanding, theories and tools to anticipate innovation with certainty are limited primarily to those instances of incremental innovation, for which historical project analysis provides a sound basis for planning. The capability for real time computation and telecommunication makes rapid development and commercialization of breakthrough innovations imperative for competitive success in the globally connected 21st Century environment.

This paper assesses the course of technology from its empirical base in antiquity through the initial scientific technology stage of the 19th and 20th Centuries, to the 21st Century environment governed increasingly by technologies of thinking. It examines the need for and benefits from a new information technology enabled paradigm of Accelerated Radical Innovation (ARI). By combining advanced information and telecommunications technology tools and innovation management techniques in a real-time decision-making environment, the ARI paradigm has the potential to overcome technological, organizational and societal challenges and hurdles, thereby achieving a factor of 10X improvement in radical innovation effectiveness.

Further development of this proposed new paradigm is envisioned through a collaborative multi-university program of research and teaching, in collaboration with selected industrial partners to identify methodology variants appropriate for diverse companies and industries. Successful implementation will contribute significantly to the proposed activities required for a 21st Century innovation ecology, envisioned by the National Innovation Initiative report, "Innovate America".

Key Words:
Accelerated Radical Innovation, Paradigm, Challenges, Hurdles, Information Technology

**Background and Introduction**

From antiquity tacit knowledge and empirical discovery provided the basis for major technology advances, and subsequent incremental improvements associated with the maturing of these technologies and their geographical and temporal propagation (Merrifield 1999). The 19th Century marked the boundary between the ancient world and the modern world (Betz 2003) characterized increasingly by the disciplinary influence of science and the research university in defining the underlying principles for a rapidly growing science and technology infrastructure that enables technological innovation based on ***scientific technology***. The rise of large industrial organizations in the late 19th Century played a significant role through the formation of major, central research and development laboratories seeking competitive advantage based on proprietary technology (Fusfeld 1994). During the 20th Century the size and scope of industrial research grew both geographically and virtually due to the increasing capability of transportation, communication and computing technologies (Gerybadze 1999).

Recognition since the mid 20th Century that technology is the key driver of innovation (Schumpeter 1939, Mensch 1982), has stimulated multidisciplinary management of technology (MOT) research dedicated to better understanding and improving industrial innovation through collaborative industry-university-government initiatives (Kelly 1978). National Research Council workshops (NRC 1987, NRC 1991) have further stimulated systematic study of the innovation process leading to the recognition of many diverse individual and organizational roles important for success (Fusfeld 1994, Roberts 1987 and 1988, von Hippel 1986 and 1988). Nevertheless, the complexities inherent to innovation have hindered the development of qualitative and quantitative models for forecasting and prediction (Age 1995). High performance execution of innovation projects to plan are limited to incremental innovation projects for which documented, historical procedures provide a basis for repeated success (Senhar 1995). Due to the unavailability of a sound, general theory for improving radical innovation effectiveness, practical guidelines for breakthrough innovation are still based primarily on historical best practices from case study research (Leifer 2000 and 2001, O'Connor 2001 and 2005, Christensen 1995).

Recently a consensus has emerged (NII 2004) that a more rapid and effective approach to radical innovation is needed for future industrial and societal competitiveness. Existing innovation strategies for cost reduction and continuous improvement over the past 25 years are inadequate, and may prove counterproductive in creating the high growth rate industries and sustained economic development and job creation required for success in the globally connected 21st Century world.

In May 2004, a group of fifty leading scholars and industrial practitioners of radical innovation from around the world (Dismukes 2004, Bers 2004) established the vision for a dramatically improved, global, accelerated radical innovation methodology that could significantly improve the arduous, meandering, often decades-long process of radical innovation, thereby achieving a factor of 2X-10X improvement in innovation effectiveness, as measured by reduced risk, reduced time and reduced cost. To realize this vision, they proposed a mission to develop sound theory and validate practical open-innovation approaches (Chesbrough 2003) that would integrate academic and business innovation professionals and knowledge workers in a collaborative environment enhanced by computer science and telecommunication tools.

In today's geographically and virtually connected society, the widespread availability of education and knowledge, and access to exponentially increasing power of information technology for real time interaction makes possible the development of a practical breakthrough innovation process with a sound theoretical basis. This paper briefly reviews the course of technology revolutions, assesses the structure and practice of incremental and radical innovation, and further develops the vision and mission recently proposed (Dismukes 2004; Bers 2004) for the new paradigm of Accelerated Radical Innovation (ARI). The result is a strategic roadmap and plan for its implementation through iterative university-industry collaboration funded by government and foundations, to validate and teach the methodology.

## Current Status and Future Directions of Technological Innovation

### *The Phenomenon of Industrial or Technology Revolutions*

From antiquity technology has played an important role in innovations that determined the economic status of individuals and societies, and their geographical and temporal propagation. Various eras are often historically linked to specific technologies that played a key role at that time and place (Merrifield 1999). Hence the stone age, copper age, bronze age and iron age, for example, are associated with technologies based on tacit knowledge and empirical discovery, before the advent of modern science. The impact of technology on individuals and society changed irreversibly (Betz 2003) from the ancient world to the modern world based on the rise and adoption of the paradigm of ***scientific technology*** in the late 1700's. This new paradigm emphasizes the rationality of nature and the possibility for human beings to successfully investigate, understand and develop technological applications based on the scientific laws and principles governing the physical world, e.g. chemistry, physics, biology, and the various engineering disciplines.

The industrial revolution model (Perez 2002) views technological and economic growth over the last 230 years in the empirical context of five technology revolutions (Table 1) each of approximately 50-60 years duration. Perez associates each revolution with a specific period or age, a core geographical region of origin, a nominal "big bang" or launch event, and a time of maturity of the core technologies. Each technological revolution comprises sequential, experimentally measured periods of discovery and commercialization, followed by diffusion and eventual maturation of the technologies. Although the basis is empirical, not theoretical, the rate of historical growth and diffusion of particular technology applications can be mathematically retrofit (Hirooka 2003) to substitution type plots (Fischer 1971) based on demographic saturation of end application usage.

A significant and as yet unexplained feature of this model, warranting further research, is that even though scientific knowledge and the number of worldwide scientific investigators has been exponentially increasing, the nominal duration of these innovation cycles appears to have remained approximately constant at 50-60 years.

*Theory and Practice of Technological Innovation in the 20th Century*

Prior to 1930 the influence of technology on innovation and economic growth was largely ignored, in favor of classical economic theory in which technological change is viewed outside the scope of economics, and prices of products and services move to reach an equilibrium equating supply and demand required by Adam Smith's theory of the "invisible hand". The published work of the early pioneers in this field (Kondratiev 1926, Schumpeter 1939) provided clear evidence that new technology exerts a "creative destruction" effect, whereby new products, processes and markets are created and existing ones become mature or obsolete. Technology is thus a powerful and often dominant driver of economic growth, even more significant than labor and capital. Indeed, studies by the National Science Foundation have confirmed that technology contributed approximately 50% of economic growth in the United States over the last 50 years of the 20th Century.

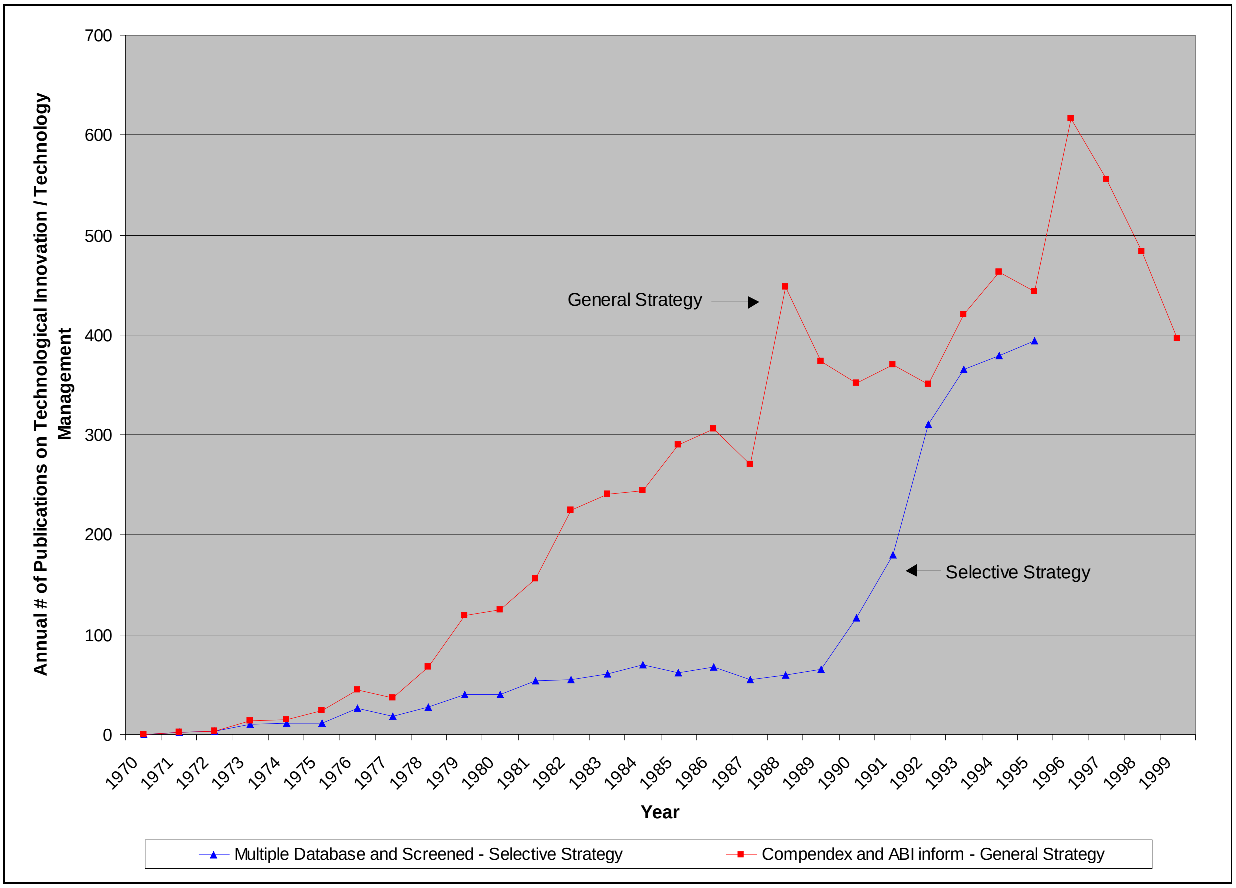
Published research studies of the innovation process began in the 1950s with investigation of the phenomenon of spatial and temporal technology and product diffusion (Rogers 1962, Grubler 1997, Baptista 2001). Progressively, physical and

**Table 1.** Summary of Scientific Technology Revolutions Since the Late 1700s, Representing Each as a Constant 50-60 Year Cycle

| Scientific Technology Revolution | Period or Age | Core Region of Launch | Big Bang Event (feasibility) | Launch | Maturity (approximate) |
|---|---|---|---|---|---|
| 1st | Industrial Revolution | Britain | Arkwight Textile Mill | 1771 | 1829 |
| 2nd | Steam and Railways | Britain (Europe & USA) | Rocket Steam Engine | 1829 | 1873 |
| 3rd | Steel, Electricity, Heavy Engineering | USA & Germany (Britain) | Bessemer Steel Plant | 1875 | 1918 |
| 4th | Oil, Automobile, Mass Production | USA (Germany & Europe) | 1st Ford Model T | 1908 | 1974 |
| 5th (Perez (2002) Hirooka (2003) | Information, Telecommunications, Biotechnology, Nanotechnology | USA (Europe & Asia) | 1st Intel Microprocessor | 1971 | 2045 |

social scientists and business professionals took up the study of innovation, with initial focus on identifying the important factors influencing the success of technological innovation (Kelly 1978, Myers 1976). Recognition of the competitive threat to US manufacturing by the Japanese during 1970s also stimulated increased study of the innovation process, as reflected by the exponential increase in the number of papers on innovation, Figure 1, appearing in peer reviewed journals between 1970 and 2000. During this period two industry-university-government workshops sponsored by the National Research Council (NRC 1987, NRC 1991) recommended launching new multidisciplinary Management of Technology (MOT) programs within universities. The following are representative of the many published studies assessing diverse individual, organizational, geographical and societal factors important for initiation, propagation and renewal of innovation (Abernathy, 1974 and 1977, Carlsson 2002, Chesbrough, 2003, Collins, 1994 and 2001, Drucker 1993 and 1999 and 2002, Eidt 1995, Kocaoglu 1994, Kodama 1995, Leifer 2000 and 2001, Mansfield 1968, McElvey 1985, Moore 1999 and 2002, Porter 1990, Roberts 1987 and 1988, Rouse 1992, Smits 2002, Utterback 1974 and 1993, and von Hippel 1986 and 1988).

**Figure 1.** Exponential Increase from 1970-2000 of Published Papers Dealing with the Technological Innovation Process




As a result of these studies it also has become clear that interactive engineering-business-social science approaches to technological innovation are required for development of a robust theory and model of innovation (Aje 1995).

*Observed Innovation Patterns Based on Incremental and Radical Innovation*

Literature studies have proposed classification of innovations in a number of types, including basic, radical, disruptive, discontinuous, next generation, incremental, imitative, new to the company, new to the world, and others (Mueser 1985, Shenhar 1995, Garcia and Calantone 2002, Betz 2003). Due to the complexity of the phenomenon, no universally accepted typology exists. For simplification and clarity of focus, in this paper innovations are classified fundamentally in two categories, as either ***incremental*** (continuous) or ***radical*** (discontinuous), with additional descriptors providing insight into the nuances of the innovation process as indicated in Table 2. An incremental innovation represents a relatively small and

**Table 2.** Innovation Categories Based on Level of Innovation Uncertainty Combined With Other Differentiating Innovation Characteristics

| Differentiating Innovation Characteristics | Incremental Innovation | | Radical Innovation | |
|---|---|---|---|---|
| | Low-Tech | Medium-Tech | High-Tech | Super-High-Tech |
| Technology | No new technology | Some new technology | Integration of new, existing technology | Development and integration of new technology and system |
| Scope of Product or Service | Existing material, component, subsystem, system, array | Some newness of scope | Major newness of scope | Broad newness of scope |
| Time (months, years, decades) | Months, estimated with high accuracy | Months to several years, estimated with fair accuracy | Several to many years, estimated with uncertainty | Many years to decades, estimated with extreme uncertainty due to numerous re-do loops |
| Company or Organization Size | Small, medium or large | Small, medium or large | Venture, small, medium, large | Venture, small, medium, large |
| Industry | Various product, process, and service providers | Various product, process, and service providers | Various product, process, and service providers | Various product, process, and service providers |
| Supply Chain or Value Chain | Regional, national or global | Regional, national or global | Regional, national or global | Regional, national or global |
| Market | Known market and customer | Known market and customer | Anticipated customer | Anticipated product or service need |
| Company Structure and Culture | Age, Core Values, Vision | Age, Core Values, Vision | Age, Core Values, Vision | Age, Core Values, Vision |

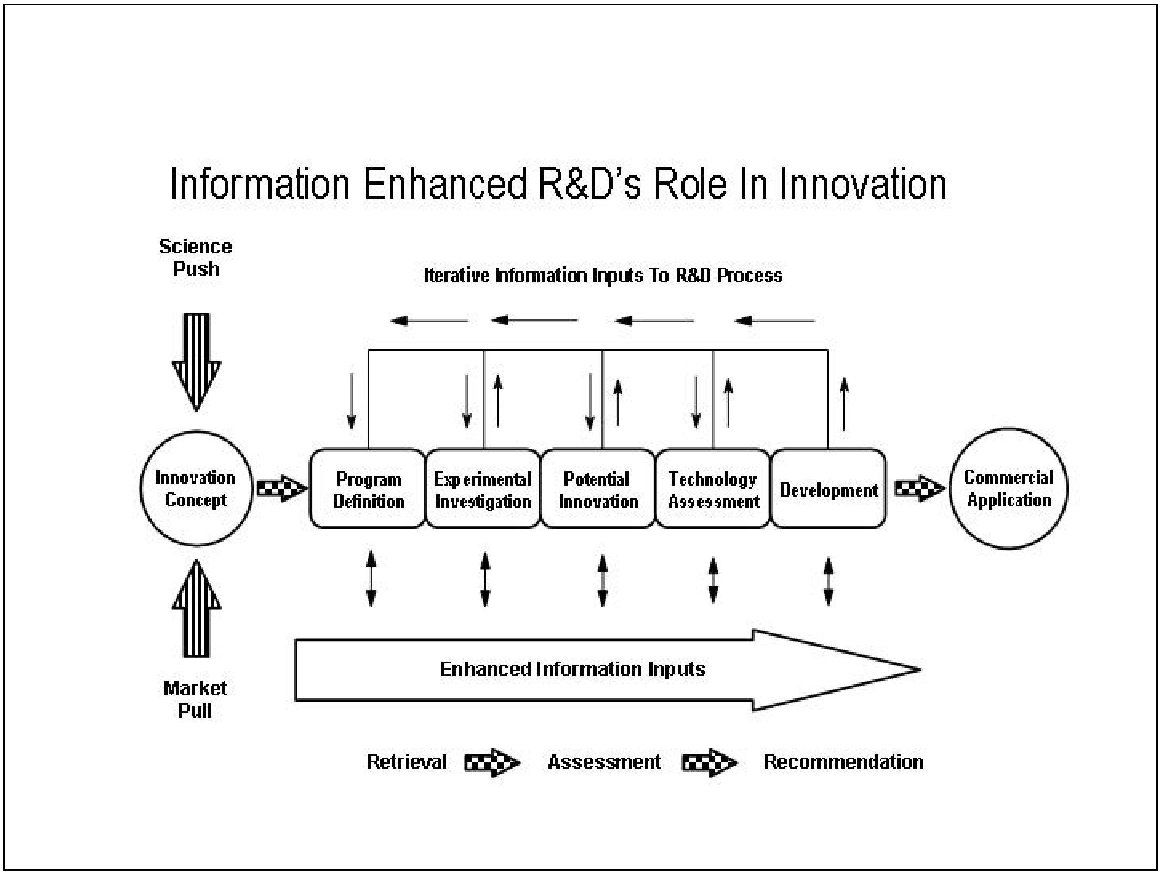
continuing improvement to an existing technology, so that the cumulative impact of incremental innovations can be quite large as represented by an S-curve of progress. However, these improvements typically approach diminishing returns based on reaching some fundamental limit imposed by the physical nature of the core technology (Foster, 1986). In contrast, a radical innovation represents a dramatic, major, improvement based on a discontinuity in the type of core technology and magnitude of application performance achieved (Leifer 2000). Most often, radical innovations have no clearly defined performance specification or market as first conceived. Thus an iterative process of technology push and market pull is typically involved during which product specifications and cost are examined and debated by supplier and customer, and finally concurrently defined leading to eventual market acceptance.

The classification in Table 2 follows the phenomenology of an earlier analysis (Shenhar 1995) proposing that that innovations first be grouped into columns representing four levels of technological uncertainty: 1) low-tech, 2) medium-tech, 3) high-tech and 4) super-high-tech. Low tech innovations involve no new technology, and the company addressing them has a successful track record and ample history of successful innovation projects of this type. Medium tech innovations are similar to low tech innovations, but require incorporation of some new technology that appears well defined. Both low tech and medium tech innovations can be considered as ***incremental innovations***. High tech innovations require the integration of new, but known technologies into new, first of a kind product, process or service. Super high tech innovations require the design and integration of new, key technologies into a new family of product, process or service representing a quantum leap in performance and cost effectiveness for the user. Both high tech and super high tech innovations can be considered as ***radical innovations***.

Even a brief inspection of Table 2 suggests why a quantitative or even qualitative general theory of innovation is so elusive (Age 1995). Any defining theory of innovation must deal with at least the eight innovation characteristics indicated as rows: 1) technology, 2) scope of product, process or service, 3) time, 4) size of company or organization, 5) industry, 6) supply chain or value chain, 7) market and customers, 8) organizational structure and culture. The complexity of this tabular representation of innovation perhaps provides a clue why a constant period of 50-60 years has been repeatedly assigned to the industrial or technology revolutions discussed in Section 2.1. This simple analysis also suggests that any significant advance in methodologies and tools for improvement of innovation effectiveness must deal with this complexity.

Paradigm Shift From Scientific Technology to Accelerated Radical Innovation Figure 2, adapted from a

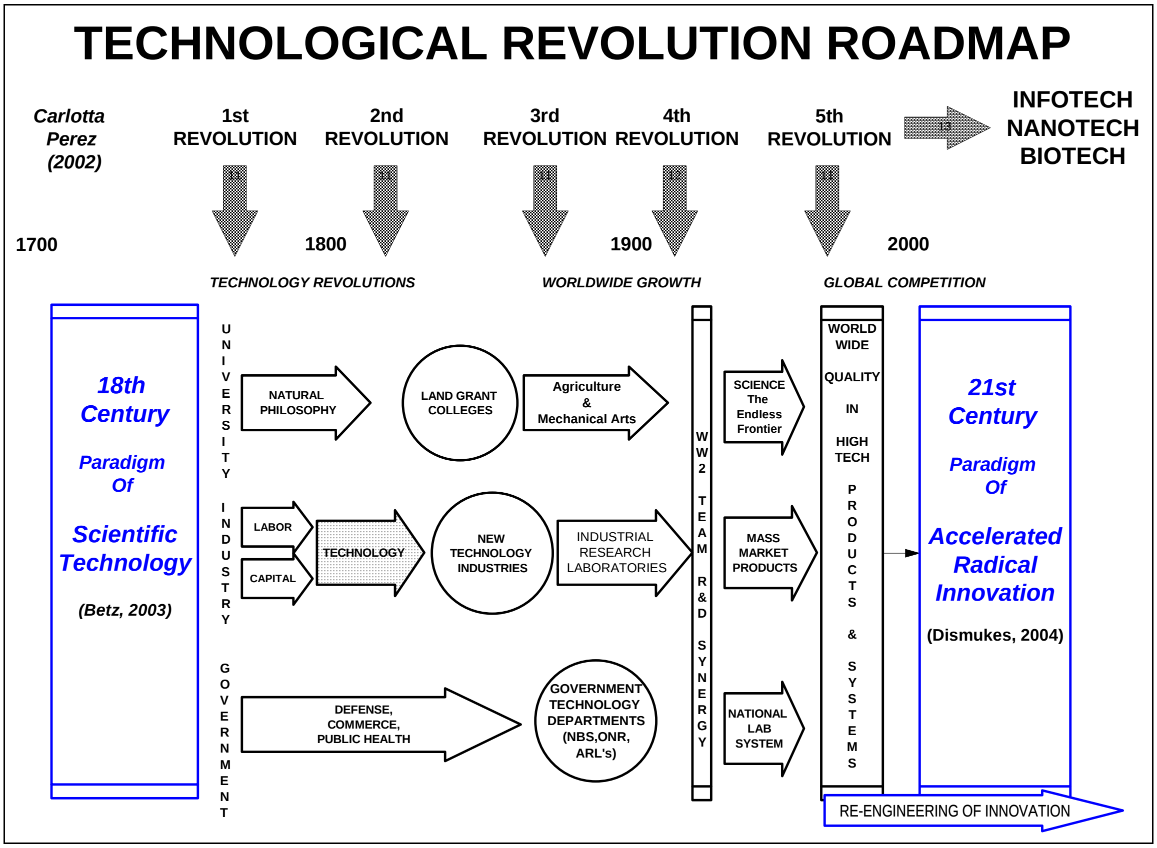
**Figure 2.** Schematic Representation of the R&D Process Sequence From Concept to Commercialization.




published paper (Walton 1989) reveals early recognition of the significant impact of information in enhancing the progress of R&D towards commercialization. This effort, undertaken by the author and co-workers at Exxon Research and Engineering in the late 1980s to investigate the effect of information retrieval and analysis on materials science R&D, is one of the first published studies documenting the importance of information assessment for enhancing the effectiveness of research. These

results motivated further research leading to the recent development of a technological revolution roadmap, schematically shown in Figure 3, depicting a fundamental postulate as a guide to further advance the theory and practice of radical innovation. Specifically, Figure 3 proposes that a paradigm shift has been in progress since the beginning of the 5th technological revolution (ca. 1971), whereby the world is in transition from a period (ca. 1771- 1971) dominated primarily by ***scientific technologies of power*** to a 21st Century world that will be increasingly dominated by ***scientific technologies of thinking*** (Betz 1997).

**Figure 3.** Paradigm Shift from Economic Progress Driven by Technologies of Power During The First Four Technology Revolutions, to Economic Progress in the Fifth Technology Revolution Driven By Technologies of Thinking.



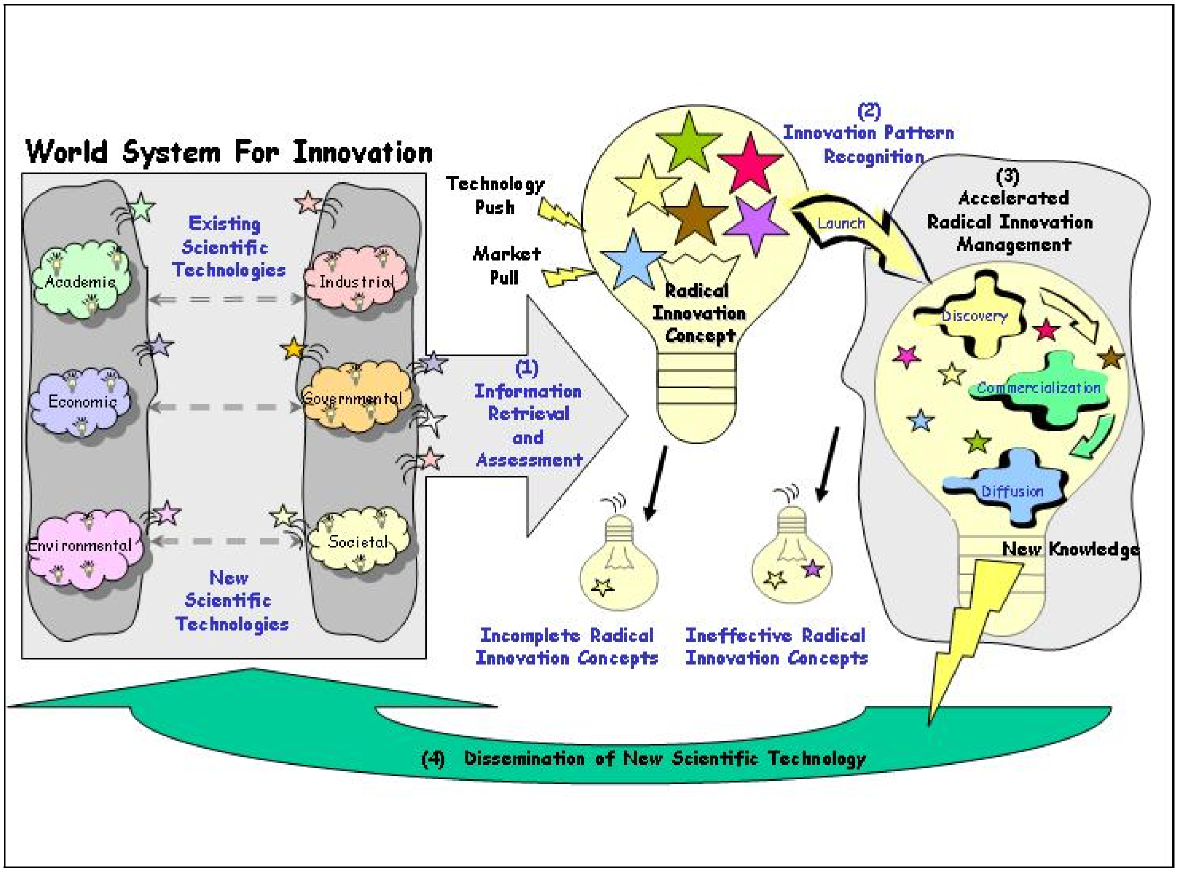

*Source: Betz (1997)*

As a further development of this line of thinking, Figure 4 provides the first schematic representation of the ***Accelerated Radical Innovation*** paradigm presented in a poster session paper at the 1st ECI Conference on Accelerating the Radical Innovation Process, Charleston, SC, USA, May 2004 (Dismukes 2004). Figure 4 further pictures radical innovation as an information driven, closed loop process involving a number of complex phases:

1) information retrieval and assessment of existing scientific and technological knowledge from the "world system for innovation",

2) application of technology push, market pull and pattern recognition criteria for identification of a highly promising radical innovation concept,

**Figure 4.** A Schematic Illustration of a Closed Loop Paradigm for Accelerated Radical Innovation, Driven by Information Technology




3) a disciplined process of innovation management through the stages of discovery, commercialization and diffusion, and

4) the dissemination of new knowledge as scientific technology back to the “world system for innovation”.

Clearly this is a selective process as indicated by the rejection of radical innovation concepts as incomplete for further consideration during Phase 1 or Phase 2, or as inadequate for commercialization based on results from various steps in Phase 3.

This plausible process description includes all of the steps involved in an actual process for commercialization of a successful radical innovation. Considerable assessment and analysis is typically conducted during the initial evaluation of a radical innovation concept, leading to its classification as a “discovery”. Numerous recent publications have treated this portion as the “fuzzy front end” of the innovation process (Koen 2002). The “commercialization” portion of the innovation, typically an extended and often iterative investigation lasting from years to decades depending on technical, market, management and societal acceptance factors, may be represented as a sequence of decision "gates" and development "stages" popularized by Robert Cooper (Cooper 2001 and 2002A and 2002B) as the Stage-Gate-System approach. Sustained profitable commercialization of the innovation by one company typically marks the end of the "commercialization" portion of the innovation. Propagation of the innovation geographically and temporally to other commercial companies comprises the "diffusion" portion of the innovation, that can be considered to approach completion at demographic market saturation. The diffusion portion might also be designated the "fuzzy back end" of the innovation cycle.

The time from Discovery through Commercialization through Diffusion will obviously differ considerably depending upon the differentiating factors identified in Table 2. Classically this might be identified with a fraction (e.g. 0.2-0.9) of the typical time of 50-60 years for a technology revolution (Table 1) to which the radical innovation might be classified.

## An Improved Approach to a 21st Century Innovation Ecology

The initial descriptions of the principles and vision of the paradigm of Accelerated Radical Innovation (ARI) for speeding up and improving the radical innovation process, were developed and published (Dismukes, 2004, Bers, 2004) subsequent to the 1st ECI Conference on Accelerating the Radical Innovation Process, Charleston, SC, USA, May 2004. This section of the paper extends these initial descriptions and proposes an information enabled methodology for accelerating the sequential innovation phases of discovery, commercialization and diffusion that addresses many requirements for a new innovation ecology proposed by the National Innovation Initiative Report, "Innovate America" (NII 2004).

## Recommendations of the National Innovation Initiative

The recent task force report, "Innovate America", drafted by top industrial and academic leaders based on a 15 month study, has identified the need for a new 21st Century innovation economy focused on talent, the capacity to take risks, and the continuous renewal of an innovative infrastructure. Reports by the National Academy of Engineering and the Task Force for the Future of Innovation have reached similar conclusions. Significant characteristics that must be addressed for industrial and societal competitiveness include that 1) the bar for innovation is rising, 2) innovation is diffusing at ever-increasing rates, 3) innovation is becoming increasingly multidisciplinary and complex, 4) innovation is becoming more collaborative requiring cooperation and communication among scientists and engineers and between creators and users, 5) workers and consumers are demanding higher levels of creativity, and 6) innovation is becoming global in scope with mutual demands from centers of excellence and from consumers.

The report further concludes that the innovation economy differs fundamentally from the industrial or even the information economy, and that it will require a new relationship among companies, government, educators and workers to assure creation of an effective innovation ecosystem that can successfully adapt and compete in the global economy. As during the 1970s and 1980s, when the United States faced a similar challenge in manufacturing from Japan, new innovation methodologies and management tools are now required to catalyze the transition from a nationally oriented to a globally oriented economy.

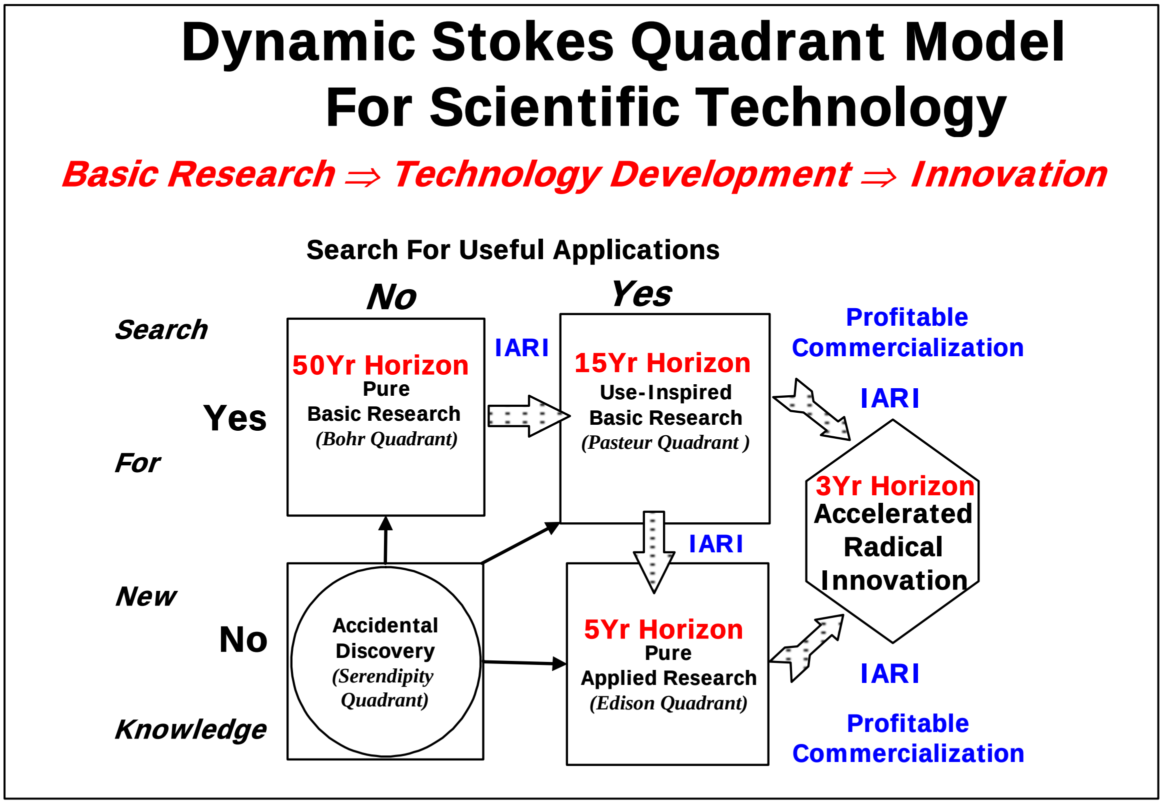
The next section describes a dual conceptual framework required as a basis for building an effective operational roadmap for an information driven innovation ecology. The first is a unifying description of the relation between scientific discovery, useful technology development, and commercialization. The second is a generic representation of the grand challenges and hurdles that must be overcome to achieve Accelerated Radical Innovation.

## A Conceptual Roadmap For Building a 21st Century Innovation Ecology

Stokes recently published an enlightened science policy assessment of role of research funding at the research university on the development of new knowledge in science and technology (Stokes 1997). In his monograph, "Pasteur's Quadrant", Stokes for the first time provided a generic, rational distinction between applied research and basic research, and further categorized basic research depending upon motivation for new knowledge or upon search for useful applications. Figure 5 presents an expanded version of Stokes' four-quadrant model in a format that enables clear visualization of the dynamic, operational relations of these four research quadrants to the innovation cycle comprising scientific discovery, technology commercialization, and diffusion of technology and new knowledge.

This expanded model enables both academic researchers and industry technology and business managers to visualize a collaborative innovation ecology, in which academic researchers will no longer be threatened by the fact that basic research can lead to useful applications, and in which business managers will recognize that basic research can play a dual role in providing useful applications as well as new knowledge. This model is the first portion of the required dual conceptual framework required for building an effective roadmap.

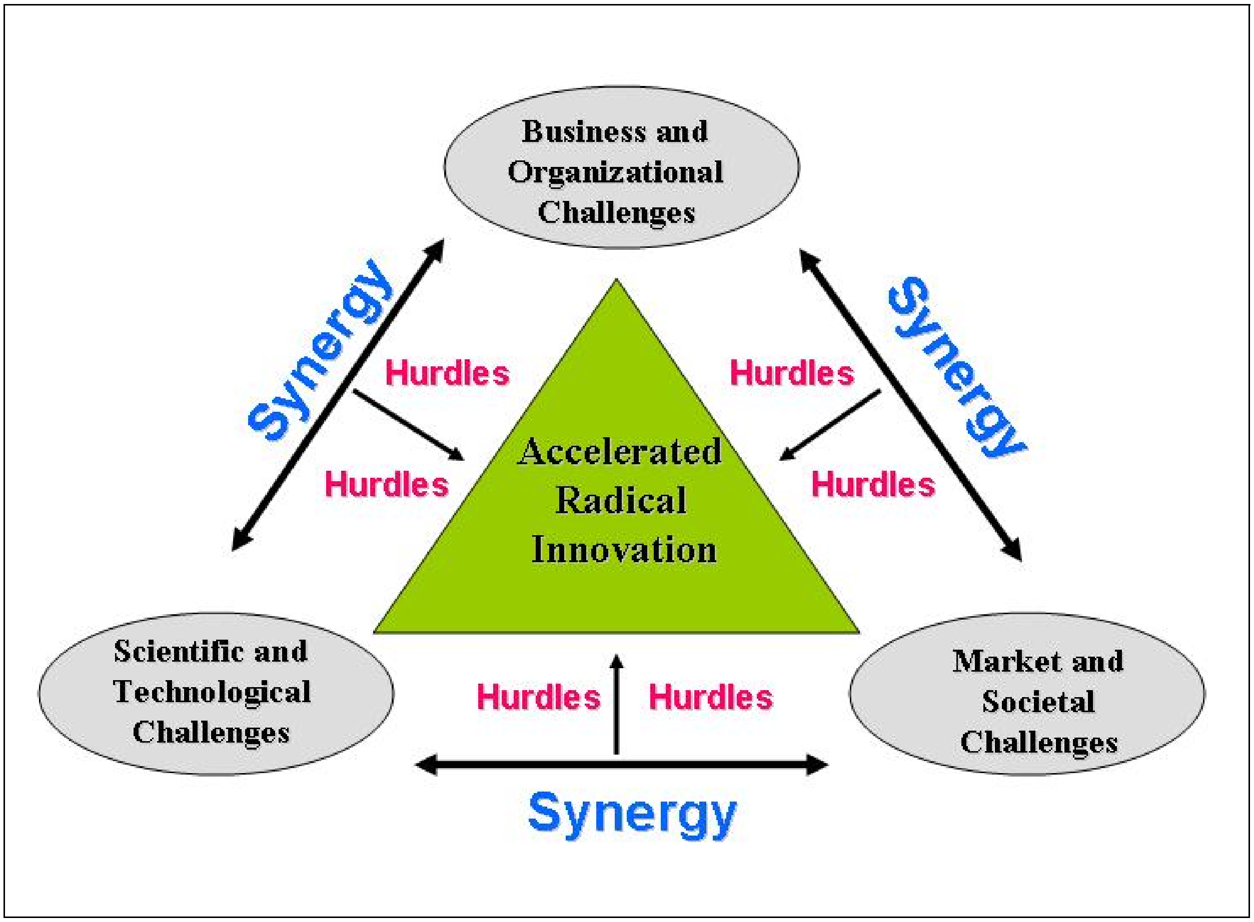
**Figure 5**. A Dynamic Stokes Quadrant Model of Scientific Research Connecting Basic Research With Technology Development Leading To Accelerated Radical Innovation




The problematic characteristics of the 21st Century Innovation Ecology discussed in Section 3.1 constitute a synergistically related set of grand challenges and operational hurdles that must be envisioned, addressed, and overcome by any truly effective, operational roadmap to Accelerated Radical Innovation. For simplicity, Figure 6 groups these inter-related grand challenges into three categories: I) Scientific and Technological Challenges, II) Business and Organizational Challenges, III) Market and Societal Challenges. Various hurdles will be encountered depending upon the interaction of the many complex factors listed in Table II that govern the dynamics of innovation, including: 1) technology, 2) scope of product, process or service, 3) time, 4) size or company or organization, 5) industry, 6) supply chain or value chain, 7) market and customers, 8) organizational structure and culture.

This complexity suggests that any effective roadmap to an innovation ecology must combine a generic framework with an approach tailored to the particular innovation. Since at present no "Ohm's Law" is envisioned that will simplistically describe all

**Figure 6.** The synergistic interaction of the grand challenges and associated hurdles that must be overcome to achieve Accelerated Radical Innovation. The three linked grand challenges are: I) Scientific and Technological Challenges, II) Business and Organizational Challenges, III) Market and Societal Challenges.




innovations in the 21st Century innovation ecology, development of a comprehensive theory and model must be the subject of further research.

## An Operational Methodology For a 21st Century Innovation Ecology

The historical assessment and current status of the field of technological innovation supports the need for a new operational methodology based on the technologies of thinking (Betz 1997) as an important component of a 21st Century innovation ecology (NII, 2004). Due to the complexity of the innovation process (Age 1995), numerous models proposed for the innovation cycle have proved inadequate. A decade after this assessment, the situation still remains the same, that successive models proposed as generally applicable to the innovation process still have limitations (Porter 2005).

This is particularly true of the "linear model" that originated after World War II based on Vannevar Bush's paradigm of "science the endless frontier" (Bush 1946). That model assumes a successful sequence of activities such as those made popular as a Stage-Gate System (Cooper 2001 and 2002 A and 2002 B). The best current guideline for radical innovation, based on the extraction of best practices from historical case studies (Leifer 2000), however, does not provide a predictive model.

The new methodology proposed in this paper adopts three guiding principles:

1) identification, creation and application of the best possible management techniques for accelerating radical innovation in a real world industrial environment

2) adaptive real-time integration of the best information technology software tools for pursuit of accelerated radical innovation,

3) continuous adaptive improvement of management techniques to address the acceleration of each sub-step of the innovation process .

This model incorporates a world view (Figure 7) of the innovation cycle (discovery, commercialization, diffusion) that envisions the use of four key information and telecommunications tool suites (e.g. Boer 2002, Cios 1998, Kostoff 1999 and 2004, Porter 1985, Porter 2005, Price 1984, Probert 1999, Quinn 1996 and 1997, Stratton 2003, Wymbs 2004, Willyard 1987) that can be applied by an innovation team at various milestone points in the innovation. These are:

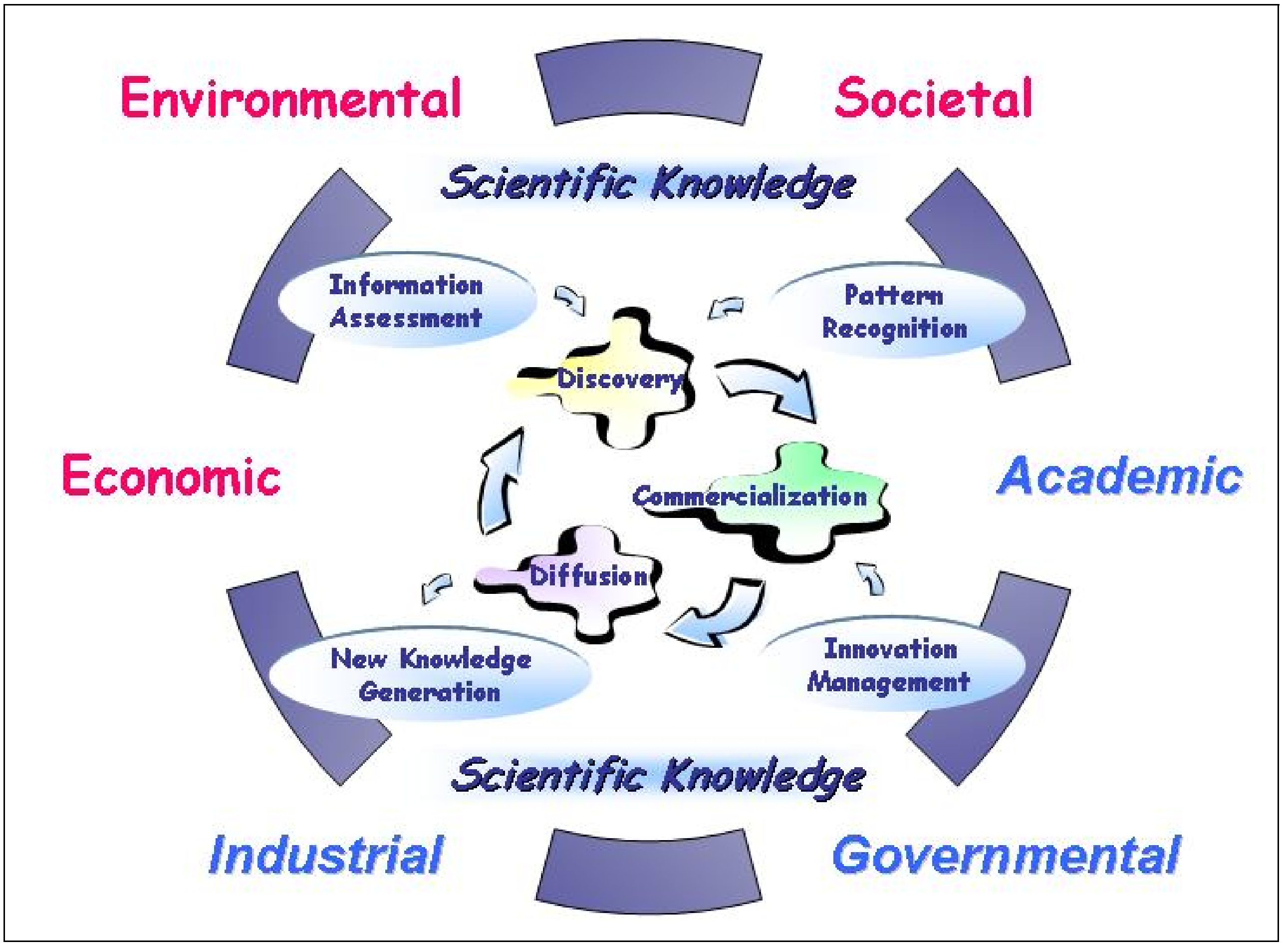
- Information Assessment,
- Pattern Recognition,
- Innovation Management, and
- New Knowledge Generation.

As indicated in the outer "influence circle" in Figure 7, environmental, societal, and economic factors exert both long term and near term guidance on innovation strategy and operations, reflecting up to date real time consumer viewpoints. Industry driven research, development and innovation activities in the cycle of discovery, commercialization, and diffusion, aided by academic research and governmental policy inputs, provide the engine of the overall innovation system.

Based on experience in the electronics and petrochemical industry over a 30-year period, the author proposes an adaptive innovation template, Figure 8, that can be applied at any individual step or sequentially at each step of the overall innovation cycle, Figure 7.

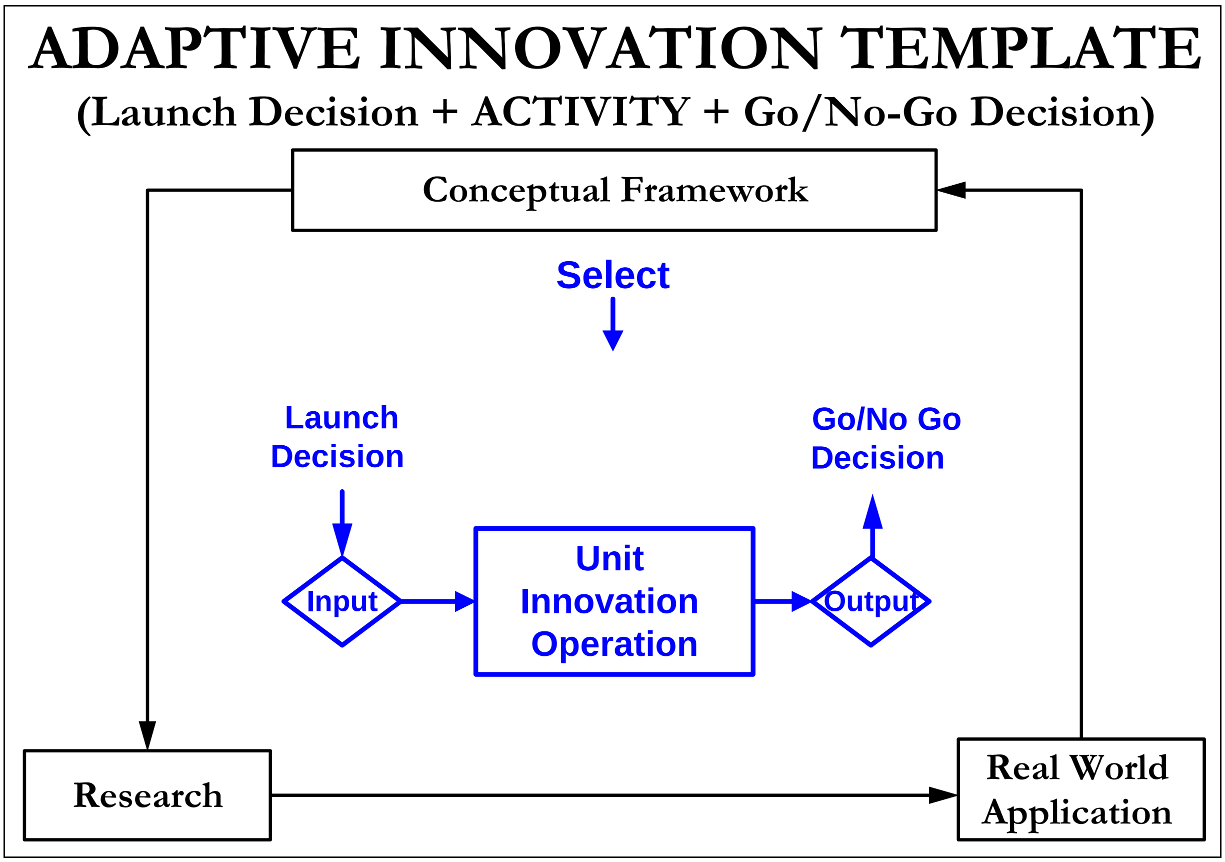
In spite of the frequent criticism of the linear Stage-Gate-System model that it is linear and unrealistic, a number of studies (Walton 1989, Cohen 1998) have recognized that this type of model comprises an iterative sequence of independent operations (i.e. launch decision + unit innovation operation + go/no-go

**Figure 7.** A conceptual "adaptive and self-renewing radical innovation system model" driven by "technologies of thinking". In this model, industrial activities supported by academic research and governmental policy and funding inputs, provide the operational driver of the overall innovation system comprising the sequential phases of discovery, commercialization and diffusion. Societal, economic and environmental requirements exert a strong influence on the selection and success of specific industrial innovation activities. In this operational model, strategic application of computer science and telecommunication tools is the catalyst resulting in dramatic improvement in the effectiveness of each phase of the overall innovation cycle. The key assessment methodologies include: a) Information Assessment, b) Pattern Recognition, c) Innovation Management, and d) "New Knowledge Generation".




decision) with periodic interruptions or termination possible. Although superficially similar to the Stage-Gate-System models (Cooper 2001) simplistically laid out in a linear array sequence, the iterative model proposed here truly envisions real time input and assessment, and recording of activities, information

**Figure 8.** Conceptual description of the key adaptive building block process for an operational innovation methodology involving pursuit of an innovation goal involving iterative conduct of innovation phases punctuated by milestone decision points.



and decisions in a data mining system (Cios 1998) retained for future instant retrieval and review. Therefore the innovation activities of the iterative model may be considered as a commercial or industrial equivalent of the military special forces operations involving a focused team of specialists in real-time communication, dedicated to a specific well defined task. Hence the iterative model should be capable of improved 10X performance compared to baseline activities using conventional techniques. Referring to the dynamic stokes quadrant model in Figure 5, this chart

illustrates the possibility based on Accelerated Radical Innovation to reduce the time for profitable commercialization from 50 years ⇒ 15 years ⇒ 5 years ⇒ 3 years. Such an achievement, if experimentally verified, would bring the particular radical innovation into view on the typical radar screen of business executives faced with quarterly and yearly profitability demands of stockholders and the investment community.

As a final justification in this proposal for information Accelerated Radical Innovation (ARI) as the operational model required for a 21st Century innovation ecology, the issues of risk, cost and acceptable success rate of profitable commercialization need to be considered. Two strategies are proposed to address these obvious requirements for a dramatically improved and effective operational methodology. The first strategy begins with is a rigorous initial assessment of discoveries and their potential (Walton 1989) as innovations, and a systematic screening and selection at the start of the innovation cycle, rather than at the end of the innovation cycle, as conducted in the classical funnel model (Chesbrough, 2003). Reduced overall operating costs of a company's R&D operation achieved by focusing on fewer, higher potential value innovations should more than offset the costs of a higher intensity, information enhanced, real-time approach to the highest priority projects. Reduced time and higher success rate should also be obtained by focusing on the highest value potential innovations.

The second strategy proposed in launching information Accelerated Radical Innovation as the operational model for a 21st Century innovation ecology involves adoption of a methodology successfully employed for total reorientation of R&D focus by a major petrochemical company during the early 1990s (Eidt 1995). This approach, here given the name ***Activity Based Roadmapping***, is in effect the development of a long range business model based on an interactive assessment and prioritization of:

- long range business opportunities and associated grand challenges (Figure 6)
- technologies needed as core technologies for success

- technological hurdles that must be overcome for success
- scientific and engineering research required to overcome the hurdles
- a flexible, interdisciplinary and cross functional plan with predetermined goals

Though superficially similar to the classical case-study based radical innovation methodology, in reality it is radically different, since it involves a generic system approach to a business model incorporating a sequential assessment and targeting of core technologies, without regard to a specific organizational structure or business hub (Leifer 2000). The new methodology can be applied at any step of the innovation process, including new venture activities, new attempts at an overall radical innovation, and new attempts at getting an existing radical innovation process back on target.

**Conclusion**

This paper first reviews the course of technology from its empirical base in antiquity through the initial scientific technology era of the 19th and 20th Centuries, to the 21st Century environment of Accelerated Radical Innovation governed by technologies of thinking. It then assesses the need for and benefits from a new information technology enabled paradigm of Accelerated Radical Innovation (ARI). By combining advanced information technology tools and innovation management techniques in a real-time decision-making environment, the ARI paradigm has the potential to overcome technological, organizational and societal challenges and hurdles, thereby achieving a factor of 10X improvement in radical innovation effectiveness.

Further development and validation of this proposed new paradigm is envisioned through a collaborative multi-university program of research and teaching, in collaboration with selected industrial partners to identify specific methodologies appropriate for specific company structure and industry goals. Successful implementation will contribute significantly to the proposed activities required for a 21st Century innovation ecology, envisioned by the National Innovation Initiative report, "Innovate America".

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# Continuing Business as Usual: A Case Study of Hialeah, Florida

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**Keywords:** *Latinas, Cuban immigrants, gender, spatial distribution, ethnic enclave, globalization*

## INTRODUCTION

This article poses research questions about the issue of spatial distribution of immigrant women in urban environments and the impact of occupational segregation issues based on gender and race that is exacerbated by economic globalization. That is, how has the relationship between more recent émigrés and those of the past industrial expansion period changed? A case study is provided exploring the experiences of recently immigrated women from Cuba within the ethnic communities of Hialeah, Florida. How have they been absorbed into the employment sector of this community?

Recent Cuban émigrés, as well as low-income women across the nation, are experiencing a similar "spatial mismatch" (Queralt and Witte 1998 p. 455; Waldinger 1996 p. 35) between the availability of jobs with adequate wages (usually in suburban areas) and the areas where they reside (Allen and Kirby 2000). Complicating that factor is the spatial distribution of child care services, nursing homes for elderly relatives, and the lack of public transportation between residential areas and the location of better paying jobs often in suburban areas. Commuting time is a significant factor because women strive to be close to their residences in order to balance their employment and family responsibilities.

## HISTORICAL CONTEXT

Migration streams from Europe in the late 1800's and early 1900's included migrants who worked long hours in negative and often hazardous working conditions to pave the way for an improved situation for their children. With employment opportunities available in textiles and manufacturing, the absorption of immigrants into the employment sector was swift. Tenement housing developed in urban areas within close proximity to major urban centers. As immigrants learned social skills and were assimilated into their environment they moved from the lowest paying jobs to more skilled employment that increased wages, and improved housing options. Immigrants continue to take the place of those who follow the track of upward mobility. However, “the social ladder no longer works, or no longer works with similar force" (Waldinger, 1996, p. 40) due to global economic realities as well as differences between immigrant groups.

Moreover, advances in mass transit and the use of automobiles have widened the distance between residences and places of employment providing more options for workers. As the country developed there were eventually areas that became industrial development centers or districts (Sorenson 2003; Stafford 2003). This occurred even when the concept of efficiency was not consistent with the pattern due to the reliance on “social networks” or the concept of “social proximity” (Sorenson 2003 p. 515). This research note reviews the issue of the use of female immigrant labor in the manufacturing sector in a global economy. This subject requires additional attention within the industrial geographical literature.

## SPATIAL DISTRIBUTION, GLOBALIZATION AND THE SLOW-DOWN OF UPWARD MOBILITY

This social connection is pivotal when examining the spatial distribution of populations in urban centers based on the development of “ethnic niches” (Waldinger 1996 p. 4). Within these ethnic enclaves informal connections are made for newcomers to take the place of their co-ethnic counterparts who have moved on to other employment. Waldinger (1996) referred to the economy in these areas that created a “virtuous circle” (p. 42) because the new immigrants who replaced earlier ones can be easily exploited as fluctuations in the economy or production needs occur.

However, this pattern is being altered due to the need for small manufacturers such as those in Hialeah to utilize low wages to remain competitive within a global economy and avoid moving their operations out of the country. This metropolitan area represents one of the top 25 areas noted across the country with expanding economies (Workforce Weekly 2004).

However, despite the positive business climate the impact of globalization is causing a significant change from prior social mobility patterns. Hiring recent immigrants with limited English proficiency is advantageous because it provides inexpensive laborers who are vulnerable to exploitation because of the cultural sense of belonging within the ethnic enclave. The abundant immigrant labor pool creates competition for employment between recent immigrants and the immigrants who have been in the country for a longer time period as well as the native population. The net effects include greater fluctuations in employment, lower wages, and longer work hours. For relatively recent Cuban émigrés, there is also competition with immigrants from Central America, the Caribbean, native whites and African Americans (Zsembik 2000). Previous immigrants did not have to consider possible economic competition from their homeland because manufacturing plants could be relocated to these locales to reduce labor costs and stay competitive.

## IMMIGRANTS, GENDER, GEOGRAPHIC DISTRIBUTION AND THE LABOR MARKET

Prior research exploring immigrant participation in the labor market has focused on the wage gaps without examining the social context. Personal choices to work within or outside the enclave are often complex and relate specifically to gender. Recent Latino émigrés are more likely to be economically disadvantaged within the labor market due to lower levels of education and lower labor force participation levels. Yet the increased presence in the labor market can bolster the family's economic resources enough to alleviate poverty among immigrant families (Greenlees and Saenz 1999; Bean, Leach and Lowell 2004). Greenlees and Saenz (1999) suggest a model for examining the role of immigrants in the labor market. Their theoretical model suggests that "women's employment is influenced by their personal (individual level) capital resources, household budgetary requirements (for individual married couples) that affect decisions for home or work production, and employment opportunities available" (p. 2**).**

Gilbertson's (1995) analysis of immigrants working within an enclave economy points to another aspect of the labor market experiences many immigrants have; co-ethnic exploitation in ethnic enclave economies. This is consistent with the findings of Nee, Sanders and Sernau (1994), who posit that there exists an inherently exploitative relationship between the co-ethnic worker and their co-ethnic employer based upon the need to have a readily accessible and abundant low wage labor pool. Although Sanders and Nee (1987) did not focus on women, Gilbertson (1995) does. She contends that women within the enclave are more likely to be exploited due to discrimination, occupational segregation and work/family conflicts that reduce wages and include a more narrow range of opportunities for women than men. For example, Zhou and Logan (1989) contend that Chinese women workers in New York City had no measurable earnings return on their previously attained human capital. Their participation within the enclave economy was based not only on the income they provide to support their family's needs because they also had to consider how their paid work would affect child care and other family responsibilities. Consequently, although wages outside the enclave were generally higher, those jobs often did not provide the hours and flexibility found with enclave employment (Zhou and Logan 1989). Enchautequi (2002) referred to job networks based on gender that produces "labor market segmentation according to recency of arrival" (p. 594).

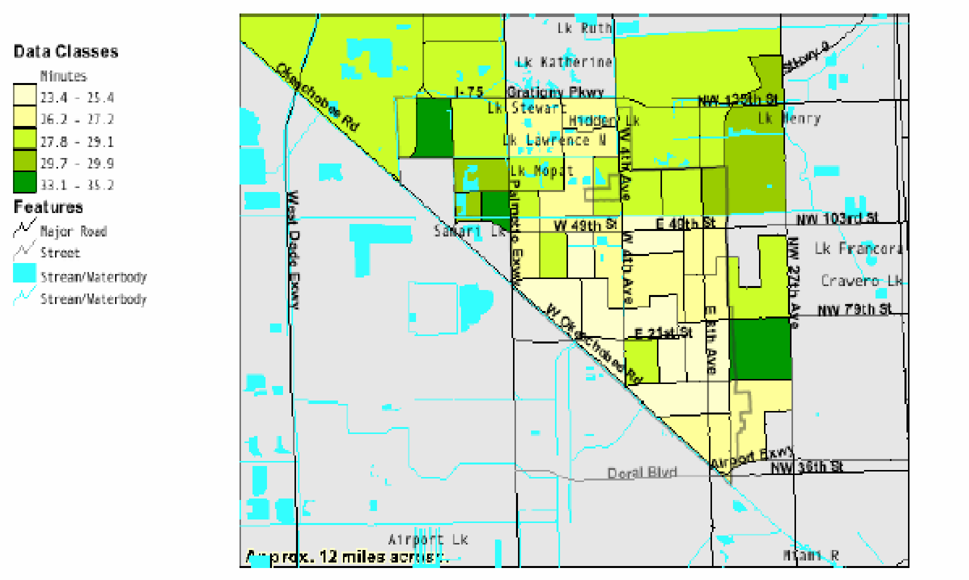
Females within the co-ethnic workplaces seek employment close to the enclave in order to reduce their commuting time and because they share a common language and culture (Logan and Zhou, 1989; Ellis, Wright, and Parks 2004). A Catalyst (2003) report identified the challenge of employers not recognizing Latinas definition of "family" (p. 2**)**. This factor reduces opportunities for advancement because work responsibilities are viewed as temporary until their husbands can find jobs with higher pay. Therefore, the need to balance their jobs with their family responsibilities is paramount for them (Portes and Stepick 1993). Care of children, elderly family members (Kolb 2000) and the desire to focus on the needs of their husbands, referred to as machismo (Mayo and Resnick 1996) requires that they take employment that is close to their homes and with the shortest transit time on public transportation (Allen and Kirby 2000). This limits their accessibility to higher paying jobs that could lead to more responsibility in suburban or other employment areas that would be farther away. This balancing of home and family and employment demands is increasingly common to most females in America due to the need for two incomes to access or maintain a middle class existence. Compounding this issue is the decreasing ability to receive governmental assistance when females find themselves raising children as single-parents. Moreover, for new immigrants the ability to obtain governmental assistance is not possible (U.S Department of Health and Human Services, 2005, para. 2).

Low-wage workers of any race or ethnic group rely on public transportation and are often limited in their commuting time by familial responsibilities. As women seek jobs they often find "precarious positions in the workforce" (Allen and Kirby 2000 p. 7). Communities need to address this economic and social challenge by increasing the use of global information systems (GIS) to plot current commuting patterns with public transit routes, child-care centers, nursing homes and areas where employment will provide higher wages and more stability (Queralt and Witte 1998 p. 455).

## CASE STUDY: HIALEAH, FLORIDA

With a population of 226,419, Hialeah represents an important economic base for Miami-Dade County (U.S. Census 2003). Over 90% of Hialeah residents , self describe as Latino, the majority are Cuban and Cuban American. More women reside in Hialeah than men. The median household income is lower than the national average at $29,492 compared to $41,994 (U.S. Census Bureau, 2003, Summary File 1 (SF 1) and Summary File 3 (SF 3)). Their average travel time to work is 27.4 minutes slightly longer than the national average. This time would increase if workers would look to other regions of the county for employment opportunities.

**Figure #1**
**Travel Time**




*Source: US Census (2000)*

Adjacent to the middle and working class neighborhoods of Hialeah are manufacturing plants that produce and assemble a variety of goods from reading glasses and textiles to plastic novelty items. Recently immigrated Cuban women provide much of the needed labor. They have limited language skills and look to the factories for employment that is close to their ethnic enclaves. In Hialeah, the small factories are conveniently located near the Miami-Dade Counties public transportation bus routes.

The relationship between the immigrants and factories that hire them was explored to determine if employment in these factories provides sufficient benefits for the immigrants? The alternative is to travel from Hialeah to the city of Miami where their travel time increases and the insecurity of leaving the predominantly Spanish speaking community is perceived as more of a risk.

An example of one manufacturer in the city of Hialeah is that of a plant that produces and manufactures inexpensive reading glasses costing $7.99 to $12.99, more than an hour's wages for the entry-level employee of $6.50. Women primarily run the machines, assembling and polishing the glasses. Personal semi-interviews were conducted with 10 Latinas who recently migrated from Cuba and are married with children and work within Hialeah. Additionally, five (5) personal interviews were conducted of supervisors and management of the factories. Women such as Juanita (not her real name) polish glasses and place them on the line to the next worker for packaging. Her view of her employment is positive.

> *Juanita: I am raising two children with this job. My husband's employment is not enough. I am luckier than most.*
>
> Juanita's male supervisor explains," *We would like to pay higher wages but that would be difficult in this economy. We are competing with cheaper wages from China and are always looking for ways to cut production costs*."

This supervisor also stated that "we hire people who are willing to work at the wages we can afford to pay. Here that means new Latinos. We are a business and that means we have to make money. We are no different than other businesses here. We do what we have to do to stay in business". (Personal Interview)

## CONCLUSION

Manufacturers in Hialeah, look to recent immigrants as an alternative to relocating their factories off shore and as an inexpensive alternative to the more expensive Anglo or African American laborer because they will work for the minimum wage with few benefits. The continued migration to the Hialeah area suggests that finding enough laborers will not be difficult for the foreseeable future. As immigrant women weigh the costs and benefits of the factory work they are likely to have different priorities. Their priorities include a focus on earning money to help the family's financial outlook while still retaining the traditional family responsibilities that could be diminished if they would seek employment farther from the enclave. Close proximity to the workplace that does not require lengthy commutes appears to offset lower wages since the Latinas value being close to home. Thus, the issue of short commuting distances, access to cars and the availability of public transportation are key factors that require further study in additional to the more obvious language challenges that could appear to restrict Latinas to manufacturing jobs that exploit them.

Future research on this topic should be explored including how the use of GIS's can be more fully utilized when planning for public transportation corridors as well as the location of low-cost housing and child-care centers. Spatial distribution of public resources also needs to be explored as the effects of globalization are studied to determine if the tide of immigration will continue or possibly increase. Current and projected U.S. Census data indicate that immigration from the Caribbean Basin and Latin America will continue as economic and political push-pull factors create better opportunities for employment and political liberties that are not present in the immigrants' homeland. Urban centers with strong cultural bases such as Hialeah highlight globalization processes where immigrants in their new host community are able to access culturally defined goods and services and experience few cultural impediments such as language and different social skills. Ironically, however, if they work in manufacturing positions they run a risk not encountered by prior immigrants and that is the threat of their job going to the land that they just left.

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**Compiled by E. LaFary*

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All submissions must represent the original work of the authors. It is the responsibility of the author to obtain copyright permission, if necessary. Simultaneous submissions of works to other journals are not acceptable. It is expected that work submitted to review are not under consideration elsewhere.

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The format of headings and tables will be left to the discretion of authors. In the case of tables, it should be acknowledged that the portrait orientation is always preferred.

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