Introduction

The purpose of this chapter is to give an insight into how the performance of nations in elite sport can be forecast with what appears to be a reasonable degree of accuracy. Forecasting performance is an essential part of the performance management process as it allows managers to anticipate the resources they might need and the strategies they might follow. It also sets out the areas in which performance must be managed within elite sport systems in order to produce medal-winning athletes – arguably the main area of performance and indicator of success for these sport organizations. The chapter is concerned with looking at the effectiveness of nations at using the resources at their disposal (inputs), the techniques they use to produce athletes (processes), and the results they achieve as a result (outputs). The research upon which the chapter is based is from the summer Olympic Games of 2008. For this event, a forecast had been made of the host nation’s performance against which actual performance achieved is reviewed.

The use of the Olympic Games as a case study is quite deliberate as it represents a broad portfolio of sports and disciplines that act as a proxy for a nation’s success in sport. In the case of the 2008 Beijing Olympic Games, performance is measured over 28 sports, 41 disciplines (for example the sport of cycling has four disciplines, namely track, road, mountain bike and BMX), and 302 events. The focus on a large-scale multi-sport event with high numbers of medal-winning opportunities is deliberate because, unlike the FIFA Football World Cup where there is only one winner, it is possible to calculate a nation’s “share” of overall success in the summer Olympics. In a single sport, such as football or rugby, where there can be only one world champion and therefore there is only one winning opportunity, the techniques described in this chapter are not really appropriate.

Why should we bother ourselves with measuring success in sport? After all, the International Olympic Committee (IOC) does not recognize the Olympic medal table as an order of merit and simply presents the number of medals won by each nation in descending order of gold, silver and bronze medals, for information purposes only (De Bosscher et al., 2008a). The answer to this question lies in part in the investment made by national governments in elite sport systems. Governments are required to account for their use of public funding, which is a scarce resource and therefore needs to be justified. A good example of how return on
Forecasting the performance of nations

investment can be measured is the report made by the National Audit Office (NAO) in the UK after the 2004 Athens Olympics which found that on average each medal won by athletes representing Great Britain and Northern Ireland "cost" £2.4m (NAO, 2005). Following the award of the 2012 summer Olympic Games to London there has been a considerable increase in public funding for elite sport and with this a continued scrutiny of how the investment is being used. In its 2008 report (NAO, 2008), which pre-dated the Beijing Olympic Games, the National Audit Office (NAO, 2008: 7) made the recommendation cited below.

UK Sport should agree firm medal targets with each sport for 2012 as soon as possible after the Beijing Games and in time to inform funding decisions for the start of the 2012 Olympic cycle in April 2009. It should then confirm the level of funding it will provide until 2012 for each sport it expects to win medals, subject to achieving their performance targets at major events in the years leading up to the Games.

The message from the NAO is that there must be a clear link between the medal-winning prospects of a specific sport and the level of funding provided by UK Sport for that sport. Thus, regardless of the IOC’s position, it is certainly the case in the UK, and probably in many other nations, that the Olympic medal table is more than just for information only in the context of national performance in elite sport. So how can performance in the Olympic Games be measured and how can future performance be forecast? In the remainder of this chapter these questions are tackled by looking at macro-economic forecasts of performance and the processes that nations use to give themselves a competitive advantage in elite sport, and we conclude by looking at an alternative forecasting technique using China, the last hosts of the summer Olympic Games, as a case study.

**Macro-economic measures of performance**

The use of macro-economic measures to forecast the performance of nations in the Olympic Games has been an area of considerable interest for researchers since the 1950s, for example Jokl et al. (1956), Jokl (1964), Shaw and Pooley (1976), Colwell (1982), Baimbridge (1998) and Johnson and Ali (2002). The rationale for this type of analysis is that athletic talent is evenly distributed across the globe and will inevitably rise to the top. It is for this reason that population is such an important macro-economic variable because, in theory, the more people a nation has, the more athletic talent it will have. On its own, population explains around 20 percent of nations’ sporting success. Perhaps the key flaw with population-based measures is that they overestimate the expected performance of highly populated, but relatively economically poor, nations such as India. Similarly, nations with relatively small populations, but high wealth, tend to have their performance underestimated, for example Norway. However, it is not surprising that a country’s population will be a determining factor for sporting success as the bigger the population, the greater the talent pool from which athletes can be selected. Furthermore, all things being equal, there will be greater opportunities to organize training and competition from which to filter talented athletes upwards to the highest level. There are also plausible explanations as to why relatively wealthy countries perform better than their poorer counterparts. Richer countries can invest more in sport generally and elite sport specifically; individuals have the opportunity to participate in a wide range of sport; and a higher living standard may improve their general fitness and ability to perform at the top level. Den Butter and Van der Tak (1995) found that the number of medals won correlates strongly with income (GDP) as well as with more general welfare indicators.
In the literature it has been the trend over the last 60 years for economists to use models that are based upon the two key variables of population and wealth. In her doctoral thesis, De Bosscher (2007) reviewed 33 studies which sought to compare actual performance in the Olympic Games with what macro-economic variables such as population and wealth might predict. Many of these studies show that population and wealth are the two most important socio-economic determinants of success (see, for example, Bernard and Busse, 2004; De Bosscher, De Knop and Heyndels, 2003; Johnson and Ali, 2002; Kiviaho and Mäkelä, 1978; Levine, 1974; Morton, 2002; Novikov and Maximenko, 1972; Suen, 1992; and van Bottenburg, 2000). These two variables typically account for, or “explain,” over 50 percent of a nation’s success in the Olympic Games where success is measured by either total medals or medal points (for example gold = 3 points, silver = 2 points and bronze = 1 point). For these reasons, success has also sometimes been reported in terms of medals per head of population, or in terms of per capita GDP, as a measurement of wealth.

Taking into account one determinant such as population size or wealth in isolation is crude in two regards. First, it ignores other potentially important determinants. Second, it assumes that there is a linear relationship between the factor concerned and success. This approach can create a biased view as a nation that has twice as many inhabitants as another country might not be able to win twice as many Olympic medals. For example, in the 2008 Olympic Games there were 11 boxing events and 44 medals available (four per event as both losing semi-finalists receive a bronze medal). However, nations are only allowed to enter one boxer per weight category and thus, regardless of the size of a nation, a maximum of 11 boxing medals could be contested by any one nation. Add to this a complex continental qualifying system and we find that a relatively small nation such as Cuba is able to contest as many boxing medals as a larger nation such as the UK.

The techniques commonly used to include more than one variable into a forecast of sporting success are multiple regression and econometric modeling. For an overview of the subject in the context of the Olympic Games see De Bosscher et al. (2008b), who found that 52.4 percent of success could be explained by the three variables: population; wealth as measured by gross domestic product (GDP) per head; and whether or not a country had or had previously had a communist government. These findings were broadly similar to the work of Bernard and Busse (2004), who derived four key variables in their highly accurate econometric forecasting model, namely population, GDP per capita, past performance and a host nation effect. Whilst regression analysis and econometric modeling provide a useful context in which to compare a nation’s performance in the Olympic Games, the two key determinants of such success, population and wealth, are not really controllable in the short term for the purposes of elite sport. That is, it would be hard to imagine a nation making the policy decision to pursue population growth or economic growth in order to drive ambitions in elite sport.

To conclude this section we review the July 2008 forecast of performance in the Beijing Olympic Games made by Andrew Bernard using his model based on population, GDP, past performance and the host nation effect (Bernard, 2008). The Bernard forecast was confined to the top five nations as shown in Table 7.1.

As can be seen in Table 7.1, the Bernard model was exactly right for the USA; within two gold medals for Russia and Australia; overestimated Japan’s score by 8 gold medals; and underestimated China’s score by 14 gold medals. Across the top five nations the accuracy of the model was within two gold medals out of 133 actually won, or a 98 percent accuracy rating. The purpose of a model of this type is to set realistic expectations of what nations might reasonably anticipate achieving using an objective measure (Chapter 6 has discussed
Forecasting the performance of nations

However, the nature of sport is that people and nations are competitive and seek to perform better than an objective measure of performance might otherwise forecast. These nations often take what is known as a “strategic approach to elite sport development,” which in broad terms can be defined as adopting a set of policies designed to enable the nation concerned to achieve success at a greater rate than would be expected ordinarily. Good examples from history include East Germany and the then Soviet Union, while more contemporary examples include Australia, China and currently the United Kingdom. Nations that are successful in their efforts to implement a strategic approach to elite sport development tend to have their performance underestimated by models based on macro-economic variables. To illustrate this point, for the Athens Olympics Bernard and Busse (2004) produced forecasts of how they expected nations to perform. Following the event, these forecasts were reviewed by Shibli and Bingham (2008), who found that where the actual medals won differed from the forecast by more than two gold medals, the data was characterized by two key points. First, the variance was mainly actual gold medals won exceeding the forecast, which was true in seven out of nine cases as shown in Table 7.2. Second, all seven of these nations were known to be investing in elite sport development systems, or taking a strategic approach to achieve elite sport success.

For nations achieving more elite sport success than might be expected on the basis of macro-economic variables, we would cite two plausible explanations. First, the variance between actual and forecast performance could be entirely random and due to a chance event such as the emergence of an exceptional athlete who is capable of winning medals single-handedly. A good example of this phenomenon is Zimbabwe, which until 2004 had only ever won one Olympic medal. The emergence of the Zimbabwean swimmer Kirsty Coventry

<table>
<thead>
<tr>
<th>Nation</th>
<th>Forecast gold medals</th>
<th>Actual gold medals</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>37</td>
<td>51</td>
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</tr>
<tr>
<td>USA</td>
<td>36</td>
<td>36</td>
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</tr>
<tr>
<td>Russia</td>
<td>25</td>
<td>23</td>
<td>–2</td>
</tr>
<tr>
<td>Japan</td>
<td>17</td>
<td>9</td>
<td>–8</td>
</tr>
<tr>
<td>Australia</td>
<td>16</td>
<td>14</td>
<td>–2</td>
</tr>
<tr>
<td>Total</td>
<td>131</td>
<td>133</td>
<td>+2</td>
</tr>
</tbody>
</table>

Source: Bernard, 2008

<table>
<thead>
<tr>
<th>Nation</th>
<th>Predicted gold medals 2004</th>
<th>Actual gold medals 2004</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
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<td>4</td>
<td>–5</td>
</tr>
<tr>
<td>Greece</td>
<td>10</td>
<td>6</td>
<td>–4</td>
</tr>
<tr>
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<td>17</td>
<td>+3</td>
</tr>
<tr>
<td>Hungary</td>
<td>5</td>
<td>8</td>
<td>+3</td>
</tr>
<tr>
<td>Brazil</td>
<td>1</td>
<td>5</td>
<td>+4</td>
</tr>
<tr>
<td>Norway</td>
<td>1</td>
<td>5</td>
<td>+4</td>
</tr>
<tr>
<td>China</td>
<td>27</td>
<td>32</td>
<td>+5</td>
</tr>
<tr>
<td>Ukraine</td>
<td>1</td>
<td>9</td>
<td>+8</td>
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<tr>
<td>Japan</td>
<td>6</td>
<td>16</td>
<td>+10</td>
</tr>
</tbody>
</table>

Table 7.1 Bernard forecast medals compared with actual in Beijing

Table 7.2 Actual versus predicted gold medals outside the range of +/- 2
who won one gold, one silver and one bronze medal in 2004 and one gold medal and three silver medals in 2008, is an example of how an athlete can create the illusion that a nation as a whole is “punching above its weight” in the Olympic Games. Kirsty Coventry was not the product of a system in Zimbabwe and indeed had done most of her training at an American university. Second, nations that seemingly overachieve in elite sport could have effective elite sport development systems in place whereby success is driven by proactive policy factors rather than by passive factors such as population and wealth. This point is particularly pertinent where a nation’s overachievement occurs on a consistent basis. Australia is a good example in this regard. Following the perceived disappointment of Montreal 1976, when Australia was ranked in 32nd place in the medal table with one silver and four bronze medals, the Australian Institute of Sport was established, which enabled large-scale investments to be made in infrastructure, personnel and systems to improve Australia’s future performance. The impact of these investments has been impressive, as demonstrated by the performance of Australia in the summer Olympic Games subsequently, which is shown in Figure 7.1.

Following the establishment of the Australian Institute of Sport in the 1980s, Australia enjoyed continuous improvement from 1988 to 2000, when it was the host nation and finished fourth in the medal table. Since the peak of 2000 there has been a decline in the number of medals won by Australia but the achievements of 2004 and 2008 exceed all preceding editions in the time series except 2000. There is no random pattern to Australia’s performance and it would be appropriate to attribute the nation’s success to the impact of the investment in its elite sport development systems. Hogan and Norton (2000) even found there was a linear relationship between money spent and total medals won by Australia since the 1980s, which in turn reinforced an Australian saying in elite sport which is “more money in equals more medals out.” An overview of the components most commonly found in an elite sport development system is provided in the following section.
Managing performance in elite sport development systems

Since the 1960s the competition between nations to win medals in major international competitions has increased. This has led to governments across the world spending increasing sums of money on elite sport. In their quest for international success in a globalizing world, the elite sport systems of leading nations have become increasingly homogeneous. More than ever before, they are based around what appears to be a single model of elite sport development with only marginal cultural variations (Oakley and Green, 2001a, 2001b; Clumpner, 1994; Krüger, 1989). The premise of what Oakley and Green (2001b) describe as “a global sporting arms race” is that international sporting success can be produced by investing strategically in elite sport. Based on the previous research reviewed above, De Bosscher et al. (2008a) concluded that the factors leading to success which are influenced by policy can be distilled down to nine key factors or “pillars.” These nine pillars along with the notions of the processes found in a system, namely “input,” “throughput” and “output” are illustrated in Figure 7.2.

The term “input” refers primarily to money and “output” refers to the production of elite athletes and the winning of medals. Consequently, these concepts are easily understood. The more interesting and more complex concepts to understand are the techniques that are used to convert the inputs into outputs, that is, the processes used or “throughput.”

Figure 7.2 The nine pillars used in elite sport development systems

Source: De Bosscher et al., 2008a: 24

De Bosscher et al., 2008a: 24
Input

**Pillar 1: Financial support**

Financial resources are measures of input because countries that invest more in elite sport are able, in theory, to create more opportunities for athletes to train under ideal circumstances. Although the link between expenditure on elite sport and success (output) is rare in the literature, there are many examples of countries that have performed better after increasing their investment in elite sport, notably Australia as discussed earlier.

Throughput

**Pillar 2: An integrated approach to policy development**

The amount of resource devoted to elite sport is important, but it is the organization and structure of sport in a particular country and its relationship to society that enables efficient use of these resources to further the chances of elite sporting success (SIRC, 2002). As Clumpner (1994) notes, it is important to have a good communication system and clear task descriptions as well as financial resources.

**Pillar 3: Participation in sport**

Most elite athletes tend to originate from grass roots participation. Van Bottenburg (2003) found a significant correlation between mass participation and medals won during the Barcelona 1992 and Sydney 2000 Olympic Games, especially when sport was “intensive and competitive.” A broad base of sport participation is not always a condition for success, but it may influence success to a large extent because it provides a supply of young talent and the opportunity for training and competing at various levels of ability and in various sports.

**Pillar 4: Talent identification and development system**

Pillar four begins when a talented athlete is “discovered” and starts to receive special attention, normally from a national governing body for sport. From a recognized best practice perspective, there is the necessity for monitoring systems to identify talent characteristics; for robust talent detection systems that minimize drop-out; and for well-organized scouting systems. The second phase of the pyramid is where athletes follow a period of intensive training during which they develop a mastery of their sport. This is the phase of talent development. Many nations have established national coordinated programs to support governing bodies to set up high-level training and competition programs and to support athletes to combine their academic careers with a career in sport.

**Pillar 5: Athletic and post-career support**

The logical extension of the talent identification and development phase is the production of athletes capable of competing at the highest level. This stage is often coordinated by the national governing bodies or by elite sport clubs. In only a few sports can athletes make a living from their earnings and pay for all the costs they incur. Therefore some countries provide financial support for athletes to meet their living costs and to fund support programs...
to give them access to the services needed to help them realize their potential. Finally, athletes also need to be prepared for life after sport while they are still engaged in their athletic careers.

**Pillar 6: Training facilities**

Training facilities are an important success factor enabling athletes to train in a high-quality environment. Facility provision also supplies a link between participation and excellence. For example, De Bosscher and De Knop (2002) showed that in tennis the number of courts was highly correlated with the international success of tennis playing nations ($r^2 = 0.858$).

**Pillar 7: Coaching provision and coach development**

The quality and quantity of coaches is important at each level of the sport development continuum. At the highest level it is recognized that the best athletes will only reach their potential if they have access to the best coaches. For this reason a global market has been created for the services of the world’s top coaches. In the same way that athletes need to be developed, so too sport should have in place mechanisms to produce the coaches of the future so that a system is dependent upon its structures and procedures and not key individuals.

**Pillar 8: (Inter)national competition**

It has been shown consistently in sport that the staging of international events provides nations with a positive home advantage effect. Athletes performing in their home country have the benefit of low travel costs, limited disorientation caused by traveling, familiar weather conditions and facilities, as well as crowd support. Internally, the national competition structure is also an important ingredient as competition is a necessary factor in player development and helping talent to be filtered upwards.

**Pillar 9: Scientific research**

Scientific research concerns the systematic gathering and dissemination of scientific information in areas such as talent identification and development, medicine, nutrition, psychology, physiology and biomechanics. These factors were typical in the former communist nations and are now commonplace as nations use research to innovate and to achieve performance gains.

**Output**

Outputs in elite sport can be clearly defined in terms of actual performance, both in terms of the production of elite athletes and the success they achieve in international sporting competition. In any national level elite sport development system some, or all, of the nine pillars will be present to a greater or lesser extent. There will, however, be variations in how effectively the nine pillars are implemented and in the range of sports to which they are applied. In the search for processes that will provide nations with a competitive advantage in international sport, it is not a case of what nations do, as most nations are doing essentially the same, but rather how effectively nations carry out the processes (Böhlke and Robinson, 2009). Some nations try to achieve success in a relatively narrow range of sport and are said to be taking a “priority” approach, whereas others pursue success in a broader portfolio of sport and are said to take a “diversification” approach.
Nations taking a strategic approach to elite sport provide an interesting context in which to experiment with alternative models that might forecast their likely results with a comparable degree of accuracy to those based on macro-economic variables. In the next section we demonstrate how the use of linear regression analysis on past performance, plus making an adjustment for host nation effect (where relevant), has produced credible results that are a relatively simple alternative to those based on macro-economic variables.

**An alternative forecasting technique**

Forecasting using macro-economic variables in a regression model is beyond the abilities and resources of most people with an interest in how nations might perform at the Olympic Games. Shibli and Bingham (2008) forecast that China would win 46 gold medals at the Beijing Olympic Games by simply regressing China’s historical performance over time and factoring in a home advantage effect. Casual observation of the data since 1984 when China first took part in the Olympic Games revealed that the nation was on something of an upward trajectory, particularly in terms of gold medals won, as shown in Figure 7.3.

When China took part in the 1984 Los Angeles Olympics it won 32 medals in total, of which 15 were gold medals. However, this edition of the event was marred by the Eastern Bloc boycott, which had the effect of reducing the level of competition and thereby enabling nations to win more medals than they would have done had there been no boycott. Perhaps not surprisingly, in Seoul 1988, when normal order was restored, after the various boycotts of 1976, 1980 and 1984, China performed less well than it had done in 1984. To the ruling party of China the Seoul 1988 performance was perceived as being a huge humiliation to national pride and the government “took steps” to improve performance for the future. These can be summarized as: first; making success in international sport an explicit government priority; and, second, implementing most of the nine pillars discussed earlier in a culturally relevant manner. Chalip (1995: 5) states that changes in policy follow what can be described as being

![Figure 7.3](image-url)  
*Figure 7.3 China’s performance in the Olympic Games (1984–2004)*
“focusing events,” which are “nationally traumatic events that can symbolize an issue and focus policy makers’ attention on proposals to redress the issue.” Some focusing events in national sporting performance have led to increased investment in elite sport, often as a means of overcoming perceived failures. In the same way that Montreal 1976 was a focusing event for Australia, so too Seoul 1988 was a focusing event for China. From a forecasting perspective it was clear that 1984 probably overstated China’s performance and that consequently, for the post-boycott era, 1988 was probably a better starting point. The end result produced a very strong correlation of 0.97 ($r^2 = 0.94$) as shown in Figure 7.4 and suggested that China would win 39 gold medals.

The forecast of 39 gold medals did not factor in any host nation effect, which historical evidence indicated was likely to be positive. In the case of China, there were three factors which suggested the potential for a positive home nation effect. First, China had been bidding to host the summer Olympic Games since the early 1990s, when Beijing was a candidate city for the 2000 Olympic Games. In preparation for eventually hosting the event China had made a massive investment in its sport infrastructure and elite sport development systems. The Association for Asian Research (2004) estimated that in the Athens Olympiad alone China invested US$2.4 billion in the China General Administration of Sport (CGAS), the central government body for sport related affairs in China.

Second, and perhaps most significantly, being host nation enabled China to contest more events and more medals than it had ever done before. According to Hong et al. (2005), in 2004 China contested 203 out of 301 events and took part in 26 out of 28 sports. In most of the 28 sports contested (swimming and athletics excluded), the host nation is afforded preferential qualifying rights for its athletes and teams. A good example to illustrate this point is boxing, in which the number of nations from any given continent taking part is rationed by a continental quota system. The quotas used for boxing revealed that under normal circumstances China would have had to compete with the rest of the Asian continent

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**Figure 7.4** Extrapolating China’s gold medals in 2008 based on past performance
for a restricted number of qualification places. However, being the host nation under the qualification criteria in place at the time, China was guaranteed places in six weight categories of its choice. In addition, China had the right to contest as many additional weight categories as it could by securing such rights on merit in the normal round of qualifying tournaments. In Athens 2004 China contested five boxing events, and favorable qualifying conditions alone enabled China to contest more boxing medals in 2008 than it did in 2004. These favorable qualifying conditions for the host nation are replicated in most other sports, enabling the host nation to contest more events and more medals than would be the case typically.

Third, China enjoyed an advantage in sport where familiarity with the venue was a source of competitive advantage. In the case of sailing, for example, Chinese competitors had four years to become familiar with winds and currents on the regatta waters, which was much greater access than for competitors from other nations. In the five editions of the Summer Olympic Games before Beijing (1988–2004) the host nation has performed better than it did in the previous edition of the event. This point can be demonstrated clearly by plotting the change in gold medals won against the change in medals table rank for the five nations concerned as shown in Figure 7.5.

All host nations since 1988 have won more gold medals and improved their medal table ranking relative to the Games prior to being host. For example, in 2004 Greece won two more gold medals than it did in 2000 and in so doing improved its medal table ranking by two places. In 1992 Spain won twelve more gold medals than in 1988 and improved its medal table ranking by nineteen places. The most pragmatic way of computing the host nation effect was simply to take the average of the increase in gold medals won by the last five host nations relative to their tally in the edition prior to being host. This average was seven gold medals. On the basis of the home nation effect data we revised our forecast by proposing that

![Figure 7.5 Host nation performance compared with the Games immediately prior to hosting](image-url)
China would win 46 gold medals in 2008, that is, 39 based on the past performance regression and an additional seven for the host nation effect. This forecast proved to be five gold medals fewer than China actually won, but more accurate than Bernard (38) and also than a form-based forecast made by former head of the Italian Olympic Committee Luciano Barra, who stated that China would win 37 gold medals (see Williams, 2008).

When this forecasting approach is applied to other nations the results remain encouragingly accurate. If we replicate Table 7.1 using the methods employed by Shibli and Bingham (2008) we achieve results that are broadly comparable to those achieved by Bernard (2008) as shown in Table 7.3.

Despite the weakness in the Russia forecast, the total number of gold medals forecast for the five nations in Table 7.3 was 139, which in total was six more than actually achieved by the nations concerned. The overall accuracy of the approach was 96 percent, which is comparable to the Bernard model of 98 percent accuracy (minus two gold medals between the forecast and the actual). The point of comparing the accuracy of models is not to come up with a judgment about which is the best. A more constructive purpose is to illustrate the relative importance of the various components of a forecasting model. What the findings discussed in this chapter seem to indicate is the importance of past performance and host nation effects as factors that are likely to impact upon future success. As increasing numbers of nations take a strategic approach to elite sport development, it is likely that factors such as population and wealth will reduce in importance and policy factors such as the nine pillars will increase in importance. Past performance seems to have a useful role in acting as a proxy for the efficacy of policy factors.

Money alone does not buy success and there may be other factors at play. First, there are positive psychological effects for the host nation. Many people believe that playing at home gives athletes a lift and enables them to perform at their best. This is unproven scientifically and is equally likely to hinder athletes, who may become riddled with self-doubt under the weight of national expectation. Crowds do help, but it tends to be the more subtle impact of crowds on officials in subjectively scored events that creates benefits for the host nation. Judges might be subconsciously influenced to award higher marks to host nation athletes and referees inadvertently tend to favor home teams. The second key benefit of home advantage was highlighted earlier in that Chinese athletes had the opportunity to train in the facilities that were actually used during competition. Finally, the favorable qualifying conditions

<table>
<thead>
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<th>Nation</th>
<th>Forecast gold medals</th>
<th>Actual gold medals</th>
<th>Variance</th>
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</tr>
<tr>
<td>Total</td>
<td>139</td>
<td>133</td>
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</tr>
</tbody>
</table>

1 The forecast for Russia is based on three data points as Russia has only competed in the Olympic Games in its own right since 1996. In 1992 Russia competed as part of a Unified Team and up until 1988 Russia was part of the Union of Soviet Socialist Republics' team (URS), which was an amalgamation of 15 different nations. It is not really appropriate to conduct a linear regression on three data points, so for the purposes of this exercise a simple average of Russia's three most recent scores has been taken (26 gold medals in 1996, 32 in 2000 and 28 in 2004).
offered to the host nation mean that qualification for the host nation may be easier than it is for other nations.

**What can we learn from the performance of China?**

The findings about the performance of China in Beijing 2008 provide an improved insight into the potential causes of improved performance in international sporting competition. What are the ingredients that contribute to improved sporting performance and to what extent were they present in the case of China? Table 7.4 provides a summary of the key factors that we have discussed in this chapter and it demonstrates that all were present to a greater or lesser extent in China.

Where the policy factors outlined in Table 7.4 are present, that is excluding population and GDP, it is likely that forecasting performance will be more accurate using techniques that rely more on variables that can be influenced in the short term by policy decisions rather than macro-economic variables. This can then feed directly into the performance management process as these are factors that can be included in organizational plans. Increased population and wealth do not of themselves cause improved sporting performance. They are, however, building blocks that can be used in the sense that increased population may increase the pool of talent from which to produce athletes; and extra wealth may provide the resources required to fund policy decisions. Once a decision to develop elite sport has been taken, it is highly likely that some or all of the nine pillars will be implemented to a greater or lesser extent. In managerial and policy terms this is in effect to adopt the principles and procedures of performance management rather than passively waiting to see what happens in the end. The forecasting set out in this research provides a rationale for pursuing investment in elite sport systems, which can then be managed using the performance management processes set out in the previous chapter.

### Table 7.4 Factors influencing improved elite sport performance

<table>
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<th>Factor</th>
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</tr>
</thead>
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<td></td>
<td>+3%</td>
</tr>
<tr>
<td>Increased wealth (GDP)²</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>+124%</td>
</tr>
<tr>
<td>Evidence of a “focusing event”</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Seoul 1988</td>
</tr>
<tr>
<td>Central government support for elite sport</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>(Hong et al., 2005)</td>
</tr>
<tr>
<td>Increased funding for elite sport</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>(Hong et al., 2005)</td>
</tr>
<tr>
<td>Previous track record of improvement</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>See Figure 7.3</td>
</tr>
<tr>
<td>Evidence of the nine pillars in use</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>(Hong et al., 2005) not Pillar 3</td>
</tr>
</tbody>
</table>

¹ China 2004 population 1.295 billion; 2008 1.330 billion; increase +3%
² China 2004 GDP US$1.93 trillion, 2008 US$4.33 trillion; increase 124%
References


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