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Organised Labour and the National System of Innovation in South Africa

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Abstract: This paper looks at the relationship between organised labour, the state and private enterprises within the context of the governance of the national system of innovation. In general, from the triple-helix model organised labour may be seen as the missing link, mostly due to its perceived and often actual adversarial relationship with private enterprise and with the state. The paper examines this relationship in the case of South Africa since the advent of democracy and argues that the adversarial relationship, which was implicitly assumed and rapidly became fact, has led to an exclusion of organised labour from the planning of the evolutionary course of the national system of innovation. This exclusion is evidently total from the perspective of the narrow version of the system of innovation, in terms of STI planning. It is also largely absent from the planning of the broader version of the national system of innovation, in terms of national economic, education and social planning. This exclusion persists in spite of a formal institutional space, created at the dawn of democracy for the collaboration of the state, organised labour and the private sector in national planning. It also endures despite the formidable power of organised labour in South Africa.

Keywords: organised labour; South African national system of innovation; triple-helix model

JEL: J08; O38

1. Introduction

Over the twentieth century, in South Africa, the relationship between most of organised labour, excluding white-based labour unions, and the state and the business sector grew into a struggle between a liberation movement and a predatory state. The incidence of strike action and other forms of civil revolt accelerated rapidly since the 1946 African Mine Workers Union strike and reached such a level of intensity as to be a significant factor in the deterioration of business prospects. This factor, together with the isolation imposed by the global anti-apartheid movement, pushed the corporate sector to motivate strongly for the end of apartheid. Democracy brought in a new era for labour relations, with the end of legislated racial discrimination laying down the base for a normalisation of the relations between labour, capital and the state. However, the historic opportunity to re-design and re-invent a new national system of innovation and in the process to alter the fundamental base of the relationship between organised labour, private business enterprises and the state was missed.

This paper looks at a largely unquestioned gap in innovation policy and in the framing of the national system of innovation in South Africa. That gap is the absent participation of organised labour in the design of the evolution of the post-apartheid national system of innovation. This is not unique to South Africa. In the assumed historical polarisation between capital and labour across most of the global economy there is no apparent scope for engaging organised labour with the national system of innovation. This gap is also reflected in the paucity of theoretical literature on this relationship, but it is not universal. There is a small group of empirical cases that seem to violate the assumed zero-sum game between capital and labour, especially in the area of innovation. There is also scope for extending the system of innovation approach and the modelled interactions within the system of innovation to incorporate organised labour as an active participant.

Since the early 1990s, the system of innovation approach to the understanding of economic dynamics has rapidly shifted from the periphery of economic theory, as a countervailing account to the neoclassical orthodoxy, to an increasing prominence in national economic planning frameworks. The progressive move from a neoclassical treatment of technology as exogenous to the economy or as the outcome of highly stylised models of firm level decision processes¹ to a conceptual framework which is grounded in evolutionary economics has had notable implications for national policy. This development was reflected in South Africa in the rapidly increasing prominence assigned to innovation policy within the national economic planning framework. In the mid-1990s Science and Technology was paired with Arts and Culture in one ministry, which seriously devalued the role of science, technology and innovation policy within national planning. However, in 2001 a separate Ministry of Science and Technology was formed, and in 2012 the first recommendation of the ministerial review of the South African system of innovation was that the planning of the national system of

¹ See Reinganum (1989) for an extensive coverage of game-theoretic modelling of firm behaviour with respect to investment in innovation.

innovation should be raised above ministerial level to a cross-cutting body with the country's Deputy President as Chair (DST, 2012: 18).

The concept of national systems of innovation has a long provenance from List (1841) through Schumpeter (1934), Nelson and Winter (1982), Lundvall (1992, 2nd edition 2010), Freeman (1995), and the volume of writing opened up by Dosi et al (1988). This concept is open to a wide range of interpretations dependent on which particular definition of innovation is adopted and the agents of innovation which are considered as relevant. Innovation may be conceived narrowly as science and technology or broadly as all new ways of coordinating human activity to create value which are demonstrably better than the current ways. The broad version of the systems of innovation approach thus includes organisational and institutional change as well as new technology in the definition of innovation. Lundvall (2010: 2) provides one of the more open definitions of the national system of innovation as:

...the elements and relationships which interact in the production, diffusion and use of new, economically useful, knowledge...and are either located within or rooted inside the borders of a nation state (Lundvall, 2010)

Scerri (2014 and 2016) has broadened the definition of innovation to an extent where the national system of innovation may be seen as an alternative account of the general political economy. This is based on a proposed 'innovation theory of value' where past streams of innovation, broadly defined, form the economic (but often non-tradable) value of output. From this broad a perspective all aspects of what is normally seen as the economy may be reformulated as components of the national system of innovation. Moreover, those spheres of activity and planning which are seen as lying outside the economy by mainstream economics, such as all aspects of social welfare, are also included. Fundamentally, the systems of innovation approach to economic dynamics, especially in its broader interpretations, offers a countervailing discourse to the meta-narrative of the neoclassical foundation of mainstream economics which claims a universality of application, regardless of time and space. In contrast to mainstream economics the system of innovation approach emphasises historical and ideological specificity as a core determinant of the development path of national economies.

The role of organised labour in the evolution of national systems of innovation has been largely neglected in theoretical work with the consequence that this shortcoming is reflected in national innovation and economic policy formulation. This is particularly puzzling within the system of innovation approach which places the human element, whether in the form of human capabilities (Sen, 1999) or technological capabilities² at the core of its understanding of the formation and evolution of national systems of innovation. This omission holds

² Defined by Lall (1992: 166) as those capabilities which are directed at '...mastering new technologies, adapting them to local conditions, improving upon them, diffusing them within the economy and exploiting them overseas by manufactured export growth and diversification'. We can therefore define the technological capabilities of a national system of innovation as its capacity for the creation, adoption, absorbing and adapting new knowledge within a specific context.

significant implications for innovation planning in particular and economic planning in general, especially within the context of developing economies which are still in the process of forging the institutional base of the emerging national political economy. The effects of this exclusion are of particular concern in the case of the post-apartheid system of innovation where the absence of organised labour in the drafting of innovation policy is symptomatic of its progressive exclusion from the wider national planning structures.

The following section of this paper looks at different approaches to the understanding of the interaction of various agents in the evolution of national systems of innovation. The section after that looks at the shifting role played by organised labour in national economic planning in South Africa since the end of apartheid, specifically with respect to the relationships with the state and the business enterprise sector. The following section narrows this examination to the relationship between organised labour and science, technology and innovation planning. The concluding section looks at various policy implications of this gap in the planning of the evolution of the South African system of innovation. The end of apartheid brought about the possibility of a fundamental rupture on many fronts in the evolution of the national system of innovation. While this break is evident in many significant facets of innovation planning, the exclusion of organised labour as a participant has cemented a significant degree of continuity between the apartheid and the post-apartheid national systems of innovation.

2. The agents of innovation

In the development of the commonly accepted framework for science, technology and innovation policy the normal model for public-private sector collaboration is the triple helix formation of the state-university-business enterprise link. This model was designed to capture and exploit the private and public economic aspects of the generation and deployment of innovation, in all of the complex interactions of a tri-partite process of interaction, learning, feedbacks and adaptation (Etzkowitz and Leydesdorff, 2000 and Leydesdorff, 2005). Relatively recently (Leydesdorff, 2012), this model has been expanded to a quadruple helix which incorporates civil society organisations to ensure a better coverage of the various market and non-market determinants of the formation and evolution of national systems of innovation.

Kuhlmann et al (2010) propose that innovation emerges as a process of interactive learning among groups of agents who engage in innovation practice, public sector strategies and innovation related theory, respectively. These three groupings of agents interact in a space labelled the 'innovation dance floor' with agents in each group observing each other, learning from each other and reacting to each other. This dance metaphor allows for smooth complementary movements in the shaping of the national system of innovation as well as for missteps, friction, conflict and disharmony. In the process, the relationship among the three spheres continuously alters with any one of them temporarily becoming the driver of the dance. The space for the dance, the 'dance floor', sets the limitations to the possible interactions among the three groups of agents and thus indirectly the limits to the development of the national system of innovation. These three groups of agents at first

glance seem to be equivalent to the original configuration of business enterprises, the state and tertiary education institutions, as originally envisaged in the early triple helix model. However, there is nothing inherent in the specification of the three spheres of activity which engage in the dance that limits the consideration of agents to these three groups. The extension of the helix to the 'n-tuple' level (Leydesdorff, 2012) indicates the open-ended nature of these models of interaction within the national system of innovation.

The helix and the innovation policy dance formulations of the interaction among the agents of innovation (Kuhlmann et al, 2010) may be a description of actual interaction and, given their accounting for feedback effects and unpredictable outcomes, may also help improve the efficacy of policy in terms of design and implementation. These two aspects are obviously closely inter-dependent with the specification of the normative implications being set by the particular version of the national system of innovation approach which is adopted and, less frequently, with the analytical shape being driven by developmental imperatives. The strict correspondence of the helix and the innovation policy dance to the private/public/university sector configuration is strongly rooted in the narrow version of the system of innovation. A broader understanding would allow the consideration of other players both within and across the three spheres of activity in the dance. This is where the theoretical space opens up for the role of organised labour in the national system of innovation.

The literature on the relationship between organised labour and innovation is rather sparse. Within orthodox neoclassical economics labour unions are seen as introducing monopoly power on the sellers' side of the labour market with the consequent detrimental effect on a narrowly defined 'optimal allocation of resources' which could include investment on research and development (R&D). From within this approach the monopoly positioning of labour unions allows rent-seeking behaviour which acts as a distortionary tax on investment by the firm with a special impact on R&D projects whose foreseen outcomes are much less certain than other types of investment. Bradley et al (2015) explore the game-theoretic approach to the relationship between organised labour and innovation in terms of a proposed 'misaligned incentives hypothesis' where an assumed distortion of incentives for workers and employers follows unionisation. The three main sources for this misalignment are the ability for workers to obtain higher wage concessions once investment is sunk into R&D projects, thus reducing the firm's incentive to invest in R&D (the 'hold-up problem' introduced by Grout, 1984), the reduction of the negative consequences of shirking work due to employment protection and the reduction of the incentive for innovative workers due to the reduction of wage inequality. The result of this misalignment is an underinvestment in R&D. On the other hand, Bradley et al (2015) also explore the reasons for a possible positive relationship between labour unions and innovation. They point to the prevalence of workplace innovations which flow up to the research laboratories to become patentable and the reduction in R&D costs through using shop floor workers as support staff for engineers in R&D. Both these factors are enhanced by the job security resulting from strong unions.

Overall Reinganum (1989) concludes that game-theoretic modelling of the firm's investment decisions on innovation is much too stylised to incorporate the uncertainty and areas of

ignorance accompanying R&D investment and thus to contribute significantly to empirical work in this area. Empirical work based on regression analysis is rarely able to capture underlying contextual effects with the result that empirical findings on the relationship between organised labour and innovation often appear to be arbitrary. The outcome of empirical work of this nature often affirms one or the other side of the dichotomy between conflictual and collaborative relations between capital and labour with the role of the state as the mediator and performer as the critical factor. The core conclusion that one can draw from the wide range of empirical findings is that the historical and institutional context is crucial to the form that this relationship takes. The main divide in this case is between Anglo-American and Northern European contexts.³ In the case of the latter there are numerous accounts of a strong positive relationship between organised labour and innovation. The most notable of these come from Nordic economies where advanced welfare states with strong labour unions set the context for growth prospects and levels of competitiveness which rank them amongst the highest in the world (Benner, 2015). While the states covered by Benner differ considerably in their economic base and industrial and innovation policies, they have a commonality in their commitment to full employment, welfare and regulated labour markets which yield high and sustainable rates of economic growth even in the new age of a globalised neoliberal hegemony. This focus on the maintenance of a high quality of life for the majority of the population has worked well in the guaranteed provision of a learning, innovative and increasingly competitive labour force which is at the heart of thriving national systems of innovation. Denmark is particularly interesting in the flexibility of its labour market relations in adapting to the changing demands of an increasingly competitive global market with its model of 'flexicurity'⁴ governing its labour market. It is a model which allows for a carefully monitored process of job losses and job creation, as an inevitable consequence of the rise of the Danish economy in the global value chain and the relocation of low labour-cost jobs to less expensive countries. This balancing act which minimises unemployment while retaining a high degree of flexibility in the labour market is achieved through a close and cooperative understanding between unions, private enterprise and the state to ensure an ongoing process of re-training and re-placement of workers with an uninterrupted protection of minimum living standards.

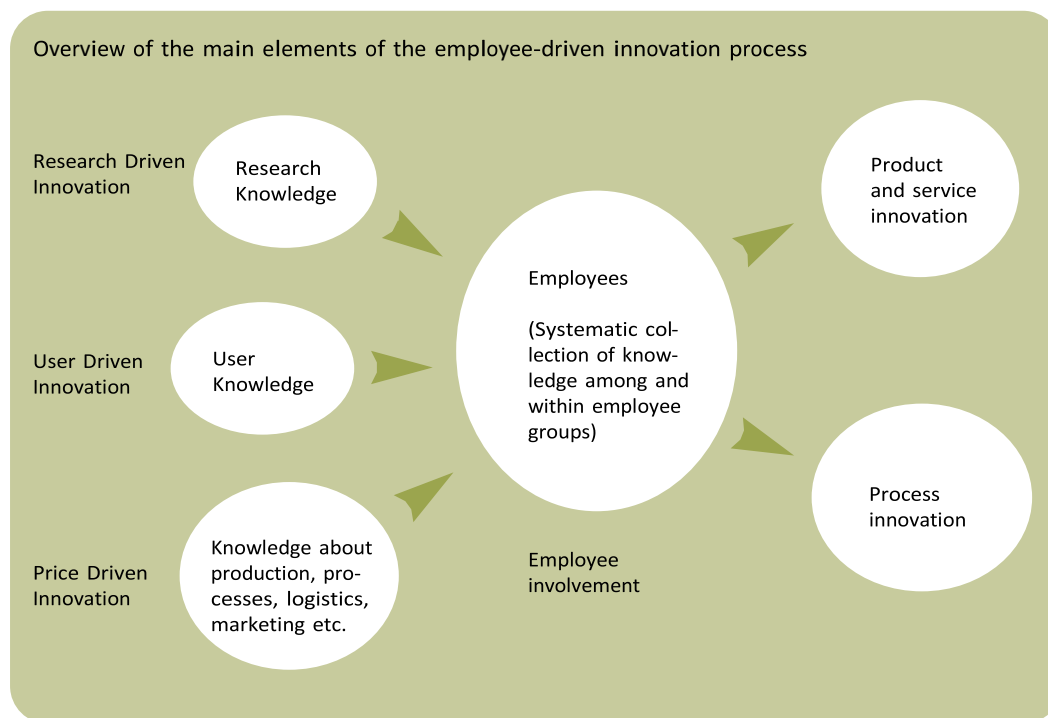
The Danish Confederation of Trade Unions uses the concept of employee-driven innovation where 'employees generally contribute **actively** and **systematically** to the innovation process' (LO, 2007: 9) as the basis of its interaction with employers in private and public sectors. The Danish Confederation of Trade Unions adopts the broad version of innovation which it defines succinctly as '... a **new idea** which, once **implemented**, creates **value**' (ibid: 9). The Confederation sees employees as utilising their knowledge of research, users and production

³ 'Theory has in one sense been channelled in this direction by empirical research pointing to a sharp dichotomy between North American findings that are almost invariably negative in respect of the union impact on innovation capital and European research that generally points to an absence of significant associations once one proceeds beyond the raw correlations in the data.' (Addison et al, 2013: 3)

⁴ See Daemrich and Bredgaard (2012) for a discussion on the nature and functioning of Denmark's flexicurity system.

processes to convert knowledge into innovation. This process of bottom-up innovation is represented in Figure 1. For employee-driven innovation to work there has to be an accord, both codified and tacit, between unions and employers, an accord whose endurance, especially in its tacit component, and effectiveness is cumulative and path-dependent over time. It is this path dependency which has led to the apparent anomaly of an advanced welfare state with a highly competitive national system of innovation.

Figure 1: Schematisation of employee-driven innovation (Denmark)



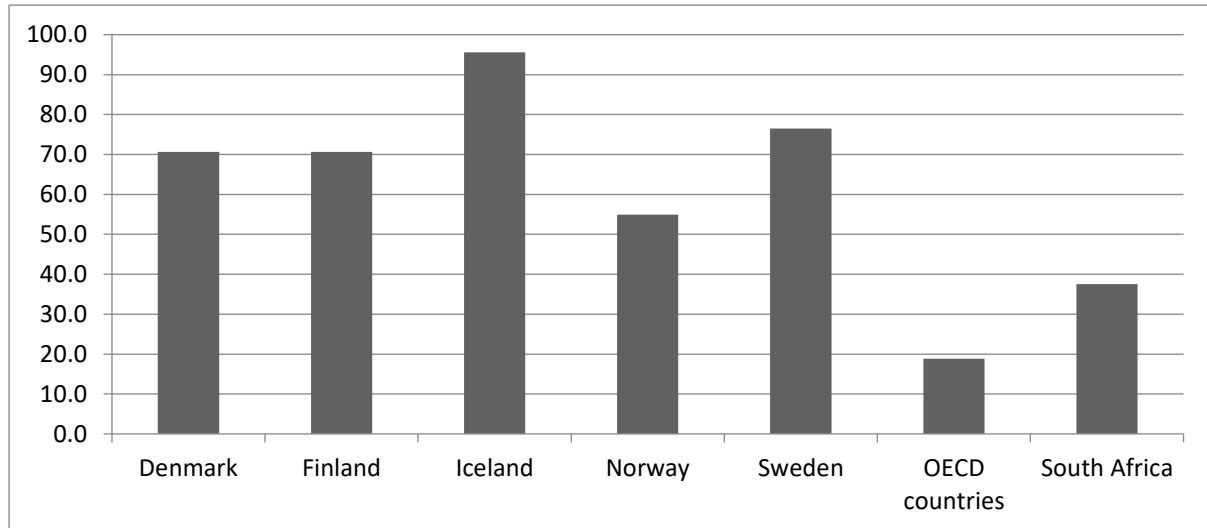
Source: LO (2008: 13)

The apparent anomaly of the combination of a high rate of unionisation and rapid rates of economic growth and development also puts in doubt the conventional wisdom about the premised relationship between innovation and employment. The commonly assumed trade-off between an increasing technological component of production and labour employment is a simplistic argument based on the premise of labour saving technology with human capabilities as a given quantum. The labour market combination of flexibility, security and re-training evident in most of the Nordic countries, Germany and the Netherlands, among others, allows for an escape from this apparent bind. Once investment in human capabilities is allowed for, the progression of economies from a low-skilled and low-technology base to one with a deeper and broader technological base need not result in unemployment. As happened in Southern Europe and in Japan over the second half of the twentieth century, an increasingly skilled and rapidly learning⁵ labour force applied to an increased technological

⁵ See Archibugi and Lundvall (2001) on the 'learning' rather than the 'knowledge' economy as the appropriate analytical framework for the study of economic dynamics.

content, whether internally generated or imported, moved the economic base of nations up the global value chain. The implications for employment in such cases tend to be positive with a shift in the global distribution of labour towards the ‘new’ middle-income developing economies.

Figure 2: Comparative unionisation rates (2005)



Source: OECD data at https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN#; South African datum from Borhat, Naidoo and Yu (2014)

One of the defining characteristics of the advanced welfare states is their high degree of the unionisation of the workforce in comparison to OECD countries in general. This is shown in Figure 2, which also shows that the unionisation rate in South Africa, while lower than those in Nordic countries, is also considerably higher than that for OECD countries as a group. The anomaly in Figure 2 is the high rate of unionisation in South Africa, both because of its improbability, given the enduring high levels of structural unemployment and the increasingly oppositional relationship between organised labour on one side and the private sector and the state on the other. The rift between labour unions and employers, both private and public, with the implicit assumption of an essentially conflictual relationship, is the prime obstacle to the participation of labour in the innovation policy dance.

3. The shifting role of organised labour in the South African economy

The history of conflict between organised black⁶ labour on the one hand and the apartheid state and corporate power on the other posed a major structural problem for the country’s first democratic government. The recognition of this problem and the urgency of its resolution led to the establishment of the National Economic Development and Labour Council (NEDLAC) by parliament⁷ in 1994. NEDLAC was established as a coalition of representatives of government, labour union federations, private enterprise and civil society, and was charged with the responsibility to act as the consultative body not only on labour

⁶ Here I use the term ‘black’ in the political, not the biological sense.

⁷ The National Economic Development and Labour Council Act, No. 35 of 1994, accessible at <http://www.nedlac.org.za/>

legislation but also on economic and social policy. The degree to which consensual overview would obtain depended on an implicit balance of power among the partners. Gostner and Joffe (1998: 140) argue that the preference of the Congress for South African Trade Unions (COSATU) to pursue certain issues through the political triple alliance with the African National Congress (ANC) and the South African Communist Party (SACP) as a means to sideline the business sector undermined the effectiveness and relevance of NEDLAC in its oversight function. This policy of prioritising a political understanding at the expense of formal consultative institutions backfired badly with the imposition of the neoliberal macroeconomic programme, the *Growth, Employment and Redistribution* (GEAR) plan in 1996, in spite of a sustained, incisive and highly public objection by COSATU.⁸ This marked a watershed in the relationship between COSATU and the ANC led government, a break in participative consultation which had hitherto been the basis on which the ANC/SACP/COSATU alliance been premised.

GEAR set the framework within which macroeconomic policy was to be formulated since 1996, first explicitly and eventually tacitly and ubiquitously. The 2001 review of the efficacy of the GEAR programme in addressing endemic unemployment led to its gradual official abandonment. However, in the absence of the articulation of a coherent alternative economic planning paradigm, subsequent macroeconomic plans, including the latest *National Development Plan* (NDP), were and still are caught within the neoliberal language which set the mould for economic planning in South Africa since the inception of its democracy. The market friendly GEAR failed to restructure the South African economy away from its dependence on the minerals-energy-complex (Fine and Rustomjee, 1996), except for the linked financialisation of the economy. Mohamed (2013), Fine (2010) and Mohamed and Finnoff (2004) point to the massive outflows of capital, initially illegal and eventually permitted by the state, as a significant reason for the low investment to GDP ratio, a factor which acts as a strong inhibitor to expenditure on R&D and the continuing binding of the South African system of innovation to a low skilled extractive economy.

The review of the GEAR programme in 2001 highlighted the failure of this macroeconomic plan to address the high, and increasing, level of unemployment in the South African economy. The two main structural problems in this regard were the imperative to raise the economy's absorptive capacity for unskilled and semi-skilled labour to alleviate unemployment and poverty in the short to medium term, while raising the skills level of the population in general to develop the economy in the longer term. The two related interim strategic plans designed to address the GEAR employment shortfall were the *Accelerated and Shared Growth Initiative for South Africa –AsgiSA* (RSA, 2004) and the *Joint Initiative of Priority Skills Acquisition – JIPSA* (RSA, 2006). At the outset, the AsgiSA document explicitly refers to the participation of organised labour in policy making as essential to achieving employment creation and poverty reduction targets.⁹ However, the nature of consultation with labour

⁸ See, for example, Adelzadeh (1996) for an extensive critique of GEAR.

⁹ 'the goal of reducing unemployment to below 15% and halving the poverty rate to less than one-sixth of households will not be achieved without sustained and strategic economic leadership from

seems to be implicitly pre-determined, as evident in the assumed requirement to liberalise labour market legislation when the document states that ‘in specific sectoral regulatory environments, regulation unnecessarily hampers the development of businesses’ (RSA, 2004: 5) with a specific recommendation that ‘the Minister of Labour will lead a review of labour laws, including their impact on small businesses’ (ibid: 13). The overt intention to involve labour unions in the strategy to address poverty and unemployment is repeated in the JIPSA document when it states that JIPSA was given the mandate by the Presidency to ‘lead the implementation of a joint initiative of government, business and organised labour to accelerate the provision of priority skills to meet AsgiSA’s objectives’ (RSA, 2006: 7) and to ‘mobilise senior leadership in business, government, organised labour and institutions concerned with education and training and science and technology to address national priorities in a more co-ordinated and targeted way’ (ibid: 7). Further on (ibid: 8) business and organised labour are proposed as partners in the acceleration of skills development. In fact, organised labour is formally placed within the JIPSA structure, along with government, business, higher education institutions, research institutes, and civil society as the constituent JIPSA partners (ibid: 9). JIPSA represents the only macroeconomic planning document which explicitly recognises the role of organised labour in national planning and embeds it in its structure. This is, however, a rare exception to the norm of the continuing exclusion of labour unions from the formulation of national economic objectives and strategies.

The continuing premise base of macroeconomic planning in South Africa is evident in the assumption of the unquestioned trade-off between wages and competitiveness in the *New Growth Path* document (EDD, 2011: 38). COSATU issued a strong critique to these assumed trade-offs (COSATU, 2011), a critique which is strongly indicative of the enduring exclusion of labour unions from national economic policy formulation in spite of NEDLAC. The 2012 NDP document explicitly refers to the worsening labour relations environment in South Africa when it states that

About 1 million work days were lost to strikes annually in the eight years after the Labour Relations Act was passed. In 2007, 9.2 million work days were lost and in 2010, 20 million work days were lost, suggesting that the labour relations environment has become particularly fraught. (NPC, 2012: 112)

However, as pointed out by Fine (2012) the NDP devotes a relatively considerable degree of attention to the easing of dismissal procedures (NPC. 2012: 113-115), effectively pursuing the idea of ‘labour market flexibility’ as a strategy for international competitiveness and employment creation. At no point is there any policy indication for the involvement of organised labour in a reformation of the labour market regulatory environment.

Structurally, the shifting power base of post-apartheid organised labour bears a striking similarity with the history of organised labour in a number of post-colonial African

government, and effective partnerships between government and stakeholders such as labour and business’ (RSA, 2004: 2-3).

economies.¹⁰ Pitcher (2007) attributes the general decline in the ability of labour unions to influence national economic policy across post-colonial Africa to a number of factors. In the first place, while organised labour has often been at the forefront of the liberation struggle against the colonial power (or against apartheid) in a close link with the party which formed the post-colonial government, the post-liberation era of democratic governments altered the power relationship between organised labour and the liberation movement turned ruling party. The 'irony of democracy' (ibid: 151) brought in numerous new claimants on the new democratic governments while participatory democracy by its very nature allowed new forms of association which often tended to fragment the previously unified liberation front which included organised labour. In the case of those post-independent states which retained an authoritarian polity the exclusion of labour unions from formal policy making structures tended to be even more thorough. The shifting relations with the global economy also helped to side-line organised labour due to the new global hegemony of the neoliberal doctrine, structural adjustment programmes and the scramble for foreign direct investment on the basis of poorly regulated labour markets.

4. Organised labour and innovation planning in South Africa

Given the general exclusion of organised labour from macroeconomic planning throughout South Africa's post-apartheid period, it is not surprising that this exclusion carried through in the case of innovation policy. Not only did GEAR bind national planning to the global neoliberal hegemony of the mid-nineties but the conceptualisation of the national system of innovation generally remained bound to the national system of science and technology, in spite of some lip service paid to the broader political economy concept of the system of innovation.

The preparatory document for the *White Paper on Science and Technology* (DACST, 1996), the country's first national Science and Technology plan since 1916 (Scerri, 2009), was the mission report by the International Development Research Centre in 1993 (IDRC, 1993). This report laid the foundations for the re-orientation of the South African national system of innovation towards the requirements of the new democratic political economy. The IDRC report does refer to the role played on the shop floor in innovation, as is evident in the following quotation.

More commonly, it (a firm's ability to innovate) will involve groups of engineers and workers making many small incremental changes. Competitiveness depends crucially on the ability to make incremental changes, and this in turn means a capability within the firm to manage these changes. (IDRC, 1993: 51-52, brackets added)

¹⁰ In the case of Namibia, the Namibian government maintained its right to act as the final decision maker in the drafting of the Labour Act of 1992 which was supposed to be the outcome of a consensual agreement between labour, capital and the state (Jauch, 2003: 3). While necessarily constituting a major improvement on pre-independence labour legislation, the 1992 Labour Act disappointed a number of the expectations of the union movement on issues of minimum wages, maternity leave, the length of the working week and annual leave.

However, apart from this brief acknowledgment, the entire focus of the report and its recommendations are strictly bound to the system of science and technology, where the human element is couched purely in terms of university graduates with a specific focus on science and engineering. This limitation of the report to the system of science of technology *in lieu* of the system of innovation is typical of the accepted version of the national system of innovation concept at the time.

The 1996 White Paper only makes some cursory references to labour laws in connection with human resource development but makes no mention of organised labour as a possible participant in the planned national system of innovation. These references include the need for collaboration among various stakeholders to develop the national system of innovation¹¹, the inclusion of non-technological innovation¹², and an exhortation for inclusivity¹³, with no mention of organised labour anywhere in the document as a possible stakeholder. Apart from various government departments, business and non-governmental organisations (NGOs) are also included as stakeholders in the national system of innovation. Labour unions are not listed among stakeholders.

In 2001 science and technology was split from arts and culture to form a separate ministry and in 2002 the *National Research and Development Strategy* (2002) was published (RSA, 2002). The conceptualisation of the national system of innovation in the 2002 strategy document is again strictly limited to the system of science and technology with R&D as the driver of the system along with an assumed unidirectional causality from R&D to wealth creation and the enhancement of the quality of life (RSA, 2002: 26-28). The labour that is considered relevant to this particular version of the national system of innovation is science, engineering and technology related 'human capital' as produced by higher education. The confines of this version of the system of innovation have no room for a consideration of labour, much less organised labour, as a significant participant in the system of innovation. In 2007 the Department of Science and Technology (DST) brought out the Ten-Year Innovation Plan for the South African economy (DST, 2007), building on the *National Research and Development Strategy*. The delimiters of the innovation plan also exclude any consideration of labour from the system of innovation, except in the highly restrictive notion of the 'human capital pipeline' which 'starts with postgraduate students at one end, and delivers world-class scientists and researchers at the other' (DST, 2007: 29).

¹¹ 'In an innovative society, individuals, groups, organizations, government and Parliament recognise that they are partners, rather than opponents, controllers or contenders' (DACST, 1996: 7).

¹² 'Innovation in the design of South Africa's social and economic institutions, and in its system of governance, is needed equally as much as innovation in the products and production processes of its economy' (ibid: 20-21).

¹³ 'South Africa's national system of innovation "consists of all individuals and organisations involved in creating and using a knowledge base in order to build a better South Africa". The White Paper enumerated a wide range of stakeholders - in government, business, education and training institutions, in multipartite bodies and in organised civil society, even including a number of interested outsiders' (ibid: 23).

The OECD review of the South African national system of innovation (OECD, 2007) while pointing out the need for a more inclusive national system of innovation again makes no reference to organised labour as a participant in the national system of innovation which could help make it more inclusive. Organised labour is excluded from the SWOT analysis provided in that report (OECD, 2007: 11) which is otherwise broad in terms of the factors which it includes as components of the national system of innovation. The Ten-Year Innovation Plan is entirely focussed on science and technology with the requirements of human capabilities articulated purely in terms of PhD graduates, especially in the natural sciences. The 'human capital pipeline' proposed by this plan neglects the fact that the entry of suitable students into the tertiary education sector requires sound primary and secondary education, that innovation requires a skilled and learning work force to be absorbed into the production sector, and that innovation also emerges from outside R&D laboratories, especially from the shop floor.

The 2012 ministerial review of the South African national system of innovation was asked to

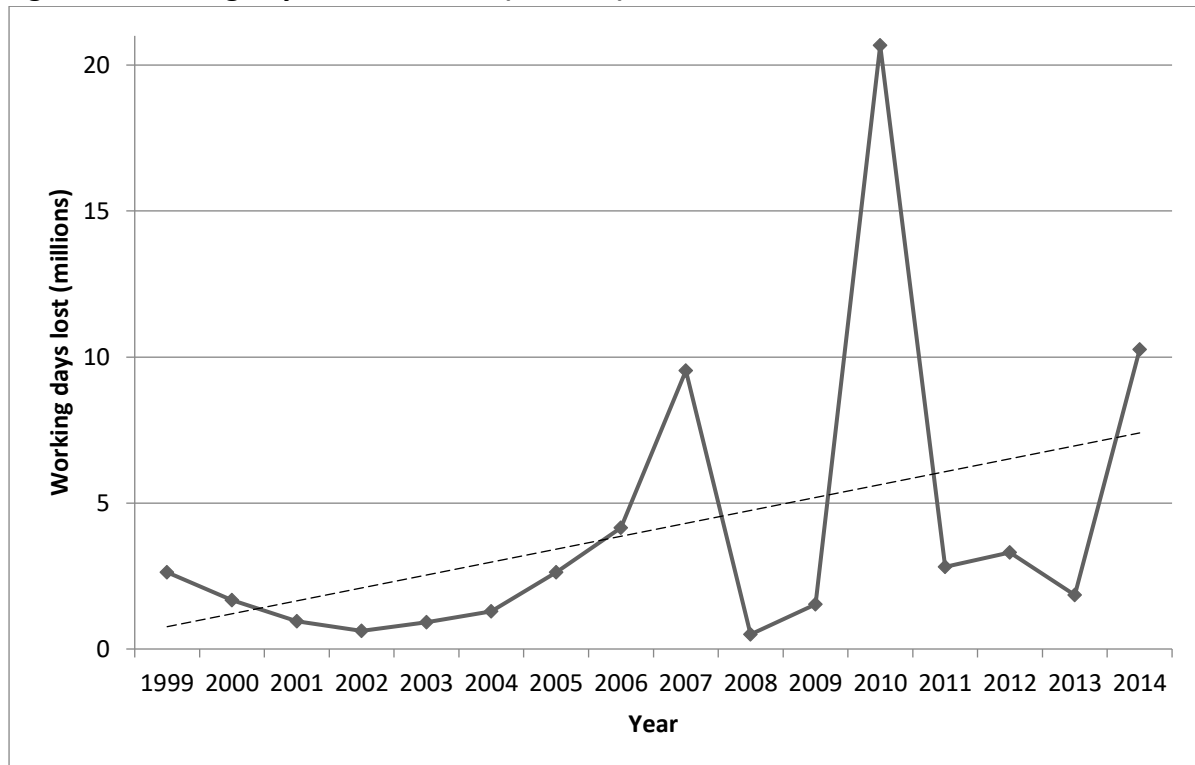
...provide the nation with an understanding of what was really being achieved by the NSI as the key driver of knowledge-based economic growth and associated inclusive national development, and to recommend ways in which the system could be made more effective. (DST, 2012: 9)

The report agreed with the OECD (2007) finding that '(t)he NSI was making an inadequate contribution to poverty reduction and wider inclusion in the mainstream economy' (DST, 2012: 10) and it is quite explicit on the requirement for a wide range of participants at all levels of policy design and implementation for the system to work when it states that

(The) responsiveness of the NSI with respect to meeting its intrinsic mandate is most critically dependent on effective and participatory joint policy-making, planning and coordination at the central NSI policy-making platform. It is essential that this platform is well-defined in its composition, so that a clear-sighted regulatory environment is achieved, keeping in mind the distinctive capabilities and contributions of the various participants. (DST, 2012: 13)

However, the report only mentions labour unions in a list of possible partners for 'social innovation' (DST, 2012: 26). This implicit omission of organised labour from the official definition of the national system of innovation is consistent with the OECD approach, as exemplified in its report on inclusive innovation (OECD, 2013) which devotes a considerable section to the informal economy as a significant component in the national system of innovation but makes no mention of labour unions.

Figure 3: Working days lost to strikes (millions)



Source: Jacobs and Yu (2013) for the years 1999-2011; DOL (2015) for the years 2012-2014

The breakdown of the relationship between the state and organised labour is reflected in the incidence of strikes over a fifteen-year period, as depicted in Figure 3, which saw wide fluctuations in the number of work days lost through industrial action annually around a rapidly rising trend. This indicates an escalating degree of conflict between employer and organised labour, a high rate of unionisation (as shown in Figure 2) which is even more significant given the high degree of unemployment, and a lock-in into the adversarial model of the relationship between unions and business with the state cast as the agent of capital. Structurally this replicates the labour/capital relations of the apartheid system of innovation and the accepted polarised relationship into which business and organised labour have settled perversely allows both sides to adopt rent seeking behaviour afforded them by their monopoly positioning on either side of the labour market (Bhorat et al, 2014: 16-17). This acceptance of the *status quo* in the context of a legitimate democratic government has become a dangerous constraint on the capacity for the transformation of the national system of innovation to one which is strongly development oriented since the legitimising power of a democratic state is inevitably stronger than that of the predatory state.

The exclusion of organised labour from any aspect of national innovation policy formulation and implementation is implicitly accepted by the unions as is evident in the sparseness of critique of innovation policy documents from their quarter. This stands in stark contrast to the ongoing and generally rigorous objections of labour unions and representative federations, especially COSATU to every macroeconomic plan since GEAR. The adversarial model and the irrelevance of organised labour to innovation policy now form the generally

accepted context for labour relationships in the post-apartheid system of innovation. The fact that this assumed context is not necessarily the only possibility is amply demonstrated by examples from other economies, more notable, as already noted, in Northern Europe. The system of innovation approach, with its focus on the specificity of the evolutionary paths of distinct national systems of innovation, cautions us against easy generalisations across radically different historical contexts. However, a time of rupture, as with the end of apartheid, offers up a fork in the evolutionary path of the national system of innovation which allows for the possible re-drafting of the fundamental relations underpinning the system. The fact that South Africa missed its historic opportunity to re-structure in an effective manner the underlying relations between labour and capital does not necessarily mean an unbreakable structural bind. The ongoing economic crises characterised by structural unemployment, poverty and a depletion of the national pool of human capabilities is intrinsically unsustainable and is steering the South African system of innovation towards another, albeit softer, rupture. This opens up distinct possibilities for the re-visiting of the understanding of the roles of the various major players in the evolution of the national system of innovation and a radical innovation, which has to be led by the state, in their relationships to each other within the framework of sustainable economic development.

5. Prospects

There are three unrelated factors which converge to determine the prospects for a reformulation of the relationship between organised labour and the state/corporate alliance within the context of the national system of innovation. The first is the course of technological and associated innovations and its structural effects on the global economy. The second is the response of South African labour unions to the effects of technological change. The third is the radical, and unpredicted, political change that South Africa has been going through since 2008.

The waves of techno-economic paradigm shifts,¹⁴ which mark the early part of the 21st century, most notably artificial intelligence, nanotechnology, biotechnology and robotics have altered the relations of production in a historically unprecedented way (WEF, 2016). These shifts have always radically altered the skills requirements of economies, rendering sets of skills obsolete while giving rise to new skills required for the emerging productive base of the economy (Freeman and Perez, 1988). As Streeck (2017: 7) puts it, '(t)he promised service economy and the knowledge-based society turned out to be smaller than the industrial society that was fast disappearing; hence a constant expansion of the numbers of people who were no longer needed.'

The current crisis of governance whose various manifestations have been summed up under the term 'state capture' marks the garish culmination of the evolution of a system of accumulation whose origins lie in the ideological choices which imprinted national planning in South Africa since the end of apartheid. The dramatic nature of the appropriation of

¹⁴ Techno-economic paradigm shifts are brought about by technological breakthroughs which are not only radical but also affect the technological base of the rest of the economy (Freeman and Perez, 1988).

various arms of the state apparatus for the enrichment of clearly identifiable private interests, the very immediate threat to the integrity of the state and the economy, and the massive media focus and public awareness that all of this has drawn hold a real possibility of a confusion of agency and structure in the analysis of the crisis. This confusion has worrying implications for the resolution of this crisis and its aftermath.

The Bhorat et al (2017) 'Betrayal of the Promise' report charts a veritable chronology of the specific details and timelines of the development of the 'capture' of the South African state and as such constitutes a significant contribution to the understanding of its evolution. However, while the focus on agency may hold a short-term solution to the overt looting of the public fiscus, one should ask how this situation came about in the first place. At one level, one should look at constitutional loopholes which vested an inordinate degree of power in the president of the country to make and terminate appointments to cabinet and parliament. At a deeper level, one may also examine the culture of the ruling party before and after the advent of democracy. These are critical areas of analysis if we are to understand the specific characteristics of the current governance crisis and the economic crisis that it has engendered.

The historical rupture marked by the advent of democracy critically altered the 'choice parameters' of the accumulation regime which had developed under colonialism, segregation under dominion status, and apartheid (each with their own specifically determined accumulation regime) but left the fundamentals in place. The face of capital changed under each regime, from imperial capital, to the rise of Afrikaner capital in between the wars, and the interpenetration of Afrikaner and English capital during apartheid. Until the advent of apartheid, the fact that the ownership of the core of the accumulation regimes was consistently white was not remarkable within the context of the empire. With the end of the age of overt imperialism after the war and the advent of apartheid, the racial nature of capitalism in South Africa, reinforced by various legislations, became unique.

The end of apartheid came at the time of the virtually absolute global hegemony of neoliberal economics which enabled the centre right section of the African National Congress (a self-declared ideological umbrella party) to gain command over the design of the macroeconomic planning framework. The inordinately market friendly orientation of the ANC saw a legitimisation, and hence entrenchment, of the ownership and control patterns over the means of production which had evolved since the discovery of gold. This entrenchment of the 'old regime' was manifest in the uncontrolled massive outflow of financial capital and in the marginalisation of organised labour and the South African Communist Party. The adherence to a neoliberal agenda, despite the failure of GEAR to address systemic unemployment and to restructure the economy significantly away from the structures formed under apartheid, was testimony to the implicit acceptance of the race (liberal) side of the race/class debate which had dominated the discourse on apartheid (Scerri, 2009). Further evidence can be found in the formulation of Black Economic Empowerment policies which focussed on altering the 'complexion' of capital ownership in South Africa, under an implicit assumption that this would somehow alter the exploitative nature of capital. The acknowledged failure to reform the education system ensured that the class relations inherited from apartheid would endure, except that they became to some degree de-racialised.

The accumulation regime which emerged with the change of power away from the Mbeki faction at the Polokwane conference in 2007 can best be described in terms of Fanon's (1962) account of post-colonial national bourgeoisie and Bayart's (2000) concept of 'extraversion'. Since the end of the Mbeki era, while the concentration of ownership remained relatively unchanged, the control over the means of production rapidly shifted with the infiltration and occupation of the key centres of the state apparatus which have led to the current crisis marked by a very public, and often illegal, looting of public resources. This unfolded crisis represents a betrayal of the progressive front, mostly championed by organised labour and the SACP, which brought about the end of the Mbeki era with the aim of, at the very least, bringing an end to the neoliberal policy agenda.

The end of the 'Zuma era' marks another impending rupture in the evolution of the South African political economy. The main concern at the cusp of this rupture is that the same mistaken focus on agency instead of structure which marked the 2007 regime change will again determine the shape and evolutionary path of the South African political economy. The extreme nature of the transgressions of this era have perversely rehabilitated the mainstays of the neoliberal agenda which were essentially the genesis of the current crisis. It is indicative that the current macroeconomic planning framework, as exemplified by the National Development Plan, is still set within a neoliberal framework. The vision of a future South African economy, following the fulfilment of the employment targets of the plan can best be captured by a look at the areas where the projected growth in employment is to occur.

Table 1: Planned sectoral contribution to NDP 2030 employment target

Sector	Percentage contribution to employment target
Agriculture	1.7
Mining	1.3
Manufacturing	6.9
Leader and high paid services (e.g. finance, transport)	20.5
Follower services (e.g. retail, personal services)	28.8
Construction and utilities	5.5
Informal sector and domestic work	19.8
Public sector, private social services and parastatals	15.5
Expanded Public Works Programme	0.1

Source: Scerri and Maharajh (2016)

As may be seen from Table 1, most of the growth in employment is to come from the services sector while the informal sector and domestic work are planned to contribute just under 20% of the projected increase. This composition of the targeted increase in employment by 2030 simply entrenches the current structure of the South African economy without any significant transformation. The projected increase in employment in the informal and domestic work sector which is marked by low wages, precariousness of employment and generally poor working conditions are simply projections of the current structure of the South African economy under a best-case scenario of full employment.

It is therefore critical at this particular historical juncture in the development of the South African economy that the fundamental conceptual basis of national economic policy and strategy are reviewed. The global hegemony of neoliberal thinking is not nearly as absolute as it was in 1994 and there is therefore considerably more political space for alternative approaches. This is enhanced by the fact that the two decades distance from the immediate aftermath of apartheid has, to a significant, extent diluted the uniqueness of the South African political economy and 'normalised' the decision-making space.

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