where $\mathcal{L}[A^\mu, \psi, \overline{\psi}]$ is given by (5), $\mathcal{L}[\chi, U, U^\dagger]$ by (10), and $\mathcal{L}_L[A^\mu, \psi, \overline{\psi}, \chi]$ by (14), so that the effective, L-dependent Lagrangian density $\mathcal{L}_L \equiv \mathcal{L}[A^\mu, \psi, \overline{\psi}] + \mathcal{L}[\chi, U, U^\dagger] + \mathcal{L}_L[A^\mu, \psi, \overline{\psi}, \chi]$ in the generating functional (19) can be written as

$$
\begin{aligned}
\mathcal{L}_L \;&=\; -\frac{\kappa_L(\chi)}{4}\, F_{\mu\nu,a} F_a^{\mu\nu} \;+\; \overline{\psi}_i \left[\; \Big(i\gamma_\mu \partial^\mu - \mu_L(\chi) \Big)\, \delta_{ij} - g_s \gamma_\mu A_a^\mu T_a^{ij} \right] \psi_j \;+\; \kappa_L(\chi)\, \xi_a(A) \\
&\quad + \frac{1}{2}\, (\partial_\mu \chi)(\partial^\mu \chi) \;+\; \frac{1}{4}\, Tr \left[(\partial_\mu U)(\partial^\mu U^\dagger) \right] \;-\; V(\chi, U)\;, \qquad (20)
\end{aligned}
$$

where $V(\chi, U)$ is the potential given by (11), and we have gone over to the limit of zero current quark masses. It is important to realize that the scale dependence of (19) and (20) arises solely through the L-dependent functions $\kappa_L(\chi)$ and $\mu_L(\chi)$, given by eqs. (16) and (17). The scale L is *not* to be misunderstood as an external parameter. Instead it is intrinsic variable of the formulation. As we will see later, the variation of L is governed by the dynamics of the fields itself, and it in turn determines the time evolution of the interacting fields. Therefore, when studying the dynamical evolution of some system under consideration, one must necessarily require this self-consistency for a meaningful solution.

At this point let us state clearly the following important remarks:

a) The effective field theory defined by (19) and (20) represents a description of the duality of partonic and hadronic degrees of freedom: high-momentum, short-distance quark-gluon fluctuations (the perturbative excitations) are embedded in a collective field χ (the non-perturbative vacuum), in which by definition the low-momentum, long-range fluctuations are absorbed. Confinement is thus associated with a dual stucture of the QCD vacuum. The formulation is gauge- and Lorentz-invariant, and is consistent with scale and chiral symmetry properties of QCD. It interpolates between the high-momentum (short-distance) QCD phase with unconfined gluon and quark degrees of freedom and chiral symmetry ($\langle\chi\rangle = 0, \langle U\rangle = 0, \kappa_L = 1, \mu_L = 0$), to a low-energy (long-range) QCD phase with confinement and broken chiral symmetry ($\langle\chi\rangle = \chi_0, \langle U\rangle = U_0, \kappa_L = 0, \mu_L = \infty$), where χ_0 and U_0 are the long-range order parameters of the vacuum, directly related to the gluon condensate and the quark condensate, respectively (Sec. 2.5 below).

b) By introducing additional fields χ and U to describe the long-range behaviour of the gluon and quark fields, we must obviously be careful not to double-count the degrees of freedom, since the full theory of QCD is contained in $\mathcal{L}[A^\mu, \psi, \overline{\psi}]$, eq. (5), already. However, by our construction the sum $\mathcal{L}_L$ in (20) gives a consistent formulation that strictly avoids